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A
DICTIONARY
OF
PRACTICAL MEDICINE.

VOL. I.

LONDON
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NEW-STREET SQUARE

A

DICTIONARY
OF
PRACTICAL MEDICINE.

COMPRISING
GENERAL PATHOLOGY,
THE NATURE AND TREATMENT OF DISEASES,
MORBID STRUCTURES,
AND
THE DISORDERS ESPECIALLY INCIDENTAL TO CLIMATES, TO THE SEX,
AND TO THE DIFFERENT EPOCHS OF LIFE.
WITH NUMEROUS
PRESCRIPTIONS FOR THE MEDICINES RECOMMENDED;
A CLASSIFICATION OF DISEASES ACCORDING TO PATHOLOGICAL PRINCIPLES;
A COPIOUS BIBLIOGRAPHY, WITH REFERENCES;
AND
AN APPENDIX OF APPROVED FORMULÆ.

THE WHOLE FORMING A LIBRARY OF PATHOLOGY AND PRACTICAL MEDICINE AND
A DIGEST OF MEDICAL LITERATURE.

BY JAMES COPLAND, M.D., F.R.S.
FELLOW OF THE ROYAL COLLEGE OF PHYSICIANS;
HONORARY MEMBER OF THE ROYAL ACADEMY OF SCIENCES OF SWEDEN;
OF THE AMERICAN PHILOSOPHICAL SOCIETY;
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AND SENIOR PHYSICIAN TO THE SOUTH LONDON DISPENSARY;
CONSULTING, AND LATELY SENIOR, PHYSICIAN TO THE ROYAL INFIRMARY
FOR DISEASES OF CHILDREN; ETC.

"Gladly wolde he lerne and gladly teche."—CHAUCER.

IN THREE VOLUMES.
VOL. I.

LONDON
LONGMAN, BROWN, GREEN, LONGMANS, & ROBERTS.
1858

151 n. 303.

"'Ο Βίος βραχὺς, ἡ δὲ τέχνη μακρὴ, ὁ δὲ καιρὸς ὀξὺς, ἡ δὲ πεῖρα σφαλερὴ, ἡ δὲ κρίσις χαλεπή. Δεῖ δὲ οὐ μόνον ἑωυτὸν παρέχειν τὰ δέοντα ποιέοντα, ἀλλὰ καὶ τὸν νοσέοντα καὶ τοὺς παρεόντας, καὶ τὰ ἔξωθεν."
HIPPOCRATES.

"Man is born unto trouble as the sparks fly upwards."
JOB.

"Honour a physician with the honour due unto him, for the uses which ye may have of him: for the Lord hath created him.

"For of the most High cometh healing, and he shall receive honour of the king.

"The skill of the physician shall lift up his head: and in the sight of great men he shall be in admiration.

"The Lord hath created medicines out of the earth; and he that is wise will not abhor them.

"Then give place to the physician, for the Lord hath created him: let him not go from thee, for thou hast need of him.

"There is a time when in their hands there is good success."
ECCLESIASTICUS, chap. xxxviii. v. 1 *et seq.*

"Quæ regio in terris nostri non plena laboris?"
VIRGIL.

"Multorum disce exemplo, quæ facta sequaris, quæ fugias."
CATO.

"—— Mentem sanari, corpus ut ægrum,
Cernimus, et flecti medicina posse videmus."
LUCRETIUS.

"To ignorants obdurde, quhair wilfull errour lyis,
Nor zit to curious folks, quhilks carping dois deject thee,
Nor zit to learned men, quha thinks thame onelie wyis,
But to the docile bairns of knowledge I direct thee."
JAMES I. *of Scotland.*

"Man is all symmetrie,
Full of proportion, one limbe to another,
And all to all the world besides;
Each part calls the furthest brother,
For head with foot hath private amitie;
And both with moons and tides."
GEORGE HERBERT.

BODLEIANA BIBL.

TO

WILLIAM FOTHERGILL COOKE, ESQ.

OAKLANDS, HANTS

TO

PETER DICKSON, ESQ.

UPPER BROOK STREET

TO

HENRY JOHNSON, ESQ.

CRUTCHED FRIARS

TO

DANIEL LOUTTIT, ESQ.

PULTENEY TOWN, CAITHNESS

TO

PATRICK PANTON, ESQ.

EDENBANK, ROXBURGHSHIRE

AND TO

THOMAS GODFREY SAMBROOKE, ESQ.

EATON PLACE, BELGRAVIA

THE AUTHOR DEDICATES THIS WORK

WITH

AFFECTION AND GRATITUDE

FOR THEIR

LONG AND INTIMATE FRIENDSHIP.

Old Burlington Street.
July 1858.

PREFACE.

I. The Author deeply regrets the long period he has required to complete his undertaking: but circumstances, which he could neither prevent nor control, obliged him to bring out the early Parts of it sooner than he desired, and delayed the subsequent Parts, which he was anxious to execute in a manner commensurate with the character and success of those which were published.

A work requiring for its satisfactory performance an acquaintance with, and a frequent recourse to the best authorities, and a constant regard to the results of the Author's observation and matured experience—to his written notes, as well as to his repeated recollections—could not be completed in a few years. The frequent interruptions arising out of public and private medical practice; the fatigue of body and mind which this practice involved; the calls required from him, the visits made, and the letters written to him, by those in his profession who claimed his attentions; the anxieties resulting from the more intimate relations of life; the disappointments and losses which often fall the most severely where they are most intensely felt—all have combined to delay the completion of an undertaking commenced with enthusiasm, and, notwithstanding numerous discouraging and retarding circumstances, prosecuted with perseverance.

During the many years the Author has devoted to this work, he has employed the time which his more active professional duties during the day allowed him, in making notes, in referring to authorities, and in comparing the descriptions of the individual cases which had come under his care—of their histories, progress, course, complications, and treatment; whilst he has employed some of the hours usually given to repose, in digesting the results of his observations and studies into the following performance. Accustomed from early age to much endurance and application, endowed with a strong and a sound constitution, and enjoying through life uninterruptedly good health, for all which he cannot be sufficiently grateful to an almighty and gracious Providence, he has been enabled to pursue his avocations, notwithstanding the interruptions alluded to, with much less loss of time in the restoration of the powers of nature in sleep than is generally required.

Thus endeavouring to economise and to regulate his time between the active duties of practice, and the not less important duties of teaching, orally and by his writings, the Author believes that he has succeeded in fulfilling the engagements he undertook in the Prospectus, which he offered to the Profession when he entered upon his undertaking.*

II. Occasion has been taken, in the course of the work, to notice topics belonging to PHYSIOLOGICAL PATHOLOGY, in as far as they may be considered introductory to those which more strictly appertain to *General Pathology*. Reference may be made to the articles *Absorption*, *Age*, *Asphyxy*, *Excretion* and *Excretions*, *Irritability* and *Irritation*, *Pulse*, *Shock*, *Sleep*, *Sympathy*, *Tremor*, *Vertigo*, and some others, which may be classed under the former head, although they also are intimately connected with the latter, and are, with it, more or less closely related to several practical matters — a relation which has never been overlooked by the author. Viewing Physiological Pathology as a department only of General Pathology, its importance should not be thereby in any way lessened. The functional connections of morbid states, whether vital or structural, whether affecting the fluids or the solids, are of the utmost importance to the scientific and rational physician; and are never overlooked by him in his examinations of disease, however slight such disease may seem. A due recognition of these states, and of their relations to the several manifestations of life throughout the economy, is the true basis of all our practical indications of cure, and of the rational performance of all our professional duties.

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* "PROSPECTUS.—This work contains, in an abstract and condensed, yet comprehensive form, the opinions and practice of the most experienced writers, British and Foreign, so digested and wrought up with the results of the Author's Practice, that the Student and Young Practitioner will not be bewildered in the diversity of the opinions and facts adduced for their instruction, but be guided in the difficult path on which they have entered, and enabled, with a due exercise of their powers of observation and discrimination, to arrive at just conclusions and successful practical results. To the experienced Practitioner, also, the work will present a diversified range of opinions, methods of cure, and authorities, which his matured judgment will enable him to apply in an appropriate manner to particular cases. It also comprises the complications and modified states of Disease, which are even more frequently met with in practice, than those specific forms too often described by Nosologists as constant and unvarying types, to which morbid actions, occurring under a great variety of circumstances, can never closely adhere. When discussing the methods of cure, the Author has attended to the various stages, states, and associations of disease, to the regimen of the patient, and to the management of convalescence. He has given prescriptions for the Medicines recommended, in the most efficient states of combination. He has also added, in an Appendix, and arranged in alphabetical order, upwards of a thousand Formulæ, selected from those most approved contained in the Pharmacopœias of various hospitals and foreign countries, and the writings of eminent practical Physicians, and from the notes of his own practice. The work, moreover, contains a full exposition of the general principles of Pathology; a minute description of the numerous organic lesions of the human body; and a detailed account of those states of disorder incidental to the sex, the different periods of life, and to particular climates, with the peculiarities resulting from temperament and habit of body. It is prefaced by a classification of Diseases according to pathological principles, and in natural order, commencing with the simplest and most limited states of functional disorder, advancing through the more extended and complicated diseases to those affecting the whole frame, and concluding with such as consist chiefly of morbid structure — the classification thus being a key to the systematic study of practical medicine as well as an arranged contents of the work. In order to facilitate reference, as well as to avoid repetition, each article is methodically divided and headed, and the paragraphs numbered; and to each a copious Bibliography, with References, is added.

"The Author having, since 1814, been in the habit of recording references to such medical works, memoirs, and subjects as he has found upon perusal deserving of notice, presents the accumulated results to the reader. He has excluded from his Bibliography all inferior productions, and nearly all inaugural dissertations; he has selected those works with whose character he is acquainted, and whose authors are distinguished; and he has brought down his record to the present day. He has likewise given copious references to such original papers and memoirs in the Transactions of societies, and in medical journals, as merit notice, believing them to constitute a most valuable part of medical literature and science.

"In conclusion, the work contains the results of many years of laborious study and research, and upwards of thirty years' extensive and diversified experience, forming of itself a Library of Practical Medicine, and copious Digest of Medical Literature."

III. *The doctrines* of Disease are fully developed under several heads, more especially in the Articles DISEASE and BLOOD. In discussing fully and circumstantially the CAUSES OF DISEASE, or ÆTIOLOGY; and, in specially considering *Absorption*, *Arts and Employments*, *Climate* and its *Changes*, *Cold*, *Endemic Causes*, *Epidemic Influences* and *Constitutions*, *Infections*, *Contagious* and *Poisonous Agents*, as topics intimately connected with Ætiology, the Author has endeavoured to show their operation on the economy, and chiefly and more immediately, on the vital force, as manifested by the organic nervous system; and, through this medium principally, and through the blood also, and consecutively on the functions, and on the organs of the frame. Viewing the primary operation of the causes of disease as now stated, he has described the procession of morbid phenomena, from the grand sources of disturbance pointed out under the designation of *Ætiology*, or the causation of disease, and from primary or early morbid vital states, described under the head of PATHOGENY, until alterations of both fluids and structures are reached. The intimate connection of these states with their causes — predisposing, exciting, and concurring, or determining — induced the Author to comprise these important departments of GENERAL PATHOLOGY under one head, namely DISEASE; and to illustrate more fully his doctrines in the Articles on changes of the *Blood*, and on those of *Gout*, *Excretion*, *Continued and Exanthematous Fevers*, *Pestilences*, *Rheumatism*, and *Morbid Sympathies*, or *Associations of Disease*. He further exhibited, under the first of these heads, a sketch of those alterations of secretion, excretion, nutrition, and of structure, which supervene upon a longer or shorter continuance of the *Pathogenic States* previously described. This general view of the lesions of the circulating fluids of the secretions and of the tissues, and also of the several metamorphoses, transitions, associations, adventitious productions, and new formations, as consequences of antecedent morbid conditions, thus became an introduction to descriptions of the minute, as well as of the more gross, and manifest alterations of structure. These descriptions are as fully given under the heads of the several organs, systems, and tissues of the body, as to comprise all the organic lesions usually described in recent works on Morbid Anatomy, with the addition of some others, of no small importance, which had not been previously noticed. The Author believes that he has thus furnished a complete view of the morbid changes observed in the more complex, as well as in the simpler tissues of the body, as they are disclosed to the unaided senses, and, as far as may be inferred, from discordant microscopic researches and descriptions.

IV. A knowledge and a due estimate of *symptoms*, of their groupings, and of their relations, are of the greatest importance to the physician, as furnishing his mind, not merely with information requisite to the recognition of the seat and nature of the maladies which he is called upon to remove, but also with the relations subsisting between these maladies and the vital conditions, and the individual functions of the frame. This department of General Pathology is treated as fully as the scope and character of the work could allow. However much certain signs and symptoms of disease may be insisted upon by some medical writers, or new methods of investigation may be extolled by those who have introduced them, or made them the means of professional parade and notoriety, much more knowledge of the distinctions, the characters, and the states of disease will be acquired by quiet, patient, and close observation, and by the experience gained thereby, than by modes of examination, whereby a greater desire is evinced to impress the mind of the patient, than to ascertain the nature of the malady, and the most appropriate means of cure.

In the study of the signs and symptoms of disease, insufficient attention, or scarcely any attention, has been directed in medical writings to those symptoms which may be produced by large doses, or a too protracted use of powerful medicinal agents. Nor have the modifications, the mutations, and the suppression of the usual signs and symptoms of disease by these agents, when thus employed, received greater attention. The Author has noticed these topics in various parts of his work, and especially when describing the operation of those medicines which become *poisonous* when thus improperly prescribed, and in the article on *General Therapeutics.*

To the due consideration of *Symptomatology*, the discussion of *Sympathy* and of *Sympathetic Phenomena*, especially as *associating* and *complicating disorder*, appears to be a proper introduction; it is accordingly entered upon fully and comprehensively. In connection with a due consideration of sympathy, *irritability* and *irritation* can hardly be overlooked; for irritation, wherever it may be seated, will give rise, according to the grade or state of irritability and susceptibility by which the individual frame may be endowed, to numerous symptoms, which are often traced with great difficulty to their primary seat. The Author has, therefore, attempted to consider the relations of irritability and the consequences of irritation, as most intimately connected with, and often the source of, sympathetic phenomena.

V. In the article on *Symptomatology*, this important department of General Pathology is viewed more comprehensively, than in other circumstances it may have been viewed. For the Author was obliged, by the scope and limits of his work, and with the object of preventing repetition, to consider, in connection with it, the subordinate topics of *Diagnosis* and *Prognosis.* Indeed, inasmuch as these topics are intimately related to General Pathology, they could not be disconnected from *Semeiology.* Besides this, diagnosis and prognosis cannot be viewed with propriety, or with precision, separately from the symptoms indicating special morbid conditions — from the vital, the humoral, and the structural signs and symptoms of disease — to which they are intimately and practically related.

In the usual descriptions of diagnostic symptoms, or of the differences existing between diseases affecting different parts, or manifesting different natures, conditions, or characters, the most prevailing evil, and one which most impresses the mind of the physician as the field of his observation extends, is, that differential signs and symptoms are described by writers as constantly existing, and as presenting lines of demarcation always, or at least very generally, observed; whereas in very numerous instances they are often either faintly seen, or altogether absent, or so very imperfectly manifested as to suggest the gradual or insensible passage of one disorder or morbid condition into another; thereby proving the necessity of studying the remoter relations, and the more intimate connections of disease, as well as their differences in seat, character, nature, and form. Also, when enumerating symptoms, references to those which are indicative of danger, or even of a fatal issue, cannot be overlooked, especially as they constitute the division of *General Prognosis*, comprised by the more comprehensive department of Symptomatology; *Special Prognosis* — or the prognosis of individual diseases — being discussed as a part of the pathology of these diseases, and in due connection with them.

A full consideration of the states and manifestations of morbid actions cannot be limited to the discussion of Symptomatology, and the sympathetic relations of disease. These subjects are merely the indications or outlines of general principles, which require to be filled up and illustrated by the more precise descriptions of the forms, courses, and complications of diseases, as they are observed in practice, in different seasons and climates, in different epidemics, and in different races. The diagnosis and the alliance of morbid conditions, although furnishing opposite indications, also require to be duly estimated, in our endeavours to obtain precise and specific information as to the natures and tendencies of diseases. It is not only the features of disease, but also the expressions of these features, which require to be studied in the investigation of the seats and vital relations of morbid action, and of the extent to which the blood and the tissues may have become contaminated and altered: and in our attempts to form a prognosis of disease, not only should these features and their expressions be duly studied, but also the extent to which they are affected, and the character of the change produced, by the means of cure which have been employed. During the course and treatment of disease, the very important diagnosis between the changes which may be imputed to the natural procession of morbid phenomena, and those which result from, and are the actual effects of, the medicinal agents which have been taken, is too frequently either neglected, or altogether unknown; and the ignorance, more than the neglect, of this diagnosis has been the cause of more serious mischief than can well be credited, unless by those whose enlightened experience and habits of close and unbiassed observation enable them to form an opinion.

To the diagnosis of the effects or symptoms produced by the usual causes of diseases, and by the action of medicines when given in excess, may be added the diagnosis of the operation, or, in other words, a due recognition of the modes of action of causes in developing morbid conditions. Thus, owing to numerous causes, more especially to original and acquired diathesis, to habits of life, and to modes of living, to indulgence in animal food beyond the wants of the economy, to the abuse of fermented and distilled fluids, to the many causes of debility and exhaustion, the organic nervous force is lowered, digestion and assimilation are impaired, secretion and excretion are diminished, nitrogenous and other excrementitious matters, the extreme products of animalisation, accumulate in and contaminate the blood, occasion numerous diseases, especially gout, rheumatism, cutaneous eruptions, visceral inflammations, &c., and require for their removal and for their counteraction or prevention, an early recognition and diagnosis of them; and, as shown by the Author in the early Parts of his work (published 1832–7), a recourse to means which may increase the secretions and excretions, may depurate the blood, and promote the organic nervous force in all its functional manifestations. In the descriptions and discussions of the more important topics, comprised under Physiological Pathology, Pathological Ætiology, Alterations of Structure, Symptomatology, &c., a strict regard has been directed, as in the instances just mentioned, to these their practical relations, and to the intentions and indications of cure, which they may suggest, or which may be suggested as regards them.

VI. The Principles of General Pathology — *the due consideration of morbid conditions, in their several relations, — the causes of these conditions, their natures and characters, the signs and symptoms by which they are indicated, and by which their precise seats and issues are inferred* — constitute the legitimate, and, indeed, the only true *Introduction* to the practice of medicine — to Therapeutics, in the general and special acceptation of the word. The importance of a due study of the principles of General Pathology has been acknowledged by all the educated members of the profession in modern times, and duly recognised in the very appropriate designation, "*Institutes of Medicine*," which has been bestowed, by many able writers, on this department of medical education.

With this impression, strongly and permanently made on the mind of the Author, *the Principles of Pathology* have been fully discussed in this work. They are described succinctly, and in connection, under the head Disease, especially as respects the causation, the primary states, the consecutive and structural lesions, and the terminations of disease; and they have been further considered in the articles on the *Sympathetic Relations of Morbid States*, on *Symptomatology*, and in various other articles referred to in the arranged contents.

The intimate connection of these states with their causes, induced the Author to comprise *Ætiology* and primary and consecutive *Morbid Conditions* in one article, and to include further a general view of alterations of structure consequent upon morbid action and nutrition — upon the pathogenic states previously described. This view of morbid conditions of vital manifestation, of the circulating fluids, of the secretions, and of the several metamorphoses, new formations, &c., thus became an introduction to the more minute description of the intimate, as well as of the more gross and manifest *Alterations of Structure*. These alterations are so fully described under the individual heads furnished by the several systems, organs, and tissues of the body, as to comprise all those contained in recent works on morbid anatomy, with the addition of several of no small importance, which had not previously been described, and of others, the nature of which had not been correctly estimated. The full exposition of structural lesions given under their respective heads may be readily inferred from the arranged contents; and requires, therefore, no further notice at this place. But it may be remarked, that pathological principles must necessarily be imperfect, or at least deficient, if the changes which the vital manifestation and the circulating and secreted fluids undergo, as far as they may be recognised, be not duly estimated, and viewed in connection with existing material or structural alterations. The dynamic states of morbid action have, therefore, received due attention, but not to the exclusion of other morbid conditions, which impart to diseases those specific, and often dangerous perversions, which constitute their natures and true essences, and with which dynamic states are also associated. The specific perversions or infections, for instance, characterising small-pox, scarlet-fever, &c., are associated either with an exalted, or with an impaired state of vital force and of vascular action at different periods of these maladies. These perversions may be manifested by both the organic nervous system and the vascular systems and fluids, in various grades in different cases, and may be so great as to occasion danger or death, even independently of the dynamic states of action. In these cases, it is not only the dynamic, but also the specifically perverted, conditions — the latter more particularly — against which the physician must direct his agents, internal, external, and emotional, appropriately to these conditions, endeavouring, at the same time to counteract, to neutralise, and to remove those more material and manifest alterations which, while they are the results of these perversions, become the most influential agents of their increasing and exterminating effects.

VII. GENERAL THERAPEUTICS may be viewed as the capital of the column which the medical teacher has erected in honour of that science, to the study of which he has devoted his life. It is attempted in this work to point out the several causes which combine to retard, if not to arrest, the progress of therapeutical knowledge. The *Principles of Therapeutics* are next stated, and divided into the Fundamental, into the General, and into the Special; these being severally illustrated and enforced by practical precepts and indications, having due reference to the states of vital force, of the circulating and secreted fluids, and of altered structures. The Author has endeavoured to develope, under this head, the principles and intentions which should guide the student and the practitioner of medicine in the application of the knowledge they have acquired of other departments of science to the grand objects of curing and of alleviating diseases. This most important subject is concluded by a classification of hygeienic and therapeutical agents, according to their modes of action and to their effects—according to their physiological operation and to their curative influences.

VIII. From the commencement of his lecturing on the Principles of Pathology and the Practice of Medicine, the Author adopted a *Classification of diseases* based on the Vital Force, as manifested by the several systems and organs of the body. He viewed disease, especially in its early states and stages, to be the result of causes affecting the conditions of this force in one or other of these systems and organs; these conditions either passing into the healthy state, under the influence of this force, or extending to and deranging other allied systems and organs, thereby perpetuating or complicating disorder, until important changes supervene in the fluids, or in the structures, or in both fluids and structures. Conformably with this doctrine, and after a due consideration, 1st, of the causation of morbid conditions; 2d, of the nature and genesis of these conditions; 3d, of the changes they occasion; and 4th, of their mutations, metamorphoses, and terminations,—subjects fully discussed under the heads, DISEASE, BLOOD, CRISES, EXCRETION, IRRITATION, SYMPATHY, and SYMPATHETIC ASSOCIATIONS OF DISEASE, and forming a system of General Pathology, — the Author entered upon the study of the special forms of disease, commencing with those which are simple and primary,— with the earliest, the mildest, and the most insidious departures from the healthy condition. Having thus commenced, he proceeded to describe the more severe and complex disorders and diseases; next, those which most frequently produce alterations of structure; and lastly organic lesions, which, as either constituting the most advanced stages of disease, or terminating life, are demonstrable after death. An outline of this Classification was published in 1822, and was adopted in the Lectures of the Author, commenced in the Session of 1824 and 1825. The changes of structure thus produced by successive morbid conditions or actions, were for the first time illustrated in these Lectures by coloured drawings and engravings.

IX. In the largest and most important portion of the work, namely in that particularly devoted to the Description of Diseases—*in their special forms* —the several species, forms, conditions, and complications of disease are delineated; and the treatment appropriate to each of these is fully stated and commented upon. The manner in which special diseases may be modified and even changed in character, form, and issue, by the nature of their predisposing, exciting and concurring causes—by sex, race, constitution, modes of living, and by endemic and epidemic influences; and the necessity of taking these causes severally and collectively into consideration during the treatment of these diseases, are as fully noticed as the limits of the work could allow. Until the appearance of the early parts of this undertaking, special diseases had been described as they appear in their most usual and unvarying forms. Neither their vital nor their material modifications and alterations, nor their complications—their vital and structural alliances and associations — as they occur in medical practice, had received due attention. No attempts even had been made to develope this very important and strictly practical view of morbid actions, and to extend it to the pathology and treatment of these actions as they appear in the dark races of our species, until they were made in the present work: and however imperfect these attempts may be considered, it is hoped that a fuller exposition of these and other practical topics will follow from the examples hereby furnished to future inquirers.

In the descriptions of Special diseases—of the simple, the complicated, the inflammatory, the febrile, and the malignant, or pestilential, — the Author has endeavoured to exhibit the changes which successively take place in the vital manifestations, in the constitution of the circulating and secreted fluids, and in the organisation of the structures, during the progress of these diseases. A due estimate of these, made with the acumen, the perspicacity, and the science which can be directed to them by the physician, constitutes the essence of pathological knowledge; and an experienced— an unhesitating recourse to remedial indications and means, appropriately to existing pathological conditions, can alone ensure successful results, as far as success can possibly be achieved.

Under the heads Blood, Disease, Fevers, Dysentery, Infection, Pestilences, Puerperal Maladies, &c., the succession of changes — dynamic, specific, or perverted — are fully exhibited and illustrated, as they are manifested from the first impression of these causes—from the earliest sense of sinking at the epigastrium and general malaise, or from the depression of the organic, nervous, or vital force throughout the frame, until the secretions, the circulating fluids, the excretions, and the structures become contaminated and organically altered, and capable, as respects certain specific maladies, of communicating the same morbid actions to healthy but predisposed and susceptible persons, exposed to the emanations proceeding from them.

In our examinations of the sources and causes of several of the maladies which are often most prevalent, and which prove most destructive to the human race, their connection with epidemics, or epizooties, in the lower animals has been too generally overlooked. That diseases, originating and becoming prevalent and fatal in the lower animals, often extend to, or infect, the human species, and that they may be recognised in this species by appearances and symptoms as nearly allied as the different circumstances of man and the lower animals are capable of manifesting, have been satisfactorily demonstrated in respect of more than one of the exanthematous diseases. Established facts of this nature suggest further researches into the concurrent causes and the phenomena not only of these, but also of other infectious and contagious diseases, and more especially where such a connection may be presumed to exist; for if disease may thus originate on any occasion, it may on others, and thus the evil may be multiplied, or even perpetuated.

X. *The descriptions* of diseases are based chiefly on the Author's own observation. His experience had demonstrated to him, what others had either overlooked, or not ventured upon, that the very different conditions and manifestations of morbid action, and the diversified characters of local and specific diseases, caused by circumstances not always manifest or even recognisable, but exerting nevertheless a more or less powerful influence on the state, course, and issue of these diseases, required due consideration, in respect both of their pathological relations, and of their treatment; he, therefore, has endeavoured, not only to describe the more usual forms and courses of diseases, but also to notice and to distinguish these modifications and differences, to assign them to their specific or influential causes, and to point out the means of cure most appropriate to each.

The nature of the predisposing and exciting causes; original constitution, temperament, and diathesis; endemic and epidemic influences, climates, and states of season and weather; secret habits and vices; the emotions and passions; the deficiency, superabundance, and the nature of food; overcrowded places of resort; a foul and too frequently respired air; infection and contagion in their various modes of transmission; peculiarity of race and varieties of the species, and the prevailing epidemic constitution, are severally, and in their diversified combinations, considered by the Author, with reference to the forms, states, the course, and issue of diseases. These circumstances, modifying, diversifying, or altogether changing the characters and states of local, or even of specific maladies, he has extended his descriptions so as to comprise the *different forms* thus produced, whether simple or complicated, and he has considered them with reference to their modifying and appropriate causes, as fully as his limits would admit.

Having viewed diseases as they are influenced, modified, or altogether changed by the above causes, or by their various combinations acting on the organic, nervous, or vital force, and consecutively on the secretions, excretions, and circulating fluids, the Author has further described, or more slightly noticed these extensions, associations, or complications of morbid action, proceeding either from these agencies, from superadded influences, or from the consecutive changes just referred to, and as more fully set forth, in the articles on *Disease*, on *Fever*, on *Irritation*, and on the *Sympathetic Association of Disorder*, or Morbid Sympathies.

The causes of disease primarily impress and influence vital conditions, according as their natures and combinations are related to, or affect, the vital force manifested by individual systems or organs; and, according as they influence, not only one system or organ, but also two or more, either simultaneously or in succession, they often produce associated or complicated disease. In practice, simple or uncomplicated disease is thus less frequently observed than the complicated, even in its early stages, and still less frequently in its advanced course. In lectures, and in systematic writings, diseases have hitherto been generally described as presenting unvarying forms or types, and as systematically and precisely as the genera and species of the organised productions of nature. But diseases seldom present such unvarying types, seats, or conditions, or such specific differences, or such uncomplicated forms; for, commencing as disturbances of vital forces and manifestations, and proceeding, thus characterised, to more extended and more serious alterations, not merely of vital conditions, but also of organisation, they are, even when individually different, constantly changing, often approximating in character and form, not unfrequently lapsing the one into the other, even when apparently the most simple and specific, and still more frequently changing when they are complicated and severe. These diverse and varying states—these mutations, extensions, and associations—are the obvious results of existing conditions of vital power at the time of exposure to the causes of disease, of the nature and operation of these causes, of their action on the vital conditions and manifestations, and of the changes effected by these conditions on the depurating and secreting organs, on the circulating fluids, and ultimately on the organisation.

Conformably with these views, or rather pathological principles, the Author has, from the commencement of his attempts to teach, either orally or by his writings, followed his descriptions of the more simple states of disease, by some account of the more frequent COMPLICATIONS presented in practice by these diseases, viewing these latter, as well as the uncomplicated states, with reference to varied forms, to altered vital conditions, and to their final results. Whilst he has endeavoured not to overlook the descriptions of disease, whether simple or complicated, furnished by the best modern authorities, he has relied chiefly on his own observation, and has stated the results, derived from a long series of years, and from different sources, and fields of experience, more especially as they have been influenced by season, climate, epidemic constitutions and causes, and by the various circumstances, fully set forth under the articles on DISEASE, on ENDEMIC and EPIDEMIC INFLUENCES, on INFECTION, on FEVERS, PESTILENCES, on SYMPATHETIC ASSOCIATION OF DISORDERS, &c.

To describe disease with originality and accuracy, especially with reference to its various phases, modifications, differences, and mutations, arising out of the causes and circumstances alluded to, is attended by no slight difficulty: and this difficulty is greatly augmented by the desire of conveying accurate views in concise, appropriate, and forcible language, without unnecessary amplification or repetition. Our perceptions of diseased actions may be distinct and accurate, and our conceptions of their causes and tendencies may be lively, or even forcible in our own minds; but to convey these with equal accuracy and force to the minds of others—to place them before the mental vision of the reader, as we have seen and considered them—and to render them objects of that amount of interest which their importance and tendencies demand, cannot always be accomplished, so as to fully satisfy the mind of the describer, and the wants of those whom he endeavours to instruct. To fail in accomplishing an object of so great difficulty—a difficulty of which an idea can be formed only by making an attempt to overcome it—may not attach to it greater blame than may be imputed to all attempts which, from the nature of the object, preclude perfect success. But, although this has not been reached by the Author, yet he cannot divest himself of the hope that his efforts have not altogether failed, and that close observers and candid judges will allow that he has endeavoured to describe faithfully what he has carefully observed; and to elucidate, neither irrationally, nor unprofitably to the reader, the sources, the natures, and the issues, of the numerous maladies which his undertaking comprised.

XI. The pathology and treatment of FEVERS and PESTILENCES are fully entertained. The Author has endeavoured to adduce all that has appeared to him deserving of description and elucidation, and to remove much error of long existence as to their nature and treatment. He has fully considered their causes, both those which primarily influence the vital force and its several manifestations, and those which affect the constitution of the circulating fluids. Certain of these causes, especially specific infections, have been supposed to act primarily on the blood; but the long periods often existing between the impression made by the causes, and the manifestation of their effects, as well as the character, course, and issue of these effects, render it more probable that the morbid impression is directly and primarily made upon the organic nervous system, the vital force of which is changed conformably with the nature of this impression; the consecutive changes being a series of effects more or less slowly evolved, until, after various periods, these changes break out into more or less acute disorder implicating the whole organisation. If the phenomena of all infectious fevers—the typhoid, the exanthematous, the malignant, and the pestilential—be closely considered, it will be found that the infectious agent may instantly and sensibly impress the body so as to produce a feeling of sinking at the epigastrium, often followed by nausea, vomiting, or retching, by manifest disorder of the organs supplied with the organic or ganglial nervous system, and by changes of the secretions, the excretions, the circulating fluids, especially the blood, and ultimately of the vital cohesion and physical conditions of the several structures. That the morbid impression is primarily made upon that portion of the organisation especially devoted to secretion, assimilation, and the growth, nutrition, and development of the body, is shown by the permanence of certain of its effects,—by the circumstance of the constitution being rendered insusceptible of the impression of the same morbid agent for ever after, and by the rapid waste and emaciation of the tissues which are always most liable to experience those changes when the vital force exerted by the ganglial nervous system is impaired. If the infectious agent acted primarily, or even chiefly, on the blood, and as a leaven producing a specific change on this fluid, no reasons could be assigned for the future immunity from the morbid action of the same specific agent, inasmuch as the constant metamorphosis and waste of the blood, and the continued renewal of this fluid by the assimilation of the chyle and lymph, would render it susceptible of repeated infections after certain intervals. In those states of general disease depending upon the absorption or passage of contaminating agents into the blood — these agents thus acting primarily or directly upon the blood — no such immunity is observed, the contamination of this fluid and its consequences resulting again and again, provided that recovery takes place from the earlier attacks.

When discussing *fevers* — continued, exanthematous, malignant, pestilential, and puerperal,—the Author has endeavoured to connect these with their causes, to describe the changes, both functional and organic, which successively occur in the fluids, general systems, and structures. He has divided the fevers which assume a continued type into the forms and varieties which most frequently appear in temperate climates, and as he has observed them. But he has contended that no precise line of demarcation can be drawn between several of them, one form passing, in individual cases, into the other the most nearly allied to it, according to the exciting cause, to the concurrence of other causes and determining influences, and to the existing epidemic constitution; certain forms thus prevailing or predominating.

As regards the three great modern *Pestilences*, the Author has, from a firm conviction of the nature of their sources, and of the causes of their dissemination, entered fully into the discussion of these important subjects. He has endeavoured also to show, under the head *Prevention of Pestilence*, how they may be prevented, their effects counteracted, and their extension limited. Sufficient evidence that his endeavours have not been altogether without beneficial results, has been adduced by others, who have stated that he has contributed to the means which have been found most successful in their prevention and treatment.*

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* The Author may be excused for giving the following extract from a letter addressed to him by Dr. ARCHIBALD SMITH, who has had an experience of more than thirty years' residence in an intertropical country. The Author should state, that Dr. A. SMITH was quite unknown to him until he did him the honour and kindness of addressing to him the letter from which the following is quoted: —"I have often consulted with you, in the pages of your valuable practical works, and never have I had occasion to do so with more interest than recently in Peru, when the yellow fever for the first time broke out in that part of the world. Your treatise on this subject, in your 'Dictionary of Practical Medicine,' was really the only work which seemed to guide our practice in the any way hopeful or successful treatment of that dreadful malady. We were there Doctors of Germany, France, Italy, Spain, and England in co-operation with the native Practitioners; and it surely is no small thing to say, that more relief was procured to the sick from the application of your principles of practice in this disease than from the joint medical knowledge of all of us put together. I think you must be gratified by knowing that at least to one forlorn class of sick — the Indian race — your turpentine treatment was signally successful; and that to all the different races, whether brown or white, your general treatment to prevent the patient from ever sinking to the stage of black vomit, or irrecoverable prostration, was peculiarly fortunate above that of all other writers, English or Continental, as far as I know. Your work, in consequence, was by the whole Profession in Lima sought after eagerly, and your name mentioned with the respect due to the prophet—though not in his own country." Dr. A. SMITH has very kindly allowed the Author to publish the above extract from his very encouraging letter. Reference may also be made to a most interesting account of the Yellow or Hæmagastric Fever as it appeared in Peru in 1852, published by Dr. A. SMITH in the 82d vol. of the Edinburgh Medical and Surgical Journal.

It may not be necessary to refer to the views adopted by the Author in respect of particular maladies or classes of disease. These can be correctly observed only by perusing them under their respective heads; but he would direct attention to *Apoplexy*, *Dysentery*, *Erysipelas*, *Fevers*, *Scarlet Fever*, *Inflammations*, *Diseases of the Heart*, *those of the Lungs*, *Tubercular Consumption*, *Dropsies*, and *Puerperal and other Diseases of Females*, as furnishing illustrations of the various modifications, important differences, and not less important complications they present in practice, arising out of existing states of vital power, of the circulating and secreted fluids, &c., influenced and caused by numerous circumstances which have been fully recognised and illustrated.

XII. The diseases which are most *prevalent in warm climates*, *especially among the white races who visit or remain in these* climates, have received a due share of attention in this work; their nature and treatment are fully described, chiefly from the Author's own observations, and with references to the experience of the best writers on these diseases. He may direct the attention of the reader, with some satisfaction, to his description of the pathology and treatment of *Dysentery*, *of Intermittent*, *Remittent*, *and Malignant Fevers*, *of Hæmagastric Pestilence*, of *Diseases of the Liver*, *of the Spleen*, &c.; and he hopes—as indeed he has received much valued evidence—that his full exposition of these maladies has been found most advantageous to medical practitioners residing in, and proceeding to, intertropical countries and unhealthy climates.

Nor has the Author neglected the states and forms of these and other diseases, as they occur in the *dark races* and aborigines of these countries, and the treatment and different means of cure which they require, when they are afflicted with them.

XIII. Having been for twenty-five years Consulting Physician to a Lying-in Hospital, the Author had acquired considerable experience of the *Diseases of the Puerperal States*, and of the treatment most appropriate to the different circumstances in which they occur, and to the causes and influences which modify their course and determine their issues. To these, as well as to the other *disorders and dangerous maladies to which females* are liable, much attention is devoted by him in this work; and a full exposition of their pathology and treatment is given, both from his own observation of these diseases, and from the more recently published works of eminent writers, who are more especially engaged in this department of medical practice. In respect of these diseases, the Author has not been influenced by any of the prejudices, or one-sided views, which have engaged the minds of too many members of his profession. He has been guided only by a desire to ascertain the truth, and by a sense of duty to the numerous readers of this work; and having succeeded, as he believed, in his endeavours, he has imparted the results in his descriptions of the nature and treatment of the organic and other diseases of females, respecting which any differences of opinion had arisen amongst physicians.

XIV. Numerous and important *diseases, peculiar to infants and children*, and others not less important and prevalent in the early epochs of life, are not more distinguished by danger and fatality, than by the difficulty of ascertaining their existence and diagnosis, especially during the earlier stages of these diseases. Having been for many years Physician to the Royal Infirmary for Diseases of Children, and having acquired, in that Institution, and in private practice, much experience of these diseases, the exposition of the pathology and treatment of them in this work may be reasonably allowed to deserve some share of attention and reliance. The importance of studying the maladies to which children are liable cannot be overrated, in respect both of the obligation imposed on the conscientious physician to ascertain the nature and the most successful treatment of these maladies, and of the habits of close observation and investigation thereby acquired by him, especially during the early periods of his practice.

XV. In the course of the exposition of the treatment of diseases, numerous *prescriptions and formulæ* are given, showing the modes of combining and of exhibiting the medicines advised for the several states and stages of disease, for which they were found most beneficial. Most of these prescriptions had been employed in practice by the Author, as well as very many of those which are given as an APPENDIX to the work. Some of the formulæ contained in this Appendix had received the sanction of very eminent observers; and all of them are deserving the notice of physicians. The successful employment, however, of these medicines, as well as of all others, depends entirely on their adaptation to the existing states of individual cases — upon the acumen, the perspicacity, and the pathological knowledge of the physician. These prescriptions and formulæ may be expected to prove of no mean service to young and inexperienced medical practitioners, and even the oldest may derive some benefit by adopting them; whilst few will fail to receive useful suggestions by referring to them.

XVI. When treating of individual diseases, especially of those which are endemic and epidemic, of fevers, &c., the prevailing general constitution, or character and complexion of diseases, as insisted upon by *Sydenham*, has been noticed. The propriety of attending to this general constitution has been proved by the Author's experience. For many years, and up to the year 1828, or about that time, these and other maladies, especially those most prevalent, presented more or less of a sthenic diathesis, and agues and other malarious diseases were comparatively rare; whilst, since the above date, these maladies have been more or less asthenic, and whilst blood-letting and other lowering means were required during the preceding number of years, these means have been rarely beneficial during subsequent years. It is not improbable that this change in the character or constitution of disease has been owing to the mean annual fall of rain during these periods; a greater fall having occurred annually since, than before the above date, and consequently tellurial miasms have been more freely generated.

XVII. Some of the disorders described by the Author in separate articles, may be viewed as *symptomatic* of some primary or latent irritation, or as an exaggerated or prominent symptom of an obscure or totally unrecognised visceral lesion, and hence not deserving of the same amount of interest as should be attached to an idiopathic or primary malady. But it is not easy, or even possible, to determine, in every case, the primary or the consecutive nature of a complaint; and when the former cannot be ascertained at once, means should be used to mitigate the symptomatic disorder, which, by its severity, may mask the original lesion. Disorders also referred to the same seat may be either primary or symptomatic, and hence should be practically viewed and treated as either condition is inferred. Moreover, the complaint, although obviously symptomatic, may attach to itself the importance and the means of cure which a primary disease would suggest. Many also of the disorders usually denominated as symptomatic are, from their severity and pathological relations, complications rather than prominent symptoms; they are, on this account, and owing often to their severity, practically viewed by the Author with all the interest which is attached to idiopathic diseases.

XVIII. At the present day the practice has grown up (and prospered as a trade) of viewing diseases, both those which are chiefly internal, and those more external or local, and of exhibiting them to the public as being better understood from being specially professed. But man, although furnishing the most wise, the most complex, and the most wonderful of all machinery, is not an inanimate machine, but is endowed with vital force distributed to, and actuating numerous systems, organs, and parts, and evincing functions and offices duly connected with and influencing each other, so that the conditions of each are manifested by all, in various modes of action, of existence, and of change. Hence the state of one organ or part cannot be considered in practice, either correctly or safely, disconnectedly from the rest of the economy; and hence an interference with a single organ may, without due reference to the state of the whole body, endanger the life of the individual. Whoever attempts to cure an external sore, an eruption, or even certain internal or local affections, without considering the relations of these affections to visceral disorder, may either, by effecting what he professes, occasion a most severe or fatal malady; or he may fail in his attempts, or even aggravate the disease by an incompetence to estimate correctly the sympathetic and the symptomatic relations of the affected organ, and of the disease of which it is the seat. All parts of the frame are bound together by the vitality which endows them; and the meddling or ignorant interference with one part, without duly considering the existing conditions and relations of the others, and the contingencies which may arise from such interference, is more likely to extend or to perpetuate, than permanently to remove disease.

The medical or the surgical specialist may err, not only by suppressing a discharge, or by healing an eruption or a sore, which have become safety-valves to a morbid constitution, or have warded off a disease to which an internal organ is predisposed; but he may err still further by his ignorance of the operation of medicines which, when given in excessive doses or too long continued, may produce effects much more serious or even dangerous than the affection for which his vaunted treatment was employed; and, moreover, he may be, as he often is, most comfortably unconscious of the evil he has occasioned, by his being completely ignorant of the symptoms by which these bad effects are indicated, and of his having been the cause of the fatal issue which often ultimately supervenes. Have certain specialists of the present day any precise knowledge of the effects of several dangerous substances when prescribed in large doses or continued for too long a time? Are they sufficiently informed as to the operation of arsenical and other poisonous preparations, and of the changes they undergo in the body when thus employed? Can they recognise, and recognising, accurately describe the phenomena which result from these preparations when thus exhibited, and when combined with other deleterious, or at least most energetic substances? The Author believes that they cannot, not only because these phenomena are most varied, complicated, and even different, according to the peculiarities of individual cases, to the constitution of the patient, and to the medicinal and dietetic combinations in which these preparations have been given, but more especially because they have been persisted in with a manifest ignorance of the operation of these medicines, until the most serious results have been produced. Within six months from writing this the Author has been called, in consultation with other physicians and surgeons, to four cases for which arsenic had been given in large doses and for prolonged periods, and which had been continued until most dangerous, and in one case fatal, effects were produced. Has it never entered into the minds of these specialists who thus wield the most dangerous weapons of their profession, the poisonous class of medicines, that they accumulate in the system, and are eliminated from it slowly and imperfectly, that they combine with and remain in the tissues and organs long after they have been taken, that consequently they must have passed through absorbent vessels and glands and into the circulating fluids, and that they may possibly irritate and inflame, or organically change, the vessels and the glands through which they pass; and in a similar manner, or otherwise, seriously affect the heart and nervous masses, as well as the organs, by which they are eliminated from the economy?

XIX. The causes, the early approaches, the advanced forms, and the treatment of INSANITY and SUICIDE are described as circumstantially and fully as the powers of the Author have allowed. A general view of the manifestations of mind by the instrumentality of the brain, is exhibited as a suitable introduction to the study of this important department of medical science. This view is commenced with a notice of the lowest and the most general states of mind — of the instinctive feelings — observed in the animal creation, and is followed by an exposition of the highest, — of the intellectual, and reflective powers, and moral sentiments — as evinced by the most civilised of the human species.* To this arrangement of the mental emotions and powers, and to the full description of the causes of disorders of these powers, the Author is desirous of directing the attention of the reader.

The increasing prevalence of insanity, and of those alterations of structure with which insanity is either remotely allied, or more intimately connected and even complicated — alliances fully described under that head

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* "Far as creation's ample range extends
The scale of sensual, mental, powers ascends;
Mark how it mounts to man's imperial race
From the green myriads in the peopled grass." — POPE.

—is to be assigned to more than one cause: but there is no cause half so influential in occasioning this calamity, as that secret vice, which has been denounced in several parts of this work, from a knowledge of its great prevalence among young persons of both sexes, and of its most injurious influence on the healthy conditions of both mind and body. The infirmity of mind and the extreme credulity which it induces, before it completely prostrates the faculties, render those addicted to self-pollution, those of the male sex more especially, the weak and drivelling victims of a class of unqualified, unfeeling, and imposing pretenders, from whose misrepresentations the laws furnish no protection, and upon whom no restrictions are imposed. The great importance of guarding against this most vile and degrading vice has not been sufficiently recognised by medical writers, especially systematic writers; but, as it can be shown that a large proportion, if not the majority of cases, of chronic diseases and of the infirmities of mind and body in both sexes, arises from this vice, practised at a period when the structures of the body are advancing to or are assuming their full development, a due regard should be directed to means of preventing it, inasmuch as it has become a most prevailing, a most debasing, and a most destructive physical and moral evil.

XX. Poisons have been ably investigated by modern medico-legal writers, chiefly, however, as regards the lesions they produce and the methods of detecting them in the digestive canal and structures of the body. The chemical and the medico-legal investigations of poisoning are not entertained, because they do not come within the scope of this work. But poisons are individually considered as respects their acute, and their chronic or slow operations and effects, each poison producing, according to its nature, specific effects, and therefore requiring an appropriate treatment. The chapters on the nature, operation, and treatment of individual poisons are prefaced by an account of the modes in which poisons are used and the varied circumstances in which they are had recourse to. Without this information, the accidental or the felonious use of them may be mistaken for the course and issue of natural diseases or even of puerperal maladies. The exhibition of poisons also during disease, either singly or added to the medicines which the patient has been taking, has often not been sufficiently recognised or even suspected by the medical adviser; and hence there is reason to believe that many persons have been destroyed without the cause having been recognised, and the effects of acute as well as of chronic or slow poisoning have been mistaken for the course and issue of natural disease. In order that this view of poisoning should not be overlooked, that the symptoms may be more clearly determined, and that the treatment should be both suitable and successful, the Author has fully considered the modus operandi or the physiological action of individual poisons, and has arranged them according to the more prominent characters by which their operation is manifested. The treatment advised for each poison has been as fully described as the limits of this undertaking could admit, both as respects the employment of antidotes, and as regards the selection of means for the removal of the injurious effects they may have produced.

The serious effects, as well those of acute as of chronic poisoning, and their diagnosis from natural maladies, have been fully described, and the

Author is desirous of directing attention especially to what he has stated respecting the effects of Antimonials, of Arsenic and its preparations, of Digitalis, of Mercurial preparations, of Lead, of the various modes of using Tobacco, of the preparations of Opium and Morphia, of Food-poisons, and of the Poisons imbibed during the dissection of recently dead bodies and from putrid animal matters. He has, as respects these and other poisons, considered not only their more immediate effects, but also their more remote consequences; and has discussed fully the treatment most suitable to each, as regards both its acute and its chronic or slow operation. This has appeared the more necessary inasmuch as he has been frequently consulted by medical men respecting dangerous cases which have appeared to have been caused by the prolonged or excessive use of arsenical and other poisonous medicines.

XXI. In the course of the work, HYGEIENIC MEASURES are not overlooked, particularly in regard to those more important occasions which demand them, as well as to those less frequent and especial occurrences which due attention to them may require. A full exposition of the causes of disease and of their modes of operation on the human frame forms of itself an important part of a *Hygeienic* system, inasmuch as the avoidance of these causes is the chief object of all hygeienic measures. When discussing special diseases their causes have been fully considered, and under the head *Ætiology* (see art. DISEASE) these causes have been arranged and viewed in connection; whilst those which are most influential and noxious, and hence most important, have been separately noticed in due connection with the effects they produce and with the means of prevention. In the exposition of *Endemic* and *Epidemic Influences*, of the effects of *Arts and Employments*, of *Infection*, of *Climate*, due attention has been directed to the means of preventing and of counteracting most important agencies in the production of disease, and to other Hygeienic considerations connected with these subjects. In the article on *Protection from Pestilences* (vol. iii. pp. 232 *et seq.*) as well as on the Sources and Causes of Pestilences, the Author has given a full exposition, not only of those sources, but also of Fevers and of all malignant and dangerous diseases, and of the most successful means of preventing their appearance, their introduction, and dissemination. Not the least important of the measures here advised are those means of protection which enable the constitution to resist infection and injurious emanations: these measures have been described as consisting, 1st, "of Medicinal Prophylactics," * and 2nd, "of

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* The Author believes it to be a duty he owes himself to state the following:— A friend, with his family, being about to proceed to the Havannah, and thence to several parts of intertropical America, applied to him in 1820 for instructions to enable them to escape the endemic and epidemic diseases of these parts. He furnished this gentleman with such instructions as he believed to be most conducive to the attainment of this object. The chief of these were to avoid all sources of malaria and situations which attract it, and the night and morning air, in these situations and after falls of rain; and, if these could not be avoided, and when circumstances requiring precautions occurred, or when exposure was inevitable, to have recourse to a prescribed dose of medicine, consisting of about three grains each, of camphor and capsicum, with either a drachm of powdered cinchona, or an ounce of the decoction, one or two drachms of the compound tincture of cinchona. This dose was to be taken at night, and upon getting up in the morning, before exposure to the morning air. If circumstances prevented this prophylactic to be taken, a cup of strong coffee, night and morning, was substituted. This gentleman (Mr. BULLOCK, the then well known naturalist), on his return to Europe, published his travels in Mexico, &c., and with them the Author's instructions, which were stated by him to have proved so successful, that, notwithstanding much exposure, a due regard to them had preserved him and the members of his family from disease during their residence and travels

Dietetic, Regiminal and Moral Prophylactics." These topics, hitherto neglected by modern writers, have received adequate attention from the Author, not only in the present work, but also in other publications, the first of which appeared as early as 1821.

XXII. No attempt has been made in this work to discuss the *Statistics of Disease*, nor has the "*numerical method*" of exhibiting the symptoms, &c., of disease and of the effects of remedies been noticed. Of the former, an approximation only, and that loose and inaccurate, can be expected; for, unlike other subjects respecting which statistics are often of use, disease varies with age, sex, season, weather, climate, and the numerous domestic, social, and Hygeienic circumstances, by which the health of communities is influenced, and which are in constant states of mutation. The same causes and circumstances also affect the phenomena, symptoms, course, character, or nature and termination of all disorders and maladies; and, whilst remedies and plans of treatment prescribed appropriately to these effects are hence obviously required, these remedies must, in order to be successful, or even not detrimental, be so combined or modified as peculiarities of constitution, causes, and influences suggest, and, indeed, demand. When, therefore, we observe, as may have been recently observed, a laudation of the numerical method — a method deserving notice only from the few eminent names who have had recourse to it, — we must infer either that they have been ignorant of the varying or even different natures, characters, and symptoms of the same diseases under the varying causes, circumstances, &c., which influence or altogether change them, or they have altogether overlooked those differences. Besides, many of the symptoms of a disease, and those even by which the experienced physician will be chiefly guided in his practice, cannot be assigned or enumerated so correctly as to direct his indications of cure. Let *Pneumonia* be taken as an instance. The physician, in assigning the symptoms of this disease, numerically, requires to do so with strict reference to the sthenic, asthenic, and gouty forms, to the gradations and to the complications — Broncho-pneumonia, Pleuro-pneumonia, &c. — of the malady. Then, following out

in that country. Soon after the appearance of Mr. BULLOCK's work, the Author's instructions contained in it, were published separately, by a bookseller in the City. At the time when these instructions were written, the sulphate of quinine had not been discovered, or at least was not then introduced into this country.

When the Niger Expedition was about to leave England in 1839, two physicians, who accompanied the expedition, called on the Author with an introduction from his esteemed friend, H. C. KENDRICK, Esq., late of the War Office. After representing to them the extreme risk they were about to encounter, and the very probable results of the expedition — results which took place exactly as they were predicted from the Author's observation and experience of Western Africa, — and after listening to, and stating reasons against, their sanguine expectations, he wrote the following prescription for them to have recourse to when they came within the influence of the African malaria; stating to them that, as soon as this should take place, their sanguine anticipations would undergo a very marked change:—*Quinæ di-Sulphatis; Pulveris Capsici, Camphoræ*, āā, gr. iij. ad gr. v. Misce. This medicine, commencing with the smaller, and increasing it to the larger dose, was to be taken night and morning, in any manner or vehicle convenient and suitable; the larger dose when the exposure was the greatest, when also, as well as on other occasions, a cup of strong coffee was to be taken at night, and in the morning before exposure to the air. On the return of this ill-fated expedition to England these two gentlemen called upon the Author to thank him for their successful recourse to the prophylactic he had prescribed for them — how many besides these returned from that expedition need not be stated. Since these occurrences and since their publication on several occasions, and since the recommendation of the above prophylactics in the early Parts of this work, they have been often adopted with success in several quarters of the globe where remittents and agues are endemic.

his boasted method, he endeavours to give the numerical results obtained from bleeding, from tartarised antimony, from camphor, liquor ammoniæ acetatis, &c., and from leaving the case to nature; and the consequences are, that, having treated the disease according to the name he has given it, and not according to the features and nature resulting from its causes and modifying influences, he finds that those means which are most heroic, especially bleeding and antimony, are the least successful, inasmuch as they have been prescribed for many cases, and in various circumstances, for which they were inappropriate or injurious; and he observes that camphor and the acetate of ammonia are more successful than these, because, whilst they are suitable in certain forms of the malady, they do not produce the injurious effects of the first-mentioned means in these forms. Hence, we cannot be surprised if this method should furnish results which may be adduced as evidence of the injurious effects of all modes of treatment, and of no treatment at all being more successful than any one method prescribed, without discrimination, for all forms, and states, and stages of the disease. Such results, however, should be rationally expected; for the empirical or ignorant treatment of all cases of a disease by its name, and by the same remedy or plan, and without reference to its very different forms and states, must be injurious to as many at least as it benefits, and hence no treatment, or the vital resistance which nature furnishes to the extension of disease, will prove the most successful. A substance is remedial only by its appropriate employment—appropriate as to its dose, combinations, and continuance — appropriate as to the states and stages, and to the various causes, influences, &c., which modify and favour the course and terminations of disease.

XXIII. The Bibliography and References appended to each article require a very brief notice. These are, to some extent, historical, and are enumerated with some, but no constant, relation to the course of time and to the progress of knowledge. They might have been made much more copious than they are; but there are several works on Medical Bibliography to which the learned reader may refer if the literature of any one subject become an object of interest to him, and where the imperfections of this department of the Author's labours may be supplied. It must, however, be confessed, that the very circumstance of a very large proportion of the References to original papers, memoirs, and researches having been made in the manner he has stated in the *original Prospectus* of his work (see p. vi.), is an indication of omissions which it was out of his power to supply; and even if he had been enabled to perfect this department to the full extent of his wishes, the benefits thereby conferred might not have compensated the labour.

If it be objected that the opinions and writings of the older medical authors are undeserving of the notices which have been taken of them, it may be answered, that the practical knowledge of disease at the present day is not so far advanced above that of some ages past, as those believe who are acquainted with the former only. Practical medicine is essentially a science of observation and close comparison; and the ability of observing closely has not been limited to a single epoch; nor can it be appropriated exclusively by the observers of the present day, although doubtless the materials and the powers of correct observation have increased. Besides, the single observer should not suppose that the whole sphere of correct medical information can be embraced by himself, or that his own extent of acquirement should constitute a sufficient amount of knowledge.

It is unnecessary to allude further to particular departments of this work, or to subjects which have received especial attention and development. It is desired, and, indeed, most ardently desired, that every part of this difficult undertaking should be closely, but candidly, scrutinised; for, although the Author has been a student during his life, he is not too old to learn and to derive advantage from judicious criticism.

XXIV. The Author may be permitted to state the incentives to his undertaking, and the sources of the hopes he has entertained of being enabled to accomplish it. When he entered upon the study of these departments of science, which are the bases of practical medicine, he felt the want of a work which would supply students and practitioners of medicine with that amount of knowledge which the due and conscientious discharge of their duties required. He had had the advantages, at that time too seldom enjoyed by medical students, of having pursued, during four years at the University of Edinburgh, those studies which form the best introduction to the attainment of medical knowledge, and not only of having assiduously attended the lectures, but also of having possessed the acquaintance, and he may say, the friendship of men whose names will long live in the annals of literature, science, and philosophy, — of DUNBAR, RITCHIE, LESLIE, PLAYFAIR, STEWART, JAMIESON, HOPE, NIELL, and FLEMING, — names he now recalls with all the happiness connected with the best of his early reminiscences. After having devoted eight years to preliminary and professional education, he closely observed, during two years, the diseases which prevailed in France and Germany soon after the peace of 1815. He subsequently extended his field of observation and experience to the most unhealthy intertropical countries; and on his return to England, he was required, from the commencement of his practice, to exert his powers of observation and discrimination in the treatment of diseases of difficulty and danger, and in examining critically the merits of those medical writings which were produced in this country and on the continent of Europe.

Having been engaged in writing on scientific and medical subjects from 1819 until the present day, and in lecturing on Pathology and Practical Medicine from 1824 until 1842; having from the earliest of these dates enjoyed as extensive opportunities in public and private practice, as he could use with advantage to his patients and to the advancement of his own knowledge; and being fully impressed by the truths which extensive fields of observation and mature experience had disclosed, he has ventured to state his opinions with the confidence inspired by a firm belief of their accuracy. To hesitate in conveying instruction, and in employing remedial means, betrays insufficient knowledge, and has never been rewarded by more than accidental success; but a firm conviction and expression of the truth of what is stated or advised, will generally produce belief in the mind of the reader or hearer. Hesitation rejects, where it fails in suggesting, further investigation: confidence commands belief, even when further research is required, and obtains success as its reward.

By the plan of his work the Author attempts, at least, to fulfil the great functions of medical writing — to arrest the attention, to engage it with an unflagging interest, to infix what is important or undisputed in the memory, and to carry on the mind, by an enlightened induction, to a due recognition of pathological principles and of therapeutical intentions and precepts. He is unfeignedly conscious that his powers are inadequate to the full attainment of these ends, but he hopes that his attempt will not be without a share of success as respects both the advancement and diffusion of rational medical knowledge, and the health of the community. Having been engaged in discussing medical doctrines and practice from an early period of life, and having promulgated opinions, formed after close observation and due consideration, different from many received or confided in, the Author has lived to see these opinions adopted either very generally, or by many of the best authorities in the profession; and he therefore hopes that his past experience in medical literature will justify his present undertaking.

Whatever defects may exist in this work — and no one is more conscious of them than the Author himself—he believes them to be those of omission, rather than of commission. Much may have been overlooked, but much has been duly recorded, and nothing deserving of notice has been willingly omitted. The Author has referred to the opinions of other medical writers — both of contemporaries and of those who have preceded him — as copiously as the plan of the work could allow. It would have been quite impossible to state these opinions otherwise than in the abstract, and he has done this as succinctly and as correctly as he could. He has been anxious to state the sources from whence he has derived his information, and he has, he believes, not failed to do so. He has referred chiefly to the names and the views of original writers and observers, and he has not in any instance interrupted the current of his histories of opinions by either eulogy or reprehension. Of those who have contributed to the science to which he has devoted himself he has recorded the labours impartially, and he has thus evinced his estimation of their value, a value which eulogistic expletives could not have increased. When he has noticed opinions that required examination, in order that truth might be elicited, he has treated no one with disrespect. Although he hopes that his labours have not been without avail, yet he is too deeply impressed by his own deficiencies — he has had too often reason inwardly to regret the imperfect state of his own knowledge of many subjects, particularly in respect of the desired extent of knowledge, — to judge harshly of others. He has considered it better to pass over altogether what he distrusted or considered injurious, than to occupy his pages by adducing it for the purpose either of exposure or reprehension. He has not adopted this resolution from a desire of his own ease, but from a conviction that he would be occupying valuable space, and still more valuable time, without adequate, if indeed any advantage.

Although few can be more sensible of the imperfections of his work than the Author himself, yet he hopes the reader who attentively studies his pages will allow him the merit of industrious study of the best medical authors, and attentive observation of the causes, course, and consequences of disease, and of the effects of remedies. His labours, which have been incessant for many years, have been persisted in, under circumstances and contingencies which few could have endured. He has received no assistance in furtherance of his undertaking, nor with his knowledge of human nature would he have accepted any. Some inaccuracies are inevitable in a work so extensive and laborious as this is; but the Author believes that they are not many or important, inasmuch as every line of it was written by his own hand, and all the proofs were carefully read and corrected by himself.

Of the manner in which he has conveyed his ideas, his doctrines, his descriptions, and his instructions, it does not become the Author to venture a confident opinion. He has endeavoured only to be clear, forcible, and condensed. He has avoided a parade of scientific and technical terms and of foreign words and phrases, and has preferred English expressions wherever they were admissible, and the instances were rare in which they were not only appropriate, but even preferable.

Thirty years of his life have been devoted to this work by its Author. He has laboured on it alone and unassisted. He has, however, been encouraged to persevere to its completion by the friends to whom in gratitude he has dedicated it, and by the indulgence and liberality of his Publishers. He feels with becoming thankfulness the kindness of many in the profession throughout the three kingdoms, who have confided in his medical knowledge and have thereby enabled him to provide for the day which was passing over him, and for those dear and nearly related to him, whom misfortune and death have left to his care. And he expresses his heartfelt thanks, not only to those friends, but also to others, who, quite unknown to him as the authors, have been favourable, kind, and considerate reviewers of the parts of the work as they successively, although tardily, appeared. Entertaining no mean opinion of the legitimate exercise of the healing art *, viewing his profession in the light in which it was held in ancient, and even in more modern times, and estimating his work according to the experience and the research, to the time he has devoted to it, and to the amount of labour and the sacrifices it has cost him, he feels assured that he has not laboured in vain; and he cannot doubt that it will be of essential service to many, — that suffering humanity will be benefited, and rational, learned, and scientific medical practice advanced by it. "For his name and memory, he leaves them to men's charitable speeches and to foreign nations, and to the next age."

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* Bacon vindicated the dignity of the healing art by appealing to the example of Christ, and reminded men that the Great Physician of the soul did not disdain to be also the physician of the body.

"Nusquam enim legimus miraculum aliquod ab eo patratum circa honores, aut pecunias, sed tantùm circa corpus humanum, aut conservandum, aut sustentandum, aut persanandum."
De Augmentis, &c., Lib. IV. ch. 2.

CLASSIFIED CONTENTS.

Preliminary Remarks.—An Arranged Contents of his work is attempted by the Author with the object of enabling the student of medicine, and the medical practitioner, to peruse what he has advanced as the results of his observation—of his practical experience—and of his reading, with the most advantage, and in the most suggestive manner. Information is useful not only as respects its amount, but also as regards what it may suggest to the mind of the reader calculated to lead to further investigation and illustration, than the limits allotted by the Author to the many subjects and topics which have come under his consideration could allow. He has endeavoured to arrange these subjects, both pathological and practical, in such an order as may enable the information first afforded, or successively obtained, to contribute to the elucidation, and to the more complete comprehension, it is hoped, of what is subsequently discussed.

It may be necessary to premise that the Classification of diseases here attempted is, as far as the Author is concerned, altogether original, although it was first published in the "*London Medical Repository*," in 1822. Notwithstanding that this attempt was made at so early a period of his practice, he had then enjoyed extensive opportunities of observation in this country, on the continent of Europe, and within the tropics. This classification and the pathological principles here stated are the same as were then published. Comprehensive and close observations, the sources of true experience, which he believes himself to have possessed, as well as to have exerted, have confirmed him in the belief, that his arrangement is the most useful, practically or therapeutically, inasmuch as it is founded upon, and has constant reference to, the conditions of vital force—to that power which actuates the whole human organisation, and to which a continued regard must necessarily be had, and a constant reliance placed, in our efforts to alleviate or to remove disease. During the many years, in which the Author was engaged in lecturing on the Principles of Pathology and on Practical Medicine, he adopted this classification, and he believes that it was then conducive to the acquisition of practical knowledge by his pupils.

This arrangement being thus based upon the states of vital force and upon the unquestionable facts, that disease, especially in its slightest and earliest deviations from health, is a deranged manifestation of life in some tissue, organ, or system; that this deviation is followed by a succession of changes, until alterations of the fluids, secretions, and structures supervene; that the existing change has been induced by that which preceded it, often aided by the persistence of the exciting cause or causes and by the concurrence of additional influences; and that it will itself occasion still further changes, if not arrested by science or art, or by the efforts of nature, or, in other words, by the resistance which the vital force or power may be enabled to oppose to successive or unfavourable changes,—it follows that a due recognition of the simplest and earliest manifestations of disorder, a correct estimate of existing changes, and an accurate view of future contingent alterations and results, are of the utmost importance, not merely as respects the places assigned to them in the classification, but still more as regards the adoption of indications of alleviation or of cure, and the selection of means by which these indications may be fulfilled. Of the essence of life itself we know nothing further, than that it is associated with, and manifested by structure, the simplest and lowest structures displaying its simplest, but yet its most generally diffused functions or properties, the more complex organisations, its higher manifestations, the highest and most perfect of created beings alone possessing its highest faculties.

The lowest formations which evince vitality possess organic nervous corpuscles and digestive and circulating systems; and as we ascend the scale of animal creation, the organic nervous system rises, from rudimental, through more perfect developments, to the most complex and complete, as displayed in the highest order of animals. Over the two latter systems — the assimilating and the circulating — the organically sensitive presides; each of these reciprocally aiding and contributing its functions to the others, and thereby supporting and increasing the vital force, whilst this force itself preserves the organic elements in which it is associated, and develops them into specific forms, more particularly when subjected to the influences which excite it into activity. Thus it will be seen that these three prime factors of life, viz., the organic nervous globules and their conformation into ganglia and ganglial nerves, the circulating systems, and the digestive apparatus, which is more especially subsidiary to the others, have certain organs—respiratory, assimilating, secreting, excreting, &c.—which are subservient to the life of the individual—to the maintenance of vital force or power; other organs, as those of voluntary motion, of sense, and of the intellectual and moral powers, for holding communication with the rest of the species and of creation; and superadded organs, intended to perpetuate the species.

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* Vital force, vital power, vital energy, are used as synonymous terms; and organic nervous force, power, and energy imply the display of vital force by means of the organic or ganglial nervous system. Vital functions are the manifestations of vital force by the organs or structures of the body, the discharge of the offices which are destined to be performed by the organs and tissues of the frame.

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* Headach is ascribed to altered sensibility, or to pain, arising from changes of the organic nervous endowment of the brain or its membranes, caused either by impaired capillary circulation, or by vascular congestion or excitement, or by organic lesion, &c. See art. HEADACH.

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* A very recent writer (*Brit. and For. Medico-Chirurg. Review*, July, 1858, p. 68.) states "that Dr. Watson has assigned a prominent position to the remarks of Dr. Golding Bird on the treatment of acute rheumatism by the salts of potash, &c. Dr. Bird's views on blood depuration, and on the existence of a peculiar class of remedies, the renal depurants, are in our opinion eminently sound, and in the highest degree worthy the attention of all physicians." (*Loc. cit.* p. 68.) The author is happy to quote this opinion in behalf of a doctrine fully set forth by him in the article on the Blood, the class of blood-depurants (the terms depurants and depuration actually employed by him) being also there enumerated. This article, as well as others, in which depuration of the blood by the action of the several emunctories, and of the kidneys especially, is insisted upon, was published in 1832, and the several articles in which these substances are prescribed from the experience of the author and of other authorities appeared in the parts of this work published from 1832 to 1837. The depurants recommended by the author are not only those adopted by Dr. G. Bird, but others also, even of greater importance, are enumerated from an ample experience of their efficacy. The first edition of Dr. G. Bird's work appeared in 1844; and that containing the chapter on depuration of the blood by the kidneys was published in 1853. "Dr. Fuller's important Experience of Alkaline Remedies in the Treatment of Rheumatism" (*op. cit.* p. 69.) was published in 1852. The article on that disease in this work appeared several years previously to 1852; and in that article alkalies were insisted upon by the author, conformably with his views of the pathology of the malady, as being among the chief remedies for its cure; magnesia, its citrates, the citrates and the acetates of the alkalies, being also considered not the less efficacious — indeed most efficacious, especially when judiciously prescribed and combined with other medicines. In addition to these the biborate of soda is there mentioned; and here the author may remark that he has found this medicine of marked benefit, both in preventing the deposition of lymph on the valves in cases of rheumatic endo-carditis, and in removing it, at an early stage of its formation, as proved to him by several cases, one of which being the son of a late eminent physician in Norwich.

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[*] Many cases of *vertigo* may be referred to debility or even to anæmia of the brain; others to congestion or to active determination of blood to the brain, and others to organic lesion. The same remarks apply to *Tremor*, which also may proceed from very opposite states of circulation in the brain, or even from structural change. See CLASS IV. ORDER III.

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Spec. 4th. Spasm of the rectum and sigmoid flexure of the colon - - - - iii. 604
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Genus 2d. Spasmodic Affections of the Digestive Canal, with increased secretion from the Villous Surface.

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Genus 3d. Spasmodic Affections of the Urinary and Sexual Organs.

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Genus 4th. Spasmodic Affections implicating chiefly the Respiratory Organs.

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* The phenomena characterising Cholera vary much with the seat of spasm and pain, — with the severity of the irritation of the organic nerves, — and with the degree of affection of the *duodenum*. When the spasmodic action of this part is great the ducts are implicated, and the discharge of bile is arrested. The irritation of the organic nerves, being propagated to the roots of the spinal nerves, occasions spasms of the voluntary muscles, as stated in the first part of the work, published Sept. 1832.

characterised more by spasmodic accessions than by inflammation, and caused by irritation or inflammation of adjoining or remote parts, may be included in this CLASS.)
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In this class of diseases the efficient cause generally depresses or irritates the seat of disease, vital excitement or reaction commonly supervening and opposing, or removing the depression, unless the depression be so extreme as to overwhelm the vital resistance.

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* Phlegmasia alba dolens may be viewed as acute dropsy of the extremity, or as serous effusion into the limb, owing to inflammatory obstruction of the veins and lymphatics. See the Pathology of the disease.

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APPENDIX OF FORMULÆ.

In order to prevent repetitions, and to facilitate reference, the following collection of Formulæ is here appended and arranged in alphabetical order, in addition to those which it was necessary to give in the body of the work. The Author has not added any of the formulæ prescribed by the three British Colleges, as they are already in the hands of every practitioner; although he has always referred to them, and has followed them, particularly those of the London College, in extemporaneous prescription — both in such as are prescribed at this place, and in those directed in the course of the work. The preparations and recipes he has given, both here and at other places, consist of a careful selection of those which are most approved, contained in the Pharmacopœias of various hospitals and foreign countries, and from the writings of a number of eminent practical physicians, as well as of those which the Author has been led chiefly to confide in during a practice of twenty years. In order to avoid circumlocution, he has retained the short and characteristic names usually employed, although many of them are by no means classical.

Form. 1. Acetum Antihystericum. (Disp. Fuld.)

℞ Castorei, Assafœtidæ, āā ʒ ij.; Galbani ℥ ss.; Herb. Rutæ recentis ℥ j.; Aceti Vini ℔ ij. Macera bene et cola.

Form. 2. Acetum Camphoratum.

℞ Camphoræ Pulver. cum Alcoholis pauxillo solutæ, ℥ ss.; Sacchari Albi ℥ ijss.; Aceti Vini ℥ vss. Solve. (℥ j. contains ʒ ss. of camphor.)

Form. 3. Acetum Camphoræ et Ammoniæ.

℞ Camphoræ ʒ j., teratur in mortario vitreo, cum Alcoholis guttis xx. vel xxx.; Sacchari Albi ℥ ss. tritis adde; Acidi Acetici Fortioris ʒ ij.; Liquoris Ammoniæ Acetatis ℥ iijss.; Infusi Cinchonæ, vel Aquæ Destillatæ ℥ iijss. Fiat Mist., cujus sumat æger Cochlear. ij. ampla secundâ vel tertiâ quâque horâ. (In the last stage of Febrile Diseases attended with depressed powers of life.)

Form. 4. Acidum Nitro-muriaticum.

℞ Acidi Nitrici, Acidi Muriatici, singulorum partes (mensurâ) æquales. Dosis à minim. vj. ad ♏ xx. bis, ter, sæpiusve quotidiè, in Hordei Decocti ℥ iv., cum Syrupo Simplice.

Form. 5. Acidum Nitro-muriaticum Dilutum.

℞ Acidi Nitro-muriatici, Aquæ Destillatæ, āā O j. Misce. (The nitro-muriatic acid bath is to consist of three ounces of this diluted acid to every gallon of water.)

Form. 6. Æther Phosphoratus.

℞ Phosphori Puri gr. ij.; Olei Menthæ Piper. ℈ j.—ʒ ss. Solve, et adde Æther. Sulphur. ʒ j. M. Vel,

Form. 7.

℞ Phosphori Puri gr. ij.; Æther. Sulph. ℥ j.; Olei Valerian. ♏ xij. M. (In doses of v. to x. drops on sugar.)

Form. 8. Aqua Cosmetica.

℞ Mist. Amygdal. Amar. vel Dul. colati ℥ iij.; Aquæ Rosar. et Aquæ Flor. Aurantii āā ℥ iv.; Sub-boracis Sodæ ʒ j.; Tinct. Benzoini, ʒ ij. M. Fiat Lotio.

Form. 9. Aqua Styptica.

℞ Ferri Sulphatis, Alumin. Sulphatis, āā ℥ jss.; Aquæ ℥ xij. Solve et cola; dein adde Acidi Sulphurici ʒ j.

Form. 10. Aqua Styptica Cupri et Zinci.

℞ Zinci Sulphatis, Cupri Sulphatis, āā ʒ j.; Aquæ Rosæ ℥ viij. Solve.

Form. 11. Aqua Styptica Zinci.

℞ Zinci Sulphatis, Aluminæ Sulphat. Calcin., āā ʒ j.; Aquæ Rosæ ℥ vj. Solve.

Form. 12. Aqua Traumatica Thedenii.

℞ Acidi Acetici ℔ iij.; Alcoholis ℔ ij.; Acid. Sulphur ℔ ss.; Mellis despumati ℔ j. Misce.

Form. 13. Aqua Vanillæ.

℞ Fruct. Vanillæ concis. et cont. ℥ vj.; Potassæ Subcarbon. ʒ vj.; Aquæ Destil. O ij.; Spirit. Vini Ten. O jss. Macera leni cum calore per triduum, et cola.

Form. 14. Balneum Ioduretum. (Lugol.)

℞ Solut. Iodinæ Rubefac. (Vide Form. inter *Solutiones.*) ʒ j.—℥ iv.; Aquæ Cong. xj.—l.

Form. 15. Balneum Sulphureum.

℞ Magnes. Sulphatis ʒ iv.; Potassæ Supertart. ℈ j.; Sulphur. Potassæ ʒ j.: tere simul, et solve in Cong. j. q. q. Aquæ Balnei.

Form. 16. Balneum Sulphureti Potassæ.

℞ Potassæ Sulphureti ʒ j. ad ℥ iv.; Aquæ Communis ℔ L ad ℔ cc. Solve. (Nearly the same as the sulphureous baths of Barèges. In Chronic Affections of the Skin, and in Chronic Visceral Affections.)

Form. 17. Balneum Sulphureti Potassæ et Gelatinæ. (Dupuytren.)

℞ Potassæ Sulphureti, ℥ ij. ad ℥ iv.; Aquæ Communis ℔ c. ad ℔ cc. Solve, et adde Ichthyocollæ ℔ j. ad ℔ ij. in Aquæ bullientis solutæ ℔ x.

Form. 18. Balsamum Astringens.

℞ Olei Terebinthinæ part. ij.; adde guttatim Acidi Sulphurici part. ijss., in vase vitreo, ope balnei arenar. calefacto. Liquori refrigerato, adde gradatim Alcoholis part. viij. Macera per dies septem. (Dosis ʒ ss. — ʒ j. vehiculo quovis idoneo, in morbis Hæmorrhagicis.)

Form. 19. Balsamum Astringens.

℞ Olei Terebinthinæ, Acidi Muriatici Concent., āā pars j.: agita bene, et post diem adde Alcoholis part. viij.; Camphoræ part. ss.

Form. 20. Balsamum Succinatum.

℞ Balsam. Copaibæ, Terebinthinæ Venet., Olei Succini, āā ʒ j. Misce. Capiat ♏ xxx. ter quotidiè in quovis vehiculo idoneo. (In Leucorrhœa, Gleet, Emissions, &c.)

Form. 21. Balsamum Sulphuris, vel Oleum Sulphuris.

℞ Florum Sulphuris pars j.; Olei Amygdal. Dulc. part. iij.; Olei Anisi part. ij. Macera per dies septem in balneo arenario.

Form 22. Balsamum Sulphuris Terebinthinatum.

℞ Florum Sulphuris part. iij.; Olei Lini part. vij; Olei Anisi part. v. Solve in balneo arenario, et adde Olei Terebinthinæ part. xx. Misce. Excitant, diuretic, expectorant, &c. Dosis ♏ x.—xxx. (*Balsamus Vitæ* Rulandi.)

Form. 23. Balsamum Terebinthinatum.

℞ Olei Olivæ ℥vj.; Terebinthinæ ℥ij.; Ceræ Flavæ ℥j.; Bals. Peruvian. ʒij.; Camphoræ rasæ ʒjss. Solve Oleum, Terebinth., et Ceram; dein adde alia. (Nearly the same as the Balsam of Chiron, a long-celebrated medicine.)

Form. 24. Bolus Anodynus.

℞ Pulv. Jacobi veri gr. iv.; Camphoræ Pulverizat. gr. iij.; Pulv. Potassæ Nitratis gr. x.; Extracti Hyosciami, gr. vij.; Conserv. Rosar. q. s. utfiat Bolus. H. s. s. (In Cerebral Affections, &c.)

Form. 25. Bolus Antispasmodicus.

℞ Pulveris Castorei optimi ʒij.; Pulv. Radicis Valerianæ ℥ss.; Camphor. rasæ ʒj. Misce accuratè, et adde Syrupi Papaveris satis quantum ut fiant Boli granorum duodecim: involvantur pulvere Stigmatorum Croci Sativi.

Form. 26. Bolus Arnicæ.

℞ Pulv. Flor. Arnicæ Montan., Camphoræ rasæ, āā gr. iv.; Conserv. Rosar. q. s. ut fiat Bolus.

Form. 27. Bolus Bismuthi Compositus.

℞ Moschi gr. x.; Bismuthi Subnitratis gr. iij.—viij.; Opii Puri gr. ss.—j.; Conserv. Rosar q. s. ut fiat Bolus, p. r. n. sumendus.

Form. 28. Bolus Cambogiæ.

℞ Cambogiæ Gummi Resinæ gr. viij.: tere cum Olei Juniperi ♏ iij., et adde Potassæ Supertart. gr. xx.; Pulv. Scillæ, gr. j.; Syr. Zingiberis q. s. ut fiat Bolus.

Form. 29. Bolus Camphoræ.

℞ Camphoræ rasæ et ope Alcoholis subactæ gr. iij.—x.; Pulv. Flor. Arnicæ Montanæ gr. iij.—vj.; Confect. Rosæ Caninæ q. s. ut fiat Bolus, quartâ vel sextâ quâque horâ sumendus.

Form. 30. Bolus Catechu Thebaiacus.

℞ Catechu Ext. contrit. gr. xv.; Confectionis Opii gr. viij.; Pulv. Cretæ gr. iv.; Syrupi Aurantii q. s. ut fiat Bolus, bis, ter, sæpiusve in die capiendus.

Form. 31. Bolus Ferri.

℞ Ferri Sub-carbon. gr. x.—xx.; Pulv. Aromatici gr. v.; Syrup. Zingiberis q. s. ut fiat Bolus, bis terve quotidiè deglutiendus.

Form. 32. Bolus Guaiaci Ammoniati.

℞ Guaiaci Gum. Resinæ gr. viij.—xij.; Camphoræ rasæ, Ammoniæ Carbon., āā gr. iv.; Pulv. Acaciæ gr. iij.; Confect. Rosæ q. s. ut fiat Bolus, horâ somni sumendus.

Form. 33. Bolus Guaiaci Compositus.

℞ Guaiaci Resin. cont. ℈j.; Ipecacuanhæ Rad. Pulv. gr. j.; Opii Puri gr. j.; Confectionis Rosæ Caninæ q. s. ut fiat Bolus, semel, bis, terve quotidiè capiendus.

Form. 34. Bolus Kino Thebaiacus.

℞ Pulv. Kino Compos. gr. v.—x.; Pulv. Cretæ Compositi gr. xv.; Pulv. Opii ss.; Syr. Zingib. q. s. ut fiat Bolus, bis, ter, sæpiusve in die sumendus.

Form. 35. Bolus Moschi Compositus.

℞ Moschi gr. xxiv.; Pulv. Rad. Valerianæ ℈jss.; Camphoræ rasæ gr. xv.; Conserv. Rosar. q. s. ut fiant Boli iij. Capiat unam 4tâ quâque horâ.

Form. 36. Bolus Nitro-camphoratus cum Opio.

℞ Camphoræ rasæ gr. iij.—vij.; Potassæ Nitratis gr. x.—xv.; Opii Puri gr. ss.—jss. Conserv. Ros. q. s. ut fiat Bolus, horâ somni sumendus.

Form. 37. Bolus Rhei Compositus.

℞ Rhei Pulv. gr. x.—xv.; Pulv. Cretæ Comp. gr. vij.; Pulv. Ipecacuanhæ Comp. gr. iij.—vij.; Syrup. Zingiberis q. s. ut fiat Bolus, horâ somni sumendus.

Form. 38. Bolus Sedativus.

℞ Acidi Boracici ℈j.—ʒss.; Conserv. Rosar. et Syrupi q. s. ut fiat Bolus, p. r. n. sumendus.

Form. 39. Bolus Sudorificus.

℞ Camphoræ rasæ gr. j.—iij.; Potassæ Nitratis gr. xij.; Pulv. Ipecacuanhæ, et Pulv. Opii Puri, āā gr. j.; Syrup. Zingib. q. s. ut fiat Bolus.

Form. 40. Bolus Valerianæ cum Ferro.

℞ Ferri Sub-carbon gr. v.—℈j.; Pulv. Valerianæ ℥ss.; Syrup. Zing. q. s. Fiat Bolus.

Form. 41. Cataplasma Iodurretum.

℞ Cataplasm. Farinæ Semin. Lini tepid. q. s.; Solut. Iodinæ Rubef. q. s. Sit Cataplasma.

Form. 42. Cataplasma Sinapeos Fortius.

℞ Pulv. Sinapeos ℔ss.; Pulv. Capsici Annui, Pulv. Zingiberis, āā ʒj.; Acidi Acetici Pyrolignei q. s. ut fiat Catasplasma, dein adde Olei Terebinthinæ ℥ij. Misce.

Form. 43. Cataplasma Sinapeos Mitius.

℞ Cataplasmatis Lini ℥iv.; Farinæ Sinapeos ℥ss. M.

Form. 44. Confectio Menthæ Viridis.

℞ Menthæ Viridis Fol. recent. ℥iv.; Sacchari Purificati ℥xij. Folia in mortario lapideo contunde: tum, adjecto Saccharo, iterum contunde, donec corpus sit unum. (Sprague.)

Form. 45. Confectio Sennæ Composita.

℞ Sulphuris Sublimati, Potassæ Sulphatis, āā ℥ss.; Confectionis Sennæ ℥ij.; Syrup. Aurantii q. s. Capiat ʒj.—ʒij. pro dose.

Form. 46. Conserva Menthæ Sativæ.

℞ Fol. Menthæ Viridis recentis ℥j.; Sacchari Purificati ℥iij. Contunde probè simul, fiat Conserva.

Form. 47. Decoctum Althææ.

℞ Althææ Radicis exsiccat. incis. ℥ij.; Rad. Glycyrrhizæ contus. ʒiij.; Aquæ Destillatæ, Ojss. Coque leni igne ad Oj., et cola.

Form 48. Decocti Arctii Lappæ.

℞ Rad. Arctii Lappæ ℥jss.—℥ij.; Aquæ ℥xvj. Coque ad ℥xij. et cola.

Form. 49. Decocti Arctii Lappæ Compos.

℞ Rad. Arctii Lap. recent. ℥j.; Lign. Sassafras., Dulcamaræ, āā ʒiij.; Rad. Glycyrrh. ʒjss.; Aquæ Ojss. Coque ad Oj., et exprime.

Form. 50. Decoctum et Infusum Beccabungæ.

℞ Herb. Veronica Beccabungæ recentis ℥iij.; Aquæ Ferventis Oj. Macera per horas binas, vel coque per quartam horæ partem et exprime. Capiat ℥ij. ter quaterve quotidiè; vel utatur externè pro embrocatione, super Ulcerationes Strumosas applicata.

Form. 51. Decoctum Calumbæ Comp.

℞ Rad. Calumbæ, Lign. Quassiæ ras., āā ʒij.; Corticis Aurantii exsic. ʒj.; Rhei Pulv. ℈j.; Potassæ Sub-carb. ʒj.; Aquæ ℥xx. Coque ad ℥xv., et cola; dein adde Spirit. Lavandul. Comp. ʒj. (Niemann.)

Form. 52. Decoctum Cacuminum Pini Compositum.

℞ Cacum. Pini Sylvest. ℥ij.; Radicis Symphyti Major. ℥j.; Aquæ ℔ij. Coque per horæ partem quartam; exprime, et cola.

Form 53. Decoctum Cinchonæ Aperiens.

℞ Corticis Cinchonæ Pulv. ℥j.; Aquæ ℔ij. Coque per partem horæ quartam, et adjice Fol. Sennæ ℥ss.; Rad. Zingiberis cont. ʒj.; Sodæ Sulphatis ℥ss.; Muriat. Ammoniæ ℈j. Macera per horas binas, et adde Syrup. Sennæ ʒj. M.

Form. 54. Decoctum Cinchonæ Compositum.

℞ Cinchonæ Lancifol. Cort. contus. ℥ss. Coque ex Aquæ Puræ ℥xvj. ad consumpt. dimid., adjectis sub finem coctionis Serpentariæ Radicis contus. ʒij. Stent per horam, et colaturæ admisce Spirit. Cinnamom. Comp. ℥jss.; Acidi Sulphur. dilut. ʒjss. M. Sumantur ℥ij. sextâ quâque horâ.

Form. 55. DECOCTUM CINCHONÆ ET RHEI.

℞ Corticis Cinchonæ Rubræ contusæ ℥iij.; Radicis Gentianæ incisæ ℥ss.; Radicis Rhei Palmati ʒijss.; Subcarbonatis Potassæ ʒj.; Aquæ Fontanæ s. q. Coque per horam unam ut obtineantur colaturæ unciæ duodecim, et cola.

℞ Hujus Colaturæ ℥vss.; Tinctura Canellæ, Spirit. Anisi, āā ʒjss.; Syrup. Aurantii, ℥ss. M. Capiat Cochlear. j. vel ij.

Form. 56. DECOCTUM CINCHONÆ ET SERPENTARIÆ.

℞ Cort. Cinchonæ Pulveriz. ʒvj.; Rad. Serpentariæ ℥ss.; Corticis Aurantii sic. ʒij.; Aquæ ℔jss. Coque ad ℔j., et adde liq. colati Tinct. Cinnamom. ʒj.

Form. 57. DECOCTUM CYDONIÆ COMP.

℞ Semin. Cydon. con. ʒij.; Rad. Glycyrrh. contus., Fici Caricæ Fruct., āā ℥j.; Aquæ Bul. Oj. Coque cum igne leni per minut. horæ decem, deinde cola.

℞ Hujus Decocti ℥vjss.; Sub-boracis Sodæ ʒj.; Potassæ Tart. ʒij.; Spirit. Æther. Nit. ʒij.; Syrup. Mori vel Suc. Inspiss. Samb. Nig. ℥ss. M. Fiat Mist., cujus capt. Cochlear. ij. larga secundis vel tertiis horis. (In irritative Inflammation of the Mucous Surface of the Digestive Organs, Dropsy, &c.)

Form. 58. DECOCTUM DEOBSTRUENS.

℞ Radicis Taraxaci, Herb. Fumariæ, Fol. Sisymbrii Nasturt., Fol. Chærophylli Sylvest., āā ℥j. Omnibus benè concisis, adde Seri Lactis ℥xxxij. Coque per minut. horæ vj.; et postea macera ad refrigerationem, dein cola. Colaturæ adde Tartar. Potassæ et Sodæ ℥ss.—ʒvj.; Mellis Optimæ ℥j. M. Capiat cyathum Vin. ij. vel. iij. vel iv. in die. (VAN SWIETAN.)

Form. 59. DECOCTUM DEPURANS.

℞ Caul. Dulcamaræ, Herb. Fumariæ Officin., Cort. Ulmi contr., Rad. Arctii Lappæ conc., Rad. Rumicis Patientiæ concis., āā ℥ss.; Aquæ Font. ℔ijss.; Coque ad Ojss., et cola. Liq. colat. adde Syrup. Sarsaparillæ ʒij. M. Capiat ℥j.—℥jss. ter quaterve quotidiè.

Form. 60. DECOCT. DULCAMARÆ.

℞ Stipit. Dulcamaræ ℥j.; Corticis Aurantii ʒij.; Aquæ ℔jss. Coque ad ℔j., et cola.

Form. 61. DECOCTUM DULCAMARÆ COMP.

℞ Caul. Dulcamaræ, Radicis Arctii Lappæ, āā ʒvi.; Radicis Glycyrrh., Lign. Sassafras ras., Lign. Guaiaci ras., āā ʒij.; Aquæ Font. ℔ij. Coque ad colaturæ ℥xx. (AUGUSTIN. Rheumatism, Syphylis, Cutaneous Affections, &c.)

Form. 62. DECOCTUM FILICIS COMPOSITUM.

℞ Radicis Filicis Maris ℥j.; Rad. Helenii ʒij.; Folii Absinthii ℥ss.; Seminum Santonici cont. ʒiij.; Aquæ Ojss. Coque ad Oj., et cola. Liq. colati adde Syrup. Rhamni ℥j. M.

Form. 63. DECOCTUM GALLÆ.

℞ Gallarum contusarum ℥ss.; Aquæ Distillatæ Oijss. Decoque ad oct. ij., et liquorem cola. Tum adde Tincturæ Gallæ ℥j. (This decoction, used as a fomentation, enema, or injection, is of considerable use in the treatment of Prolapsus Ani, Hemorrhoids, and in Leucorrhœa.)

Form. 64. DECOCTUM GENTIANÆ COMP.

℞ Radici Gentianæ Luteæ incisæ ℥ss.; Aquæ Fontanæ ℔j. Coque per semihoram, deinde infunde quantum sufficit super Radicis Calami Arom. ʒiij.: cola, et post refrigerationem adde Ætheris Sulph. ʒij.; Syrupi Aurantii ℥ss. Misce.

Form. 65. DECOCTUM GUAIACI ET DULCAMARÆ COMP.

℞ Rasur. Ligni Guiaci ℥jss.; Stipit. Dulcamaræ ℥jss.; Rad. Lauri Sassafras. concis., Flor. Arnicæ, Rad. Calami Arom., Rad. Glycyrrh., āā ℥ss.; Semin. Fœniculi ʒij.; Aquæ ℔iij. Coque ad ℔ij., et cola. Capiat ℥j.—℥iij. ter quaterve quotidiè.

Form. 66. DECOCT. HELENII COMP.

℞ Rad. Inulæ Helenii ℥j; Summit. Hyssopi Officin. ʒiij.; Fol. Heder. Terrest. ʒij.; Aquæ q. s. ut sint Colaturæ ℥xij. Coque per partem horæ quartam, et cola: adde liq. colat. Potassæ Sub-carbon. ʒj.; Syrup. Tolutan., Syrup. Althææ, āā ℥j. M. Capiat ℥j.—℥ij ter quaterve quotidiè. (In Chronic Catarrhs, the Pectoral Affections of Debility, Asthma, Chlorosis, Amenorrhœa, &c.)

Form. 67. DECOCTUM INULÆ COMPOSITUM.

℞ Rad. Inulæ Comp. ℥jss.; Hyssopi Officinal., Flor. Tiliæ Europ. āā ʒiij.; Fol. Heder. Terrest. ʒij.; Aquæ ℔ij. Coque ad ℔jss.; exprime, et cola. Colaturæ adde Spirit. Æther. Nit. ℥ss.; Potassæ Nitratis ʒj.; Syrup. Scillæ ʒij.; Syrup. Althææ ℥ss. M.

Form. 68. DECOCTUM PECTORALE ELSNERI.

℞ Rad. Glycyrrh., Croci Stig., Rad. Inulæ Helenii, Rad. Ireos Flor., Semin. Anisi, Hyssopi Officin., āā ℥ss.; Aquæ ℔ij. Coque ad ℔jss.: cola et adde Tinct. Bals. Tolutan. ℥j.; Syrup. Tolutan. ℥j.; Mellis ℥j. M. Capiat ℥j.—℥ij., 4tis vel 6tis horis.

Form. 69. DECOCTUM PUNICÆ GRANATI.

℞ Corticis Radicis Punicæ Granati recent. et exsic. ℥ij.; Aquæ Com. Oij. Macera sine calore per horas xxiv.; dein coque ad Oj. et cola. (The whole to be taken in three doses within two hours.)

Form. 70. DECOCTUM QUASSIÆ COMP.

℞ Ligni Quassiæ rasæ ℥ss.; Flor. Anthemid. ʒvj.; Potassæ Sub-carbon. ʒijss.; Aq. Fontan. ℔ij. Coque ad dimidium, et cola.

Form. 71. DECOCTUM SANTONICI.

℞ Santonici Semin. contus. ℥ij.; Aquæ Destillatæ ℥xx. Coque lento igne ad Oj., et cola. (In Ascarides.)

Form. 72. DECOCTUM SARSAPARILLÆ COMPOSITUM.

℞ Sarsaparillæ Radicis, concisæ et contusæ, ℥jss.; Glycyrrhizæ Radicis contusæ ℥ss.; Coriandri Seminum contus. ʒij.; Liquoris Potassæ ʒj (vel sine); Aquæ Ferventis Oj. Macera per horas xxiv. in vase leviter clauso, et cola: liquoris colati sumat partem 3tiam ter quotidiè. (SPRAGUE.)

Form 73. DECOCTUM SECALIS CORNUTI.

℞ Secalis Cornuti ʒij.; Aquæ ℥vij. Decoque ad ℥iv Ab igne remove, et paulo post è fæcibus effunde.

Form. 74. DECOCTUM SENEGÆ.

℞ Senegæ Radicis cont. ʒvj.; Aquæ Oij. Coque ad Oj.; et sub finem Coctionis adde Glycyrrh. Rad. contus. ℥ss. Exprime, et cola.

Form. 75. DECOCTUM SPARTII CACUMINUM.

℞ Spartii Cacuminum concisi ℥j.; Aquæ Distillatæ Oj. Decoque ad octarium dimidium, et cola.

Form. 76. DECOCTUM TARAXACI CO.

℞ Radicis Taraxaci ℥iv.; Supertart. Potassæ, Sub-boracis Sodæ, āā ℥ss.; Aq. ℔iij. Coque ad ℔ij.; et adde, ut sit occasio, vel Spirit. Æther. Nit., vel Tinct. Scillæ, vel Spirit. Juniperi Comp., vel Oxymel Scillæ.

Form. 77. DECOCTUM TARAXACI COMP. STOLLII.

℞ Rad. Taraxaci, Rad. Tritici Rep., āā ℥ij.; Aq. ℔iij. Coque ad ℔ij.: cola, et adde colaturæ Potassæ Sulph. ℥ss.; Oxymel. ℥j. M. (In Visceral Obstructions.)

Form. 78. DECOCTUM TORMENTILLÆ.

℞ Tormentillæ Radicis contusæ ℥j.; Aquæ Destillatæ Ojss. Coque ad octarium, et cola.

Form. 79. ELECTUARIUM ALCALINO-FERRATUM.

℞ Oxidi Ferri ℥ss.; Potassæ Sub-carbonatis ʒj.; Subcarbonat. Calcis ʒij.; Pulvis Zingiberis ʒjss.; Syrup. Aurantii ℥iijss. M. Fiat Elect. cujus capiat Coch. j. minim. manè nocteque. (Chlorosis, Chorea, &c.)

Form. 80. ELECTUARIUM ANTHELMINTICUM.

℞ Pulv. Valerianæ, Semin. Santonici contus., āā ℥ss.; Potassæ Sulphatis ʒiij.; Pulv. Jalap. ℈iv.; Oxymel. Scillæ ℥iv.; Pulv. Glycyrrh. (vel Extr. Glycyrrh.) ℥ij. M. ut fiat Electuarium. (For children, one to two drachms; and for adults ℥ss. three or four times daily.)

Form. 81. ELECTUARIUM ANTISPASMODICUM.

℞ Pulv. Cinchonæ ℥j.; Pulv. Valerianæ ℥ss.; Confect. Rutæ, ℥j.; Confect. Ros. Gall. ℥ss.; Confect. Aurantii ʒiij.; Olei Cajeputi ʒss.; Syrup. Aurantii ℥ijss. vel q. s. ut fiat Electuarium molle. Capiat ℥j.—ʒiij. manè nocteque. (In Epilepsy, Chorea, Hysteria, Flatulency, &c.)

Form. 82. ELECTUARIUM APERIENS.

℞ Magnesiæ, Potassæ Supertart., Flor. Sulphuris, Pulv. Rad. Rhei, Pulv. Flor. Anthemidis, āā gr. vj.; Syrup. Aurantii ʒ iij.; Olei Pimentæ ♏ ij. M. Sit Electuarium pro dose. (HECKER.)

Form. 83. ELECTUARIUM APERIENS.

℞ Mannæ ʒ vj.; Syrup. Sennæ ʒiij.; Olei Amygdal. Dulc. ʒij. Tere benè, et adde Aquæ Fœniculi ʒ ij.; Sacchari Albi ʒjss. Sit Electuarium, cujus capiat infans ʒj.—ʒ ij. pro dose.

Form. 84. ELECTUARIUM ARNICÆ COMPOSIT.

℞ Pulv. Flor. Arnicæ ʒ iij.; Pulv. Cinchonæ ℥ss.; Pulv. Rad. Serpentariæ ʒ iij.; Confect. Aromat. ʒ j.; Syrup. Aurantii ℥ v. Misce. Capiat ʒ j.—ʒ ij. 2dis horis.

Form. 85. ELECT. BECHICUM.

℞ Mannæ optimæ ℥ j: tere cum Aq. Flor. Aurantii q. s., et adde gradatim Pulv. Acaciæ ℥ ss.; Extr. Glycyrrh. ʒ j.; Syrup. Tolutan. q. s. Sit Electuarium molle, cujus capiat pauxillum urgenti Tussi. Interdum adde Pulv. Ipecacuanhæ, Extract. Conii, vel Extr. Lactucæ.

Form. 86. ELECTUARIUM CINCHONÆ APERIENS.

Cinchonæ Lancefol. Cort. in Pulv. ℥ j.; Valerian. Rad. Pulv. ʒ iij.; Confectionis Sennæ ℥ jss.; Confect. Aromat. ʒ ij. (vel Confect. Piperis Nigri ʒ iij.); Syrupi Sennæ ℥ ijss. vel q. s. ut fiat Electuarium molle. Cujus devoret Cochlear. j. vel ij. minim. manè, meridiè, et nocte. (In Ague, diseases of Debility, &c.)

Form. 87. ELECTUARIUM CINCHONÆ COMPOSITUM.

℞ Cinchonæ Cordif. Corticis Pulv. ℥ j.; Confectionis Rosæ Gallicæ ℥ ss.; Acidi Sulphurici diluti ʒ j.; Syrup. Zingiberis ℥ jss. M. Fiat Electuarium. Dosis ʒ j.—ʒ ij. ter quaterve in die.

Form. 88. ELECTUARIUM CINCHONÆ CUM FERRO.

℞ Cinchonæ Corticis pulv. ℥ j.; Ferri Sub-carbon. ℈ ij.—ʒ ij.; Syrup. Zingiberis q. s. ut fiat Electuarium. Dosis ʒ j.—ʒ ij. bis terve quotidiè.

Form. 89. ELECTUARIUM DEOBSTRUENS.

℞ Potassæ Supertart. ℥ jss.; Sulph. Præcip. ℥ j.; Subboracis Sodæ ʒ ijss.; Syrup. Zingiberis q. s. ut fiat Electuar. Cochlear. j. vel ij. minima h. s.

Form. 90. ELECTUARIUM FEBRIFUGUM.

℞ Pulv. Cinchonæ ℥ ij.; Pulv. Rad. Serpentar., Pulv. Cort. Canellæ, āā ʒ ij.; Camphoræ rasæ ℈ ij.; Opii Puri gr. iv.; Syrup. Zingiberis, et Syrup. āā q. s. ut fiat Electuarium, cujus capiat ʒ ss.—ʒ jss. pro dose.

Form. 91. ELECTUARIUM FEBRIFUGUM HOFFMANNI.

℞ Pulv. Cinchonæ ʒ vj.; Pulv. Flor. Anthemid. ʒ ij.; Caryoph. in Pulv., Ext. Centaurii Min., āā ʒ ss. (vel Pulv. Centaurii ʒ jss.); Succi Inspiss. Sambuci Nig. ℥ ss.; Syrup. Limonis ℥ jss. M. Capiat ℥ j. 4tis horis.

Form. 92. ELECTUARIUM FEBRIFUGUM TRILLERI.

℞ Cinchonæ Pulv. ℥ j.; Pulv. Flor. Anthem. ʒ ij.; Potassæ Nitratis, Ferri Ammoniati, āā ʒ j.; Syrup. Aurantii ℥ ijss. M. Fiat Electuarium, cujus capiat Cochlear. j.—ij. min. pro dose.

Form. 93. ELECTUARIUM FERRI AMMONIATI COMPOSITUM.

℞ Myrrhæ Pulv. ʒ jss.; Ferri Ammoniati gr. xxxv.: tere simul, et adde Pulv. Radicis Rubiæ ʒ jss.; Pulv. Castorei ʒ ij.; Syr. Zingiberis ℥ jss. vel q. s. ut fiat Electuarium; de quo sumatur, bis quotidiè, ad Myristicæ Nuclei magnitudinem.

Form. 94. ELECTUARIUM FERRI TARTARIZATI.

℞ Potassæ Supertart. ℥ ij.; Ferri Tartarizati ʒ iij.; Zingiberis ℈ j.; Syrup. Aurantii q. s. ut fiat Electuarium molle, cujus capiat ʒ j.—ʒ ij. bis terve in die.

Form. 95. ELECTUARIUM NITRI CAMPHORATUM.

℞ Camphoræ rasæ et ope Alcoholis pulverizat. gr. vj.—xij.; Potassæ Nitratis ʒ jss.; Confect. Rosæ Gallicæ ℥ jss.; Syrup. Simp. q. s. ut fiat Electuarium. Dosis, moles Myristicæ Nuclei subinde capiatur.

Form. 96. ELECTUARIUM PURGANS.

℞ Confectionis Sennæ ℥ ij.; Pulver. Jalapæ ʒ j.; Potass. Supertart. pulv. ℥ ss.; Syrup. Zingiber. ℥ j. M. Sumat Cochl. j. min. bis vel ter die.

Form. 97. ELECTUARIUM SCILLÆ COMPOSITUM.

℞ Potassæ Supertart. contrit. ℥ iij.; Juniperi Bac. et Cacumin. pulv. ℥ j.: tere benè simul, et adde terendo Pulv. Jalapæ ʒ ij.; Oxymel. Scillæ ℥ ij.; Syrup. Zingiberis q. s. ut fiat Electuarium. Dosis ʒ j.—ʒ iij. bis, ter, quaterve in die.

Form. 98. ELECTUARIUM SENNÆ COMPOSITUM.

℞ Sennæ Fol. pulver. ℥ ss.; Potassæ Supertart. pulv. ʒ vj.; Pulv. Jalapæ Rad. ʒ ij.; Sodæ Sub-boracis ʒ j.; Syrup. Zingiberis ℥ ij. Misce. Dosis a ʒ j.—ʒ ij. pro re nata.

Form. 99. ELECTUARIUM TEREBINTHINÆ.

℞ Pulv. Tragacanth. ℈ iv.; Aq. Puræ f. ℥ j. M. Fiat mucilago; tunc gradatim adde Ol. Terebinth. f. ℥ j.; et contere cum Sacch. Purif. ʒ ij.; Pulv. Curcumæ gr. x. ut fiat Electuarium.

Form. 100. ELECTUARIUM TEREBINTHINATUM.

℞ Olei Terebinthinæ ℥ j.; Mellis despumati ℥ ij.; Pulv. Rad. Glycyrrh. q. s. ut fiat Electuarium.

Form. 101. ELECTUARIUM VALERIANÆ COMPOSITUM.

℞ Pulv. Rad. Valerian. Minor. ʒ j.; Pulv. Sem. Santonicæ ʒ ij.; Pulv. Rad. Jalap. gr. xxx.—xl.; Oxymel. Scillæ q. s. ut fiat Electuarium.

Form. 102. ELECTUARIUM VERMIFUGUM.

℞ Sulphatis Potassæ cum Sulphure, Pulveris Radicis Jalapæ, Pulveris Radicis Valerianæ, āā ʒ j.; Oxymellis Scillitici, ℥ iv. M. Sumantur adulti ℥ ss., quatuor vices de die, et pueri e ʒ j. ad ʒ ij. (STOERK.)

Form. 103. ELIXIR ALOES COMPOSITUM.

℞ Croci Stig. pars j.; Potassa Acet., Aloes, Fellis Tauri inspiss., āā part. ij.; Myrrhæ, part. ij.; Spirit. Vini (vulgo *Brandy* dict.) part. xxiv. Infunde et macera secundum artem, et cola. ʒ j.—ʒ ijss. pro dose.

Form. 104. ELIXIR PECTORALIS WEDELLII.

℞ Assafœtidæ ʒ ij.; Flor. Benzoës, Opii Purif., Camphoræ, Croci Stig., Rad. Scillæ, Olei Anisi, āā ℈ ij.; Bals. Peruv. ℥ ss.; Spirit. Vini Rect. ℔ ijss. Macera, et cola.

Form. 105. ELIXIR PROPRIETATIS RHUBARBARINUM.

℞ Aloes Socotrin. ℥ j.; Rhei ʒ vj.; Myrrhæ ʒ iijss.; Croci Stigmat. ʒ iij.; Sub-carb. Potassæ ʒ ijss.; Vini Madeirensis ℔ j.; Alcohol. ℥ iij. Macera per dies Septem, et cola. (In dos. ʒ j.—ʒ ij. Vermifuge, emmenagogue, &c.)

Form. 106. ELIXIR TONICUM.

℞ Aloes, Myrrhæ, āā ʒ ij.; Summit. Absinthii, Sum. Centaurii Minoris, Cinchonæ in Pulv., āā ℥ ss.; Corticis Aurantii Amaræ ʒ iij.; Croci ʒ ij.; Vini Albi Hispan. ℔ ij. Macera in sole per horas xlviij.; dein adde Sacchar. Alb. ℥ viij., et cola.

Form. 107. EMPLASTRUM AMMONIÆ.

℞ Ammoniæ Muriatis ʒ j.; Saponis Duri ʒ ij.; Emplastri Plumbi ℥ ss.; Emplastrum et Sapònem simul liqua, et paulo antequam concrescant immisce Salem in pulverem tenuem tritum. Extensum super alutam parti affectæ quamprimum applicatur, et pro re nata repetatur.

Form. 108. EMPLASTRUM ANODYNUM FORTIUS. (RICHTER.)

℞ Emplastr. Galban. Comp. (vel Emp. Cumini) ℥ j.; Camphoræ ʒ j.; Ammon. Sub-carbon, Opii Puri, āā ʒ ss.; Olei Cajeput. gtt. xl. Fiat Emplastrum secundum artem.

Form. 109. EMPLASTRUM ANTICOLICUM.

℞ Gum. Ammoniaci, Gum. Galbani, āā ℥ j.; Terebinthin. Venet. et Terebinthin. Commun. āā ʒ x.: lento igne liquefactis, adjice Assafœtidæ ℥ jss.; Croci Stigm. ʒ iij.; Olei Menthæ Pip., et Olei Rutæ, āā ʒ ss.—ʒ j. et omnia misce.

Form. 110. EMPLASTRUM ANTIHYSTERICUM.

℞ Galbani, Sagapeni, āā ℥ j.; Assafœtidæ ʒ ss.; Olei Rutæ ʒ ss.—ʒ j.; Aceti Vini q. s. ad Gum. Resin. liquefaciendum: dein adde Terebinthinæ Commun. ℥ j.; Ceræ Flavæ ℥ iij.; Pulv. Myrrhæ ʒ ss.; Pulv. Castorei ʒ jss.; Olei Succini ʒ ss. Misce. (The Wurtemberg and Manheim Pharm.)

Form. 111. Emplastrum Aromaticum Compositum.

℞ Emplast. Arom. (*Ph. Dub.*), vel Emp. Cumini ℥ss.; Sulphuris Sublimat. ʒij.; Olei Macis ♏ xxxv. Fiat Emplastrum.

Form. 112. Emplastrum Belladonnæ.

℞ Extr. Belladonnæ part. iij.; Ammon. Carbon. pulv. pars j. Misce, et fiat Emplastrum. (To very painful parts.)

Form. 113. Emplastrum Camphoræ.

℞ Olei Olivæ ℥xij.; Minium ℥viij. Liqua, et massæ refrigeratæ adjice Camphoræ ℥ijss.: solutæ in pauxillo Olei. Misce benè. (Stahl.)

Form. 114. Emplast. Defensivum.

℞ Minium ℥viij.; Aceti ℥iv.; Olei Olivæ ℔j. Liqua, et adde Ceræ Flavæ ℥ij.; Camphoræ ℥ss. Misce benè.

Form. 115. Emplastrum Deobstruens.

℞ Potassæ Sulphureti, Pulv. Conii, āā ʒijss.; Camphoræ Pulveris, Terebinthinæ, āā ʒiv.; Saponis Albi ʒss.; Ceræ Flavæ ℥j.; Emplast. Simp. ℥iv. M.

Form. 116. Emplastrum Picis.

℞ Picis Abietinæ vel Nigræ ℥vj.; Ceræ Flavæ ℥j.; Terebinthinæ Vulg. ʒiij.; Liquefac simul, et fiat Emplastrum.

Form. 117. Emplastrum Resolvens.

℞ Emplast. Ammoniaci cum Hydrarg., Emplast. Picis Comp., Emplast. Galbani Comp., āā partes æquales. Fiat Emplastrum.

Form. 118. Emplastrum Roborans.

℞ Emplastr. Picis Comp., Empl. Galban. Comp., Emp. Cumini, āā partes binas; Oxidi Ferri Rubri; Thuris, āā partem unam; Olei Pimentæ q. s. ut fiat Emplastrum.

Form. 119. Emplastrum Rubefaciens.

℞ Emplast. Aromat. Comp. (F. 111.) ℥ss. Forma in Emplast., dein asperge cum Antimonii Tartarizati ʒj.; Camphoræ Pulveriz. ℈j.; Sulphur. Sublimati ʒss. in unum admixtis.

Form. 120. Emplastrum Stibiatum.

℞ Emplast. Picis Comp. part. xj.; Terebinth. Venet. part. iv.; Antimon. Tartarizat. in Pulv. part. j. Liquefac Emplastrum et Terebinthinam, et adde Antimonium. (Niemann and Augustin.)

Form. 121. Emulsio Amygdalo-Camphorata.

℞ Amygdal. Dulc. decor. ℥ss.; Amygdal. Amar. N iij.; Aquæ Fontanæ ℥vijss. l. a. Emulsio, in Colatura admisce Pulv. Gummi Arabici ʒij.; Camphoræ (cum paul. Alcohol. subactæ) ℈j.; Syrup. Papaveris Albi ℥ss. M. Et sit Emulsio, de qua sumat quovis bihorio Cochleare unum, prægressa vitri commotione.

Form. 122. Emulsio Anticharrhalis.

℞ Sem. Phelland. Aquat. con. ʒj.; Gum. Acaciæ ʒj.; Aq. Ferv. ℥ix. Macera, et cola. Colaturæ adde Syrup. Althææ ℥ss.; Vini Ipecac. ʒij. M. Capiat Coch. ij. larga 3tiis vel 4tis horis.

Form. 123. Emulsio Camphorata.

℞ Olei Amygdal. Dulc. ℥ss.; Gum Acaciæ q. s.; Camphoræ gr. x.—℈j.: tere benè simul, et adde Aquæ Fœniculi et Aquæ Laurocerasi ℥ij.; Syrup. Althææ ℥ss. M. Fiat Emulsio.

Form. 124. Emulsio Camphorata. (Augustin.)

℞ Camphoræ Subactæ gr. xvj.; Amygdal. Dulc. ℥ss.; Aquæ Flor. Sambuci ℥vj. Sit Emulsio.

Form. 125. Emulsio Camphorata Composita.

℞ Camphoræ gr. x.—℈j.: subige in Alcoholis f. ʒss.; et adde terendo Mucilag. Acaciæ ʒij.; Olei Amygdal. Dulc. ℥ss.; Syrup. Althææ ℥ss.; Aquæ Laurocerasi, Aquæ Fœniculi, āā ℥ijss. M. Capiat Coch. j. vel ij. 3tiis vel 4tis horis.

Interdum adjiciatur vel Vinum Ipecacuanhæ, vel Vinum Antimonii, vel Potassæ Nitras, vel Syrupus Papaveris Albi.

Form. 126. Emulsio Nitro-Camphorata.

℞ Camphoræ Subactæ, Potassæ Nitratis, āā ℈j.; Pulv. Gum. Acaciæ ʒj.; Infus. Pectoralis vel Aquæ Flor. Aurantii, ℥vjss.; Syrup. Althææ ℥j. M. Fiat Emulsio.

Form. 127. Emulsio Pectoralis.

℞ Spermaceti ʒj.; Gum Acaciæ ʒij.; Olei Amygdal. Dulc. ℥j.; Syrup. Simp., Syrup. Tolutan., āā ℥ss.; Aq. Fœniculi ℥ivss. M. Fiat Emulsio.

Form. 128. Emulsio pro Tussi.

℞ Olei Amygdal. Dulc. ℥jss.; Vitelli Ovi unius; Aquæ Flor. Aurantii ℥v.; Mucilag. Acaciæ ℥ss.; Vini Ipecacuanhæ ʒjss.; Syrup. Althææ ℥ss. M.

Form. 129. Emulsio Sedativa.

℞ Mist. Amygdal. Dulc.; Mist. Camphoræ āā ℥ijss.; Mucilag. Acaciæ ℥ss.; Morphinæ Acetatis gr. j.—ij.; Syrup. Tolutan. ℥ss. Solve Morph. Acetat. in Olei Amygdal. ♏ xx.; deinde adde alia.

Form. 130. Enema Aloes et Assafœtidæ Comp.

℞ Extr. Aq. Aloes ʒss.; Assafœtidæ ʒjss.; Camphoræ rasæ gr. xij.; Olei Olivæ ℥jss.; Decocti Avenæ ℥xij. Misce. (In Flatulent Colic, Ascarides, &c.)

Form. 131. Enema Antihystericum.

℞ Fol. Rutæ, Fol. Sabinæ, āā ℥ss.; Aquæ Fervid. q. s. Coque ad ℥xvj.; et adde Assafœtid. ʒij.; Olei Olivæ ʒij. Misce.

Form. 132. Enema Antispasmodicum. (1.)

℞ Tinct. Opii ʒj.; Infus. Valer. ℥x.; Mucilag. Acaciæ ʒj. M.

Form. 133. Enema Antispasmodicum. (2.)

℞ Tinct. Opii ʒss.—ʒj.; Infus. Cuspariæ, Decocti Althææ Off., āā ℥v. M. Pro Decoct. Alth. interdum utatur vel Decocto Malvæ, vel Decoct. Hordei, vel Infus. Ipecacuanhæ.

Form. 134. Enema Assafœtidæ, vel Fœtidum.

℞ Assafœtidæ Gummi Resinæ ʒij.; Decocti Malvæ Composit. ℥x.; Spiritus Ammoniæ Compos. ʒjss.; Tincturæ Opii ʒss. Misce pro Enemate.

Form. 135. Enema Assafœtidæ et Terebinthinæ.

℞ Assafœtidæ ʒj.—ʒij.; Camphoræ rasæ gr. xij.: tere cum Decoct. Avenæ ℥viij.; dein adde Olei Terebinth. ℥ss. ad ℥jss. Misce, et fiat Enema.

Form. 136. Enema Assafœtidæ Compositum.

℞ Assafœtidæ ʒj.—ʒij.; Camphoræ rasæ gr. x.; Decocti Avenæ ℥xij. Misce pro Enemate. Interdum adde Olei Terebinth. ʒiij.—℥jss. In Flatulent Colics, Worms, &c.

Form. 137. Enema Belladonnæ.

℞ Fol. Belladonnæ exsic. gr. xij.; Aq. Fervid. ℥vj. (In retention of the urine from Spasm of the Sphinct. Vesicæ, or Spasm of the Rectum.)

Form. 138. Enema Camphoræ Comp.

℞ Camphoræ rasæ gr. xij.; Olei Juniperi Angl. ʒss.; Infus. Valerianæ ℥x.; Mucilag. Acaciæ ℥j. M. Fiat Enema.

Form. 139. Enema Camphoratum.

℞ Acidi Acetici Camphorati (F. 2.) ʒss.—ʒj; Infus. Valerianæ ℥viij. M. (Augustin.)

Form. 140. Enema Catharticum.

℞ Decocti Malvæ Composit. ℥x.; Magnesiæ Sulphatis ʒj.; Olei Olivæ f. ℥ij. Misce. Fiat Enema.

Form. 141. Enema Colocynthidis Compositum.

℞ Colocynthidis Pulpæ incis. ʒj.; Aquæ ℥xij. Coque paulisper et cola: dein adde Sodæ Muriatis (vel Sodæ Sulphatis) ℥ss.; Syrup. Rhamni Cath. ℥ss. Misce.

Form. 142. Enema contra Spasmos.

℞ Camphoræ rasæ gr. v.—x.; Potassæ Nitratis ʒss. Olei Olivæ ℥j.: tere simul, et adde Infusi Valerianæ, Decocti Malvæ Comp., āā ℥vij. M.

Form. 143. Enema Emolliens.

℞ Flor. Anthemidis, Semin. Lini contus., āā ℥ss.; Aquæ Fervid. ℥vj. Macera et cola; dein adde Opii gr. vj.—xvj. M. Fiat Enema.

Form. 144. Enema Emollio-Aperiens.

℞ Decoct. Malvæ Comp. ℥xij.; Sodæ Tartariz. ℥ss.; Olei Olivæ ℥ij. M. Fiat Enema.

Form. 145. Enema Opiatum.

℞ Tincturæ Opii f. ʒj.; Mucil. Amyli ℥vj. Misce. Fiat Enema, tepid. injiciend.

Form. 146. Enema Saponis.

℞ Saponis Mollis ℥j.; Aquæ Ferventis Oj. Solve, et tepidum exhibe.

Form. 147. Enema Sedativum.

℞ Seminum Lini contus. ℥j.; Aquæ Ferventis ℥viij. Macera per horam: dein cola, et solve in Colat. Sub-boratis Sodæ ℈j.; Opii Extr. gr. ij.—iij. M. Fiat Enema. Vel,

Form. 148. Enema Sedativum Camphoratum.

℞ Infus. Lini Comp. ℥x.; Tinct. Opii ʒss.; Sub-boratis Sodæ ʒss.; Camphoræ rasæ gr. x. M. Fiat Enema, bis terve in die injiciendum.

Form. 149. Enema Terebinthinatum.

℞ Camphoræ rasæ ℈j.; Olei Terebinth. ʒss.—ʒjss.; Olei Olivæ ℥jss.; Decoct. Avenæ ℥viij. Fiat Enema.

Form. 150. Enema Terebinthinæ.

℞ Terebinthinæ Vulgaris ʒj. (vel Olei Terebinthinæ f. ℥ss.); Ovi unius Vitellum. Tere simul, et gradatim adde Decocti Avenæ tepid. ℥x. Injiciatur pro Enemate semel in die, pro re nata. (When it is required to evacuate the lower bowels, Ol. Ricini ʒj. will be found a useful addition.)

Form. 151. Enema Terebinthino-Camphoratum.

℞ Olei Terebinth. ʒj.; Olei Olivæ ℥jss.; Camphoræ rasæ gr. xv.; Decoct. Avenæ ℥viij. M. Fiat Enema.

Form. 152. Enema Thebaiacum.

℞ Opii Puri gr. j.—iij.; Mucilag. Acaciæ ℥ss.; Lactis Tepefact. ℥vj. Misce pro Enemate.

Form. 153. Enema Vermifuga.

℞ Rad. Valerian., Herb. Absinthii, Herb. Tanaceti, Cacum. (vel Sem.) Santonic., āā ʒiij.; Aq. Fervid. ℥xii. Macera per horas binas, et cola. Liq. colat. adde Salis Commun. ℥ss. Fiat Enema.

Form. 154. Extractum Aloes Alkalinum Comp.

℞ Aloes Spicati Extr. contrit. ℥iij.; Zingiberis Radicis concis. ℥ss.; Myrrhæ Pulv., Croci Stigmat., āā ʒvj. Potassæ Sub-carbon. (vel Sodæ Sub-carbon.) ℥ss.; Macera per triduum leni cum calore, dein cola. Liquoram defæcatam consume, donec idoneam habeat crassitudinem. (Dosis gr. x. ad xxx.)

Form. 155. Extractum Dulcamaræ.

℞ Stipit. Dulcamaræ, pars j.; Aquæ Bullient. part. viij. (Split the shoots of dulcamara longitudinally, and macerate them in the water for twelve hours; boil for a quarter of an hour, and express the fluid. Afterwards boil the residue with four parts of water, and finally express. Mix the two liquors, and evaporate with a gentle heat to a proper consistence.)

Form. 156. Extractum Hellebori Nigri Backeri.

℞ Radicis Hellebori Nig. exsic. ℔ij.; Potassæ Sub-carbon. ℔ss.; Alcohol. (22 grad.) ℔viij.

Backer directs the above to be digested in a sand-bath for twelve hours, shaking it frequently, and afterwards to be expressed and strained. Eight pounds of white wine are to be poured upon the residue, and digested with it for twenty-four hours in a sand-bath, and afterwards to be expressed and strained. After a few hours both these tinctures are to be mixed together, and evaporated with a gentle heat to the consistence of an extract. This is the best preparation of Hellebore. Dose from 10 to 15 grains.)

Form. 157. Fomentum Camphoratum.

℞ Camphoræ ʒss.; Acidi Acetici ℥ij.; Aceti Commun. ℥x. M. (Augustin.)

Form. 158. Gargarisma Acidi Muriatici.

℞ Infus. Cinchonæ ℥vj.; Acidi Muriatici ♏xx.; Mellis ℥ss. M.

Form. 159. Garg. Acidi Muriatici Compositum.

℞ Acid. Muriatici f. ℥jss.; Decoct. Cinchonæ, Infus. Rosæ Compos. āā f. ℥iijss.; Mellis Rosæ f. ℥j. M. Fiat Gargar.

Form 160. Gargarisma Antisepticum.

℞ Decocti Cinchonæ ℥vj.; Camphoræ gr. xx.; Ammoniæ Muriatis gr. xv. M.

Form. 161. Gargarisma Astringens.

℞ Infusus Rhataniæ, ℥vjss.; Acid Sulph. Dilut. ʒss.; Syrupi Mori ℥j. M. Fiat Gargarisma. (For Relaxation of the Uvula and Fauces.)

Form. 162. Gargarisma Astringens Zobellii.

℞ Aluminæ Crud., Potassæ Nitrat., āā ʒss.; Potassæ Supertart. ℈ij.; Aceti Distil. ℥ij. Solve, et adde Aquæ Rosar. ℥ij. M. Fiat Gargarisma.

Form. 163. Garg. Boracis Sodæ.

℞ Boracis Pulver. ʒij.; Aquæ Rosæ f. ℥vij.; Mellis Despumat., Tincturæ Myrrhæ, āā f. ℥ss. M.

Form. 164. Gargarisma Catechu Thebaiacum.

℞ Infusi Rosæ f. ℥vij.; Tincturæ Catechu f. ʒvj.; Acidi Sulphurici diluti f. ʒj.; Tincturæ Opii f. ʒjss. Sit Gargarisma sæpe utendum. (A. T. Thomson.)

Form. 165. Gargarisma Commune.

℞ Aquæ Puræ ℥xxij.; Sub-boracis Sodæ ʒx.; Tinct. Catechu ʒj.—ʒiij.; Tinct. Capsici Annui ʒj.—ʒiij.; Mellis Rosæ ℥jss.—℥iij. Interdum adde, loco Boracis Sodæ et Tinct. Catechu, Acidum Muriaticum, vel Acidum Sulphuricum.

Form. 166. Gargarisma Potassæ Nitratis. (1.)

℞ Potassæ Nitratis ʒjss.; Mellis Despumat. f. ℥ij.; Aquæ Rosæ f. ℥vj. M. Fiat Gargarisma.

Form. 167. Garg. Potassæ Nitratis. (2.)

℞ Potassæ Nitratis ʒij.; Decocti Hordei f. ℥vij.; Oxymellis Simplicis f. ℥j. M. (Brande.)

Form. 168. Guttæ Acetatis Morphinæ.

℞ Morphinæ Acetatis gr. xvj.; Aquæ Destillatæ ℥vj.; Acidi Acetici diluti ʒij. M.

Form. 169. Guttæ Ætheris Terebinthinatæ.

℞ Olei Terebinthinæ pars j.; Æther. Sulphurici (vel Æther. Nitrici) part. iij. M. (Nearly the same as that recommended by M. Durande in Jaundice and Biliary Calculi.)

Form. 170. Guttæ Anodynæ Acetatis Morphinæ.

℞ Morphinæ Acetatis gr. xvj.; Aquæ Distillatæ ℥j.; Acidi Acetici ♏iij.; Spiritus Vini ʒjss. M. (Misce. In doses of from five to thirty drops.)

Form. 171. Guttæ Antiloimicæ.

℞ Pulv. Camphoræ ʒij.; Spirit. Rect. ℥viij.; Liquor. Ammon. ℥ij.; Ol. Lavendul. ʒij. M. Fiant Guttæ, quarum capiat xx. ad ʒj. quovis in idoneo vehiculo.

Form. 172. Guttæ contra Spasmos.

℞ Olei Cajeputæ, Tinct. Æther. Valerianæ (Vide Form.) Spirit. Ammon. Succinat., āā ℥j.; Olei Anisi ʒij. M. (♏x. ad xxxv.)

Form. 173. Guttæ contra Spasmos. (Stoll.)

℞ Liquor Ammoniæ Carbon., Tinct. Castorei, Tinct. Succini, Tinct. Assafœtidæ, āā ʒiij. M. ♏L. bis terve in die.

Form. 174. Guttæ Nervinæ.

℞ Camphoræ, Croci, āā ʒjss.; Moschi, Myrrhæ, āā ℈iv.: tere cum Sacchar. Albi ℥ss; et Spirit. Vini Rectific. ʒij.: dein adde terendo Olei Lavand., Ol. Juniperi, Ol. Rosmarini, Olei Origani, āā ʒiij.; Olei Succini, Olei Cajeputi, āā ʒj.; Olei Limonis ℥ss.; Olei Terebinthinæ ℥ij.; Sacch. Albi ℥ss.; Spirit. Vini Rect. ʒij. Macera et serva, sine colat., in vase benè obturato.

Form 175. Haustus Acidi Nitrici et Opii.

℞ Tinct. Opii ♏xx.—xxx.; Tinct. Caryoph. (Vide Form.) ʒij.—ʒss.; Acidi Nitrici ♏xx.; Aquæ Pimentæ ℥j. M. Fiat Haustus.

Form. 176. HAUSTUS ACIDI NITRICI ET OPII.

℞ Acidi Nitrici Diluti ʒj.; Tinct. Opii ʒss.; Infusûs Calumbæ ʒ xss. Misce, ft. Haustus ter in die capiendus.

Form. 177. HAUSTUS ANODYNUS.

℞ Mist. Camphoræ ʒ ix.; Potassæ Nitratis gr. vj.; Spirit. Ætheris Sulph. Compos. ʒj.; Tinct. Opii ♏ x.—xij.; Syrup. Papaveris ʒ ij. Fiat Haustus, horâ decubitus sumendus.

Form. 178. HAUSTUS ANTI-EMESIN.

℞ Infus. Aurantii Comp. ʒ x.; Spirit. Menthæ Virid. ʒ j.; Liq. Potassæ ♏ x.; Magnes. Carbon. ℈ j.; Tinct. Hyosciami ʒss.; Extract. Humuli gr. viij.; Syrup. Zingib. ʒj. M. Fiat Haustus.

Form. 179. HAUSTUS ANTI-EMETICUS.

℞ Magnes. Carbon. ℈j.; Extr. Humuli gr. vj.; Liq. Potassæ ♏ viij.; Tinct. Hyosciami ʒ ss.; Spirit. Menthæ Virid. ʒ j.; Infus. Aurantii Comp. (vel Infus. Caryoph. Comp.) ʒ x.; Syrup. Zingiberis ʒ j. M.

Form. 180. HAUSTUS APERIENS.

℞ Extract. Rad. Jalapæ gr. xv.: tere cum Amygdal. Dulcis Num. iv.; Aquæ Cinnam. ℥j. Fiat Haustus.

Form. 181. HAUSTUS APERIENS EX JALAPA ET ALOE.

℞ Pulv. Rad. Jalapæ gr. xvj.; Aloes Socot. gr. x.: tere probe cum Extract. Glycyrrh. ʒss.; Tinct. Rhæi ʒj.; Ol. Carui ♏ ij.; Aquæ Cinnam. ℥j. M. Fiat Haustus.

Form. 182. HAUSTUS APERIENS EX SCAMMONIA.

℞ G. R. Scammon. gr. xij.: tere cum Glycyrrh. Extract. gr. xx.; Tinct. Rhæi ʒ ij.; Syrup. Zingiberis ʒ j.; Aq. Cinnam. ℥j. M. Fiat Haustus.

Form. 183. HAUSTUS ASTRINGENS.

℞ Quercus Corticis cont. ℥ss.; Aquæ Ferventis ℥ xiij. Macera per horam, et cola.

℞ Hujus Colaturæ ʒ xj.; Tinct. Catechu ʒss.; Tinct. Cardamom. Comp. ʒj.; Syrup. Aurantii Cort. ʒj. Fiat Haustus.

Form. 184. HAUST. BORACICUS

℞ Infus. Lini Co., vel Infus. Althææ Co., ℥jss.; Sub-boratis Sodæ ℈j.; Spirit. Æther. Nit. ʒ ss.; Syrup. Papaveris, Syrup. Aurantii, āā ʒss. M. Fiat Haustus, tertiis vel quartis horis capiendus.

Form. 185. HAUSTUS CUM CALUMBA ET FERRO.

℞ Infusi Calumbæ f. ʒ xj.; Tincturæ Ferri Muriatis ♏ xv.; Tincturi Calumbæ f. ʒj. Fiat Haustus, bis die sumendus.

Form. 186. HAUST. CAMPHORÆ COMP.

℞ Camphoræ g. iij.—vij.; Tinct. Calumbæ, Spirit. Anisi, āā ʒjss.; Aquæ Pimentæ, Aquæ Menth. Virid., āā ʒ v. Tere Camphoram cum Tincturâ et Spiritu; dein adde gradatim Aquas. Fiat Haustus, horâ somni, vel urgenti vomitu, sumendus. Si sit occasio, adde Tinct. Opii ♏ x.—xx., vel Tinct. Hyosciami ♏ xv.—xxv.

Form. 187. HAUSTUS CARMINATIVUS.

℞ Magnes. Sub-carbon. ʒj.; Pulv. Rhæi gr. x.—ʒss.; Olei Anisi ♏ iij.; Liq. Potassæ ♏ xij.; Aquæ Ammoniæ ♏ xx.; Aquæ Anethi ℥ij. M. Fiat Haustus.

Form. 188. HAUSTUS COLCHICI.

℞ Vini Colchici min. xxv.—xxxv.; Magnes. Carbon. ℈j.; Aquæ Cinnam., Aquæ, āā ʒ vj. M.

Form. 189. HAUSTUS CUM COLCHICO.

℞ Potassæ Sulphatis ʒjss.; Sodæ Carbonatis ℈ ij.; Aquæ Anethi ℥jss.; Tinct. Calumbæ ʒjss.; Vini Colchici ♏ xxv. Fiat Haustus cum Acidi Tartarici granis quindecem in Aquæ semifluid-uncia solutis, in impetu effervescentiæ sumendus.

Form. 190. HAUSTUS CONII.

℞ Infus. Conii (F. 230.) ℥j.; Liq. Ammon. Acet. ʒ ij.—ʒ iij Tinct. Hyoscyami vel Conii, ♏ xv.; Syrup. Papaveris ʒss. M. Fiat Haustus.

Form. 191. HAUSTUS CONII ET HYOSCYAMI COMP.

℞ Extracti Conii, Extracti Hyoscyami, āā gr. v.; Mucilaginis Acaciæ f. ʒ ij. Tere simul donec quam optimè misceantur, et deinde adde Liquoris Ammoniæ Acetatis, Aquæ Puræ, āā f. ℥ss.; Syrupi Rhæados f. ʒj.; Fiat Haustus, quartâ quâque horâ sumendus. (PARIS.)

Form. 192. HAUSTUS DEOBSTRUENS ET TONICUS.

℞ Rad. Angelicæ contusi ʒ ijss.—℥ss.; Rad. Calumbæ concisi ʒ jss.; Rad. Rhæi cont. ʒ ij.; Baccarum Capsici cont. gr. xxv.; Aquæ Ferventis octarium dimidium. Macera per horas duas, deinde cola.

℞ Hujus Infus. ʒ x.; Tinct. Calumbæ ʒ j.; Potassæ Sulphatis gr. xxv.; Syrup. Aurantii ʒj. M. Fiat Haustus, bis quotidiè sumendus.

Form. 193. HAUSTUS DIAPHORETICUS.

℞ Infus. Serpentariæ Comp. (F. 262.) ℥j.; Liq. Ammon. Acet. ʒ iij.; Syrup. Aurantii ʒj. M. Fiat Haustus, bis terve in die sumendus. (Dyspepsia, with dry. harsh skin; languor; and debility of pulse.)

Form.. 194. HAUSTUS DIURETICUS. (1.)

℞ Potassæ Acetatis ʒj.; Oxymel. Colchici ʒ ij.: tere cum Aquæ Fœniculi Dulcis ℥j.; Spirit. Juniperi Comp. ʒiij. M. Fiat Haustus, bis terve in die sumendus.

Form. 195. HAUSTUS DIURETICUS. (2.)

℞ Acidi Nitrici Diluti, Spiritûs Ætheris Nitrici, āā ʒj.; Infusûs Digitalis ʒ iij.; Aquæ Destillatæ ʒ ix.; Syrupi Zingiberis ʒ ij. M. Fiat Haustus, ter in die sumendus.

Form. 196. HAUSTUS DIURETICUS. (3.)

℞ Potassæ Acetatis ʒss.; Infusi Quassiæ, Aq. Cinnamomi, āā f. ʒ vj.; Aceti Scillæ, Spiritûs Ætheris Nitrici, āā f. ʒss. M. Fiat Haustus, ter in die capiendus.

Form. 197. HAUSTUS DIURETICUS. (4.)

℞ Tincturæ Jalapæ f. ʒ ij.; Aceti Scillæ ʒj.; Aquæ Menthæ Viridis f ℥jss. Fiat Haustus.

Form. 198. HAUSTUS EMETICUS EXCITANS.

℞ Pulv. Radicis Ipecacuanhæ ʒss.; Ammoniæ Sub-carbon. ℈j.; Aquæ Menthæ Piper. ℥ijss.; Tinct. Capsici f. ℈j.; Olei Anthemidis ♏ x. M. Fiat Haustus emeticus. (In Poisoning from Narcotics, &c.)

Form. 199. HAUSTUS GUAIACI COMPOSITUS.

℞ Tincturæ Guaiaci f. ʒ j.; Mellis ʒ j.: tere simul, et adde Decoct. Senegæ f. ℥jss.; Ammoniæ Sub-carbonatis gr. vj. Fiat Haustus, sextâ quâque horâ sumendus.

Form. 200. HAUSTUS INFUSI CINCHONÆ CUM ACIDO MUR.

℞ Pulveris Cinchonæ ℥j.; Confectionis Rosæ ℥jss.; Aquæ Ferventis O j.: tere benè, et per horam, in vase clauso, infunde.

℞ Liquor. Colati ʒ xj.; Tinct. Cinchonæ ʒj.; Acidi Muriatici Diluti ♏ viij. M. Fiat Haustus, ter quotidiè sumendus.

Form. 201. HAUSTUS INFUSI CUSPARIÆ COMPOSITUS.

℞ Corticis Cuspariæ contus. ʒ ij.; Rad. Calumbæ contus. ʒjss.; Rad. Rhæi ʒj.; Sem. Cardam. contrit. ʒss.; Sem. Anisi cont. ʒss.; Aquæ Ferventis ℥ xv. Macera per horas duas, et cola. Hujus Infusionis ℥j. Tinct. Cinnam. ʒjss.; Spirit. Amm. Aromat. ♏ xxv.; Syrup. Aurantii ʒj. Fiat Haustus, ter quotidiè sumendus. (In all diseases of Debility, excepting Hectic Fever, and in Relaxation of Mucous Surface.)

Form. 202. HAUSTUS INFUSI UVÆ URSI ALKALINUS.

℞ Infus. Uvæ Ursi ℥jss.—ʒij.; Potassæ vel Sodæ Sub-carbon. gr. xv.; Tinct. Hyosciami ʒss. (vel Tinct. Opii Camphor., vel Extr. Conii); Syrup. Papaveris ʒss. Fiat Haustus, ter quaterve quotidiè sumendus. (In Affections of the Urinary Organs, and of the Air Passages.)

Form 203. HAUSTUS INFUSI UVÆ URSI COMPOSITUS.

℞ Infus. Uvæ Ursi (F. 267.) ʒ xiv.; Acidi Sulphur. Dil. ♏ xx.; Tinct. Digitalis ♏ xv.; Syrup. Papaveris veri ʒjss. M. Fiat Haustus, ter quaterve quotidiè sumendus. (In Laryngitis, Bronchitis, &c.)

Form. 204. HAUST. CUM IODINA.

℞ Liquor. Potassæ Hydriodat. Iodiur. Concent. (F. 328.) ♏ vj.—xv.; Aquæ Destillatæ ʒj.; Syrup. Althææ ʒ ij. M. Fiat Haustus.

Form. 205. HAUSTUS LAXANS.

℞ Potassæ Tartratis ʒj.; Infus. Sennæ Compos., Aquæ Pimentæ, āā f. ʒ vj.; Tinct. Jalapæ f. ʒj. M. Fiat Haust. laxans.

Form. 206. Haust. cum Plumbi Acetate.

℞ Plumbi Acetatis gr. j. Solve in Aquæ Rosæ f. ℥j.; et adde Oxymellis Simplicis f. ʒj.; Tinct. Opii ♏v.; Tinct. Digitalis ♏x. Fiat Haustus, quartis vel sextis horis sumendus.

Form. 207. Haustus Quiniæ et Zinci.

℞ Zinci Sulphatis gr. ¼.—j.; Quiniæ Sulphatis gr. ij.; Infusi Rosæ Compos. f. ʒx.; Tincturæ Aurantii, Syrupi Aurantii, āā f. ʒj. M. Fiat Haustus, quartâ quâque horâ sumendus.

Form. 208. Haustus Sedativus.

℞ Extr. Conii, Extr. Hyoscyami, āā gr. iv.; Mucilag. Acaciæ ʒij.: tere simul, deinde adde Liquoris Ammon. Acet. ʒiij.; Mist. Camphoræ ʒv.; Syrup. Rhæados ʒj. M. Fiat Haustus, quartâ vel quintâ quâque horâ sumendus.

Form. 209. Haustus Sedativus Emolliens.

℞ Infus. Lini Co., vel Infus. Althææ Co., ℥jss.; Sub-boratis Sodæ ℈j.; Spirit. Æther. Nit. ʒss.; Syrup. Papaveris, Syrup. Aurantii, āā ʒss. M. Fiat Haustus, tertiis vel quartis horis capiendus.

Form. 210. Haust. contra Spasmos. (1.)

℞ Aquæ Menthæ Virid. ℥j.; Liq. Ammon. Acet. ʒij.; Spirit. Ammon. Arom., Spirit. Æther. Sulph. Co., Spirit Lavand. Co., āā ʒss.; Tinct. Opii ♏xx. M. Fiat Haustus, statim sumendus, et pro re nata repetendus.

Form. 211. Haust. contra Spasmos. (2.)

℞ Infus. Caryophyl. ℥jss.; Spirit. Pimentæ, Spirit. Rosmarini, āā ʒss.; Tinct. Opii ♏xx.; Olei Cajeputi ♏x. M. Fiat Haustus ut supra sumendus.

Form. 212. Haustus contra Spasmos cum Pilula Camphoræ.

℞ Mist. Camphoræ ℥j.; Spirit. Ætheris Sulphur. Comp., Tinct. Camphoræ Comp., āā ʒj.; Tinct. Hyoscyami ʒss.; Syrup. Papaveris ʒjss. M. Fiat Haustus, cum Pilul. sequent. sumendus.

℞ Camphoræ rasæ gr. j.—iij.; Ammon. Sub-carbon. gr. iij.—vj.; Mucilag. Acaciæ q. s. M. et fiat Pil. j. vel ij.

Form. 213. Haustus Stimulans.

℞ Aq. Cinnam. ℥jss.; Magnes. Carbon. ʒss.; Spirit. Ammon. Arom. ʒss.; Spirit. Æther. Arom. ʒj.; Olei Rosmarini ♏vij. M. Fiat Haustus statim sumendus.

Form. 214. Haustus Stomachicus.

℞ Calumbæ Rad. concisi ʒj.; Acori Calami Rad. contusi ℥ss.; Rhæi Rad. contusi ℈jss.; Cardam. Sem. contritæ ʒss.; Aquæ ferventis octarium dimidium. Macera per horam, et cola. Hujus Infusionis ʒxij.; Tinct. Aurantii ʒj.; Potassæ Sub-carbon. (vel Sodæ Carbonat.) gr. xij. Misce. Fiat Haustus, bis terve quotidiè sumendus.

Form. 215. Haustus Stomachicus Aperiens.

℞ Sodæ Tartarizatæ ʒij.; Sodæ Carbonatis ℈ij; Aquæ Anethi ℥ss.; Infus. Anthemidis ℥j.; Tinct. Calumbæ; Tinct. Aurantii Co., āā ʒj. M. Fiat Haustus cum Acidi Tartarici, granis quindecim in Aquæ semifluid-uncia solutis, in impetu effervescentiæ sumendus.

Form. 216. Haustus Terebinthinatus Aperiens.

℞ Olei Terebinth. ʒij.—ʒv. Olei Ricini ʒjss.—℥ss.; Olei Limonis et Olei Cajeputi āā. ♏iv. ad xij.; Magnes. ʒss.; Aquæ Menthæ Virid. ℥j.—℥ij. M. Fiat Haustus, pro re nata capiendus. (In puerperal, infectious, and malignant Fevers.)

Form. 217. Haust. cum Uva Ursi.

℞ Pulv. Fol. Uvæ Ursi gr. xv.—℈j.; Potassæ Nitratis gr. xij.; Pulv. Tragacanth. Comp. ℈j.; Aq. Anethi ℥jss. M.

Form. 218. Infusum Amarum.

℞ Summit. Absinthii Artem. ℥j.; Corticis Aurantii ℥ss.; Rhei ℈ij.; Rad. Gentianæ ʒj; Aquæ Ferventis ℥xij. Macera per horam, et cola.

℞ Liq. Colati ℥jss.; Potassæ Sub-carbon. gr. xij., vel Liq. Potassæ ♏xxij.; Tinct. Aurantii Co. ʒj.; Spirit. Anisi ʒj.; Syrup. Zingib. ʒss. M. Fiat Haustus, bis terve quotidiè sumendus.

Form. 219. Infusum Angelicæ Compositum.

℞ Fol. vel Rad. Angelicæ Arch. ℥ij.; Rad. Serpentar. ℥ss.; Florum Sambuci Nig. ℥j.; Potassæ Sub-carbonat. ʒiij.; Aquæ ℔ij. Macera per horas tres, et cola.

℞ Liq. Colat. ℥jss.; Spirit. Juniper. Comp. ʒj.; Tinct. Opii Co. ♏x. Fiat Haustus. (In Atonic Dropsy &c.)

Form. 220. Infusum Anthemidis Compositum.

℞ Flor. Anthemidis ℥ss.; Semin. Anisi cont. ʒiij.; Fol. Menth. Virid. ℥ss.; Caryoph. cont. ʒj.; Aurantii Cort. sic. ʒij.; Aquæ Fervid. ℔jss. Macera per horam, et cola.

Form. 221. Infusum Armoraciæ Compos.

℞ Sinapeos Semin. contus., Armoraciæ Radicis concis., āā ʒiij.; Aquæ Ferventis Oj. Macera per horam, et cola.

℞ Colaturæ ℥vij.; Spirit. Ammon. Arom. ʒjss.; Spirit. Pimentæ ʒiij. M. Capiat Coch. ij. ampla ter quotidiè.

Form. 222. Infusum Arnicæ (Ph. Mil. Dan.)

℞ Flor. Arnicæ ʒj.; Flor. Anthemid. ℥ss.; Herb. Menthæ Piper. ʒij.; Aquæ Fervid. ℥x. Macera, et cola. (Dosis ℥j.—℥jss.)

Form. 223. Infusum Arnicæ Compos.

℞ Arnicæ Montan. Herb., Summit. Artemes. Vulg., āā ℥ss.; Herb. Centaureæ Benedict., Rad. Calam. Aromat., āā ʒij.; Aquæ Fervid. ℥xvj. Macera per horas binas, et cola. Liq. colat. adde Tinct. Aurantii, Spirit. Pimentæ, āā ℥ss.; Spirit. Rosmarini ʒij. M. (Dosis ℥ss.—℥jss. bis terve in die.

Form. 224. Infusum Artemisiæ Vulgaris Co.

℞ Summit. Artemes. Vulgar. ʒvj.; Herb. Centaureæ Bened. ʒiij.; Aquæ Fervid. ℥xvj. Macera per horas binas, et cola. Liq. colat. adde Spirit. Juniperi Comp. ℥j.; Olei Rosmarini ♏xii. M. (In Epilepsy from exhaustion, Chlorosis, &c.)

Form. 225. Infusum Barberis.

℞ Barberis Corticis contus. ℥ss.; Aquæ Ferventis O ss. Macera per horas binas in vase leviter clauso, et cola. (Dosis, f. ℥j. ad ℥ij. bis ter quotidiè: interdum cum Sodæ Sub-carbonate, vel Potassæ Sub-carbonate, vel Tinct. Calumbæ.)

Form. 226. Infusum Calami Aromatici.

℞ Calami Radicis contusi ʒiij.; Aquæ Ferventis O ss. Macera per horas duas, et cola; dein adde Tinct. Calami ℥ss.

Form. 227. Infusum Calami Aromatici Compositum.

℞ Rad. Calami Arom. concis. ℥jss.; Flor. Anthemid. ʒj.; Aurantii Cort. exsic. ʒj.; Caryoph. cont. ʒss.; Aquæ Ferventis O ss. Macera per quartam horæ partem, et cola. Liquori colato adde Potassæ Sub-carbon. ʒj.—ʒij.

Form. 228. Infusum Caryophyl. Comp.

℞ Caryoph. contus. ʒj.; Cort. Aurantii sic. ℥ij.; Semin. Coriandri et Sem. Anisi cont., āā ʒss.; Aquæ Ferventis ℔j. Macera per semi-horam, et cola.

Form. 229. Infus. Cinchonæ cum Quininæ Sulphate.

℞ Cinchonæ Cordifol. Corticis in Pulv. ʒvj.; Confectionis Rosæ ℥jss.; Aquæ Ferventis Oj. Tere benè, et digire per horas duas in vase clauso; dein cola.

℞ Liq. Colati ℥vj.; Sulphatis Quininæ gr. viij.; Acid. Sulphur. Diluti ♏xxiv. Fiat Mist. cujus Coch. ij. larga tertiis vel quartis horis sumend.

Form. 230. Infusum Conii.

℞ Conii Fol. exsiccat. ʒij.; Anisi, et Coriandri Semin. contus., āā ʒjss.; Aquæ Ferventis O ss. Macera per horas duas, et cola. (Dosis ℥j. ad ℥ij. bis, ter, quaterve in die.)

Form. 231. Infusum Diosmæ Crenatæ.

℞ Fol. Diosmæ Crenatæ ℥ss.; Aquæ Ferventis O ss. Macera per horas quatuor, et cola. (Dose ʒj.—ʒjss.

Form. 232. Infusum Gentianæ Alcalinum Compos.

℞ Radicis Gentianæ concis. ʒij.; Corticis Aurantii sic. ʒj.; Semin. Coriandr. contus. ʒj.; Rosmarini Cacumin. ʒj.; Potassæ Sub-carbon. (vel Sodæ Sub-carb.) ʒj.; Aquæ Ferventis ℥xij. Macera per horas duas, et cola.

Form. 233. Infusum Guaiaci Compositum.

℞ Guaiaci Ligni ras. ℔ ss.; Glycyrrhizæ Radicis contusæ ʒj.; Sassafras Corticis Veræ concisæ ℥ss.; Coriandri Seminum contusorum ℥j.; Liquoris Calcis O vj. Infunde per dies tres, dein cola; cujus sumat æger quatuor sexve uncias pro dose, et bis die repetatur. (Sprague.)

Form. 234. Infusum Hederæ, vel Glecomæ Hederaceæ, cum Acido Hydrocyanico.

℞ Glecomæ Hederaceæ vel Hederæ Terrestris ℥ss.—℥vj.; Radicis Glycyrrhizæ ʒiij.; Aquæ Ferventis O j. Macera per horas tres, et cola.

℞ Liq. Colati ℥jss.; Acidi Hydrocyanici ♏ ij.—viij.; Syrup. Althææ Officin. ʒjss. M. Fiat Haustus, sextâ vel octavâ quâque horâ sumendus.

Form. 235. Infusum Juniperi.

℞ Juniperi Baccarum contusarum ℥ij.; Aquæ Ferventis O j. Macera in vase levitèr clauso per horas duas, et cola; dein adde, Spiritus Juniperi Composit. f. ℥j.; et insuper, pro re nata, Potassæ Supertartaris ʒijss. (Dosis, fluidunc. ij. ad iv. ter quaterve quotidiè.)

Form. 236. Infusum et Mistura Juniperi Composit.

℞ Baccarum Junip. contus. ʒijss.; Semin. Anisi contus., Semin. Fœniculi cont., āā ʒjss.; Aquæ Ferventis O j. Macera per horas tres, dein cola.

℞ Liq. Colati ℥xiij.; Potassæ Nitratis ʒjss.; Sodæ Sub-carbon. ʒjss.; Tinct. Scillæ ʒjss.; Spirit. Junip. Co. ʒijss.; Tinct. Opii ♏xxv. Fiat Mist. cujus capiat Cyathus subindè.

Form. 237. Infusum Marrubii.

℞ Marrubii Herbæ exsic. ℥ss.; Aquæ Destillat. Ferventis O ss. Macera per horam, et cola.

℞ Liq. Colati ℥jss.; Tinct. Camphoræ Comp. ʒj.; Ext. Glycyrrh. gr. x. M. Fiat Haustus, ter in die sumendus. (Chronic Bronchitis, and Catarrh with inordinate Secretion.)

Form. 238. Infusum Melissæ Compositum.

℞ Melissæ Officinalis exsic., Radicis Glycyrrh. contus., āā ʒijss.; Sem. Anisi cont., Sem. Fœniculi, Sem. Coriand. cont., āā ʒss.; Aquæ Bullientis ℔ij. Infunde per horam, et cola.

Form. 239. Infusum Menthæ Caryophyllatum.

℞ Folior. Menthæ Virid. sic. ʒiij.; Rosæ Gallicæ Petal. sic. ʒjss.; Caryophyllorum contus. ʒjss.; Aurantii Cort. sic. ʒjss.; Aquæ Ferventis O j. Macera per horam, et cola.

Form. 240. Infusum Menthæ Compositum. (1.)

℞ Fol. Menth. Virid. exsic., Radicis Glycyrrh. concis. et cont., āā ℥ss.; Semin. Anisi et Semin. Coriand. contus. āā ʒj.; Aquæ Ferventis q. s. ut fiat Colaturæ O j. (Adde *Magnes. et Sacch. Album pro torminibus infantum;* aut interdum Acidi Sulphurici Arom. ʒj. pro nausea vel vomitu.)

Form. 241. Infusum Menthæ Compositum. (2.)

℞ Menthæ Viridis exsiccat. contusæ ℥jss.; Rosæ Gallicæ Petalorum exsiccatorum ʒj.; Aquæ Ferventis O j.; Acidi Sulphurici Diluti ʒij.; Sacchari Purificati ℥jss. Menthæ et Rosæ Petalis superinfunde Aquam cum Acidi dimidio mistam. Macera; dein Liquorem effunde, et Saccharum et Acidum reman. adjice. (Dosis à fluidunc. j. ad ij. bis, ter, sæpiusve quotidiè.)

Form. 242. Infusum Menyanthidis.

℞ Menyanthidis Foliorum ℥ss.; Zingiberis Radicis concisæ ℈ij.; Aquæ Ferventis, O ss. Macera in vase clauso per horas duas, et cola. (In doses of ℥j. to ℥jss., united with Spiritus Ætheris Nitrici ʒj. ad ʒij., in Rheumatism, Arthritic Affections, and in Cachectic and Cutaneous Diseases.)

Form. 243. Infusum Millefolii Compositum.

℞ Herb. Millefolii ʒij.; Herb. Rosmarini, Herb. Thymi Vulg., āā ʒj.; Semin. Coriand. cont. ʒj.; Aquæ Ferventis ℔j. Infunde per horam, et cola.

℞ Colaturæ ℥jss.; Spirit. Rosmarini ʒss.; Tinct. Aloes Comp. ʒj.—ʒij. Fiat Haustus, primo mane quotidiè cap. (In Chlorosis, Amenorrhœa, &c.)

Form. 244. Infusum Pectorale. (1.)

℞ Herb. Malvæ Off., Herb. Tussilag., Radicis Althææ, Rad. Glycyrrh., āā ʒj.; Semin. Anisi ℥ss.; Aquæ Fervid. quantum velis. Macera.

Form. 245. Infusum Pectorale. (2.)

℞ Rad. Althææ, Herb. Melissæ, Herb. Menth. Sat., Flor. Sambuci, Flor. Arnicæ, āā ℥j.; Semin. Anisi ℥ss. M. Sint loco Theæ.

Form. 246. Infusum Quassiæ Comp.

℞ Radicis Calumbæ concis. ʒj.; Ligni Quassiæ ʒjss.; Aq. Ferventis q. s. ut sint Colaturæ ℥vijss.: adde Zinci Sulphatis gr. iv.; Acidi Sulphur. Arom. ʒj.; Tinct. Aurantii Co. ʒiij. M.

Form. 247. Infusum Quassiæ cum Aqua Calcis.

℞ Ras. Lign. Quassiæ ℥ss.; Aquæ Calcis Vivæ ℥vij.; Stent in digestione per horas xxiv.: cola, et adde Aquæ Menth. Virid. ℥ij.; Syrup. Aurantii ℥ss. M.

Form. 248. Infusum Rhataniæ.

℞ Rhataniæ Radicis contusæ ʒiij.; Aquæ Ferventis O ss. Macera per horas sex, in vase leviter clauso, et liquorem cola.

Form. 249. Infusum Rhei.

℞ Rhei Radicis concisæ ʒjss.; Aquæ Ferventis O ss. Macera Radicem per horas duas in vase leviter clauso, et cola: dein adde Sacchari Albissimi ʒij.; Olei Menthæ Viridis gtt. viij. solutas in Spiritu Menthæ Piperitæ ℥j. Tunc misceantur.

Form. 250. Infusum Rhei Alkalinum.

℞ Rhei Rad. concis. et contus. ʒij.; Potassæ Sub-carbon. ʒj.; Aquæ Fervid. O ss. Macera per horas quatuor: cola, et adde Tinct. Cinnam ℥ss.

Form. 251. Infusum Rhei Alkalinum.

℞ Infus. Rhei ℥vij.; Potassæ Sub-carbon. ʒijss.; Tinct. Sennæ et Syrup. Sennæ āā ʒiijss. M.

Form. 252. Infusum Rhei Comp.

℞ Rhei Rad. concis. et contus. ℥ss.; Cort. Canellæ Albæ cont. ʒij.; Flor. Anthemid., Corticis Aurantii, āā ʒiij.; Semin. Fœniculi cont., Sem. Coriandri cont., āā ʒj.; Aquæ Ferventis ℔jss. Macera per horas quatuor, et cola. Liquori colato adde Potassæ Sub-carbon. ʒij.; Tinct. Cinnam. ℥j. M.

Form. 253. Infusum Rosæ et Aurantii Comp.

℞ Rosæ Gallicæ Petal. sic. ʒiij.; Aurantii Cort. exsic. ʒij.; Limonis Cort. recent. ʒj.; Caryophyl. contus. ʒjss.; Aquæ Ferventis O jss. Macera per horam, et cola. Liquori colato adde Sacchar. Albi ℥j.

Form. 254. Infusum Rutæ Comp.

℞ Herb. Rutæ, Flor. Anthemid., Radicis Calam. Arom., āā ʒiij. Macera cum Aquæ Fœniculi ℥x. per horas tres, et cola. Liq. colat. adde Camphoræ ℈j.; priùs in Mucilag. Acaciæ q. s. solutæ; Spirit. Æther. Nit. ℥ss. M.

Form. 255. Infusum Salviæ Compositum.

℞ Herb. Salviæ, Semin. Sinapeos, āā ℥ss.; Aquæ Fervid. ℔j. Macera per horam, et cola. Liq. colat. adde Spirit. Armoraciæ Comp. ℥ij. M. Capiat Coch. ij.—iij. ter quaterve in die.

Form. 256. Infusum Sambuci cum Antim. Tart.

℞ Flor. Sambuci ℥j.; Aquæ Fervid. q. s. ut sit Colat. ℥vj.: cui adde Oxymel. Simplicis, Oxym. Scillitici, āā ℥j.; Antimonii Tart. gr. ij. M. Capiat Coch. j. omni horâ. — (Augustin.)

Form. 257. Infusum Santonici Seminum Compositum.

℞ Semin. Artem. Santonici cont., Rad. Valerianæ Opt., āā ℥ss. Infunde in vase clauso cum Aq. Fervid. ℥ix.: cola, et adde Aquæ Menth. Virid. ℥ij.; Extr. Rutæ ʒj.; Tincturæ Valerianæ Ammoniati ʒiij. M. Capiat ℥ss.—℥jss. pro dose. (In Hysteria, Chlorosis, Amenorrhœa, Worms, &c.)

Form. 258. Infusum Sarsaparillæ Alkalinum.

℞ Sarsaparillæ Radicis concisæ et contusæ ℥iv.; Glycyrrhizæ Radicis contusæ ℥j.; Liquoris Calcis O iv. Macera per horas xxiv. in vase leviter clauso, sæpe agitand.

Form. 259. Infusum Senegæ et Serpentariæ Comp.

℞ Rad. Senegæ, Rad. Serpentariæ, āā ℥ss.; Aquæ Fervid. O j. Macera in vase clauso per horam, et cola. Liq. colat. adde Camphoræ ʒss.; priùs solutæ in Ætheris Sulphur. ʒiij.; Aquæ Cinnam. ℥j.; Syrup. Altheæ et Syrup. Papaveris āā ℥ss. M. Capiat Cochlear. ij. largâ 4tis horis. (Hecker.)

Form. 260. Infusum Sennæ.

℞ Sennæ Foliorum ℥ss.; Coriandri Seminum contus. ʒj.; Zingiberis Rad. contus. ʒj.; Extracti Glycyrrhizæ ʒjss.; Aquæ Ferventis Oss. Macera per horam in vase leviter clauso, et liquorem cola.

Form. 261. Infusum Sennæ cum Manna.

℞ Mannæ ℥ij.; Fol. Sennæ ℥jss.; Potassæ Supertart., Seminum Anisi contus., āā ʒijss.; Semin. Coriand. Sat. contus. ʒjss.; Aquæ Ferventis O ij. Infunde per horas quatuor, et cola.

Form. 262. Infusum Serpentariæ Compositum.

℞ Serpentariæ Radicis, Contrayervæ Radicis, singulorum contus. ʒij.; Aquæ Ferventis Oss. Post macerationem in vase aperto per horas duas, liquorem cola, et adde Tinct. Serpentariæ ℥ss. vel ℥j. — (Cum Liq. Ammon. Acet. &c.)

Form. 263. Infusum et Haustus Spartii Composit.

℞ Spartii Cacum. concis. ℥j.; Marrubii Vulgar. Fol. ℥ss.; Aq. Ferventis O jss. Macera per horam, et cola.

℞ Colaturæ ʒxj.; Spirit. Æther. Nit. ʒss.; Spirit. Juniperi Comp. ʒj. Fiat Haustus, ter quaterve quotidiè sumendus.

Form. 264. Infusum Spigeliæ Compositum.

℞ Spigeliæ Radicis concis. ℥ss.; Sennæ Folior. ʒij.; Aurantii Corticis conc., Santonici Seminum contus., Fœniculi Semin. contus., āā ʒj.; Aquæ Ferventis ℥xij. Macera per horas duas in vase leviter clauso, et cola. (Dosis Cyathus Vinos. singulis auroris, jejuno ventriculo. — In Lumbrici. Sprague.)

Form. 265. Infusum Tiliæ Compositum.

℞ Florum Tiliæ Europ. ℥ss.; Rad. Althææ Officin. ʒiij.; Flor. Auran. ʒij.; Aquæ Ferventis ℔ij. Macera per horam; exprime et cola.

Form. 266. Infusum et Mistura Tonico-Aperiens.

℞ Sennæ Foliorum ℥ijss.; Gentianæ Radicis concis. ʒiij.; Aurantii Corticis excis. ʒijss.; Limonis Corticis recentis ʒiijss.; Semin. Coriandri contus. ʒijss.; Zingiberis Rad. concisæ ʒjss.; Aquæ Ferventis O ij. Macera bene in vase clauso per noctem integram (vel per horas octo); exprime bene, et cola. Liq. colat. adde Magnesiæ Sulphatis, Tinct. Cardamom. Comp., āā ℥iij.; Spirit. Vini Rect. ʒiij. M. (Dosis ℥j.—℥jss. pro re natâ.)

Form. 267. Infusum Uvæ Ursi.

℞ Uvæ Ursi Folior. ʒij.; Aquæ Ferventis Oss. Macera in vase clauso, per horas tres, prope ignem, et cola. (With the Alkaline Carbonates in Nephritic Cases, &c.; and with the Mineral Acids, &c. in Affections of the Air Passages.)

Form. 268. Infusum Valerianæ.

℞ Valerianæ Radicis contusæ ℥ss.; Aquæ Ferventis Oss. Macera in vase clauso per horas duas. Liquori colato, adde Spiritus Lavendulæ Compositæ, Syrupi Aurantii, āā ℥ss. (Dosis fluidunc. ij. ter quaterve quotidiè.

Form. 269. Infusum Valerianæ Compositum.

℞ Radicis Valerianæ, Rad. Calami Aromatici, āā concis. et cont. ℥j.; Flor. Arnicæ Montanæ ʒij.; Aquæ Ferventis ℥xij.; Liquor. Potassæ ʒj. Macera per horas binas vel tres; exprime, et adde Ætheris Sulphur. ʒiij.; et interdum Spirit. Lavandul. Comp. ʒiij., vel Extr. Rutæ vel Extr. Taraxaci ʒiij. M. (Dosis ℥ss.—℥jss. ter quaterve in die.)

Form. 270. Infusum Valerianæ et Serpentariæ Comp.

℞ Rad. Valerian., Rad. Serpentariæ, Flor. Sambuci Nig., āā ʒij.; Aquæ Fervid. ℥ix. Macera per horas binas, et cola. Liq. colat. adde Acidi Sulph. Arom. ʒjss; Syrup. Papaveris ℥ss. M. (Fevers, Hysteria, and other Nervous Affections.)

Form. 271. Infusum Zingiberis.

℞ Zingiberis Radicis concisæ ʒjss.; Aquæ Ferventis O ss. Macera per horas duas in vase leviter clauso, et cola: tum adde Tincturæ Zingiberis, Syrupi ejusdem, āā ℥ss. (This is the best vehicle for giving the Liquor. Ferri Oxygenati, and it is also a very grateful aromatic in cases of Flatulency.)

Form. 272. Injectio Aceti Pyrolignei.

℞ Acidi Pyrolignei, part. j.—ij.; Mist. Camphoræ, Aq. Rosar., āā part. ij.—iij.; Tinct. Camphoræ Co. part. ss.—j.

Form. 273. Injectio Argenti Nitratis.

		No. 1.	No. 2.	No. 3.
℞ Argenti Nitratis	- -	℈j.	℈ij.	ʒj.
Aquæ Destillatæ	- -	℥iij.	℥iij.	℥iij.

Solve.

Form. 274. Injectio Astringens.

℞ Infus. Quercus, ut suprà, ℥iv.; Pulv. Gallarum gr. xxx.; Tinct. Catechu ʒij. Fiat Mist. ex quo injicitur pauxillum, vel per vaginam vel per anum, in Sanguinis Fluxu.

Form. 275. Injectio Boracica.

℞ Aquæ Rosar. ℥iv.; Aq. Flor. Aurantii ℥ij.; Sub-boratis Sodæ ℈ij.; Tinct. Camphoræ Comp. ʒij.—ʒss. M. Fiat Injectio.

Form. 276. Injectio Zinci Acetatis Composita.

℞ Zinci Sulphatis, Plumbi Superacet., āā ʒss.; Camphoræ ʒss.; Opii ℈ij. Solve in Aquæ Bullientis Oj.: cola, et fiat Injectio, ter quaterve in die utenda; phiala agitata.

Form. 277. Ioduretum Hydrargyri.

(Internally, in doses of from one grain to three, and externally in ointments.—(Vide Unguent. Iod. Hydr.) For the best account of the preparations and uses of Iodine, consult Dr. O'Shaughnessy's excellent translation of Lugol on Scrofula.)

Form. 278. Ioduretum Plumbi.

(Internally, in doses of from half a grain to five grains; and externally. — (Vide Ung. Iod. Plumbi.)

Form. 279. Julapum Sedativum.

℞ Camphoræ gr. vj.; Spirit. Æther. Sulphur. Comp. ʒjss.; Potassæ Nitratis gr. xij.; Aquæ Flor. Aurantii ℥iij.; Syrup. Althææ ʒiij.; Syrup. Papaveris ʒij. M. Fiat Mist., cujus capiat tertiam partem omni horâ, vel bihoris. — (Pierquin.)

Form. 280. Linctus Acidi Muriatici.

℞ Mellis Rosæ ʒx.; Acidi Muriatici ♏xx.; Syrupi Rhœados ʒij. M. Simul agita, ut fiat Linctus.

Form. 281. Linctus Boracicus.

℞ Cetacei ℥ijss.; Pulv. Tragacanth. Comp. ʒiij.; Syrup. Tolutan. ℥j.: Sub-boracis Sodæ ʒijss.; Confect. Rosæ ʒv.; Syrup. Althææ ℥j. vel. q. s. Fiat Linctus, de quo lambat sæpè. (Sore Throat, Œsophagitis, &c.)

Form. 282. Linctus Camphoraceus.

℞ Camphoræ gr. xij.; Pulv. Gum. Acaciæ ʒj.; Syrup. Althææ ℥ij. Misce bene. (Niemann.)

Form. 283. Linctus Chlorureti Calcis.

℞ Chlorureti Calcis gr. iij.: solve in Aq. Destil. ℥j.; et adde Mellis ℥jss. M. Capiat infans cochleare unum minimum subindè. (In softening of the Digestive Mucous Surface.)

Form. 284. Linctus Demulcens. (1.)

℞ Olei Amygdal. Dul., Syrup. Althææ, āā ℥ij.; Syrup. Papaveris ʒxj.; Vini Ipecacuanh. ʒjss.; Vitelli Ovi unius. M. Fiat Linctus.

Form. 285. Linctus Demulcens. (2.)

℞ Cetacei ʒijss.; Pulv. Tragacanth. Comp. ʒjss.; Syrup. Papaveris et Syrup. Tolutan. āā ℥ss.; Potassæ Nitratis ℈ij; Confect. Rosar. ʒvj.; Syrup. simp. q. s. ut fiat Linctus; de quo lambat pauxillum, pro re natâ.

Form. 286. Linctus Demulcens et Aperiens.

℞ Syrup. Violæ ℥ijss.; Olei Amygd. Dul. ℥j.; Syrup. Scillæ et Syrup. Sennæ āā ℥ss. M. Fiat Linctus. (Infantibus.)

Form. 287. Linctus Emolliens. (Brendellii.)

℞ Saponis Venet. ℈iv.; solve in Olei Amygdal. Dulcis ℥jss.; Mannæ Purificat. ℥ss.; Potassæ Supertart. ʒij.; Syrup. Althææ ℥j. M. Fiat Linctus.

Form. 288. Linctus Myrrhæ et Ipecacuanhæ.

℞ Myrrhæ G. R. ʒj.; Pulv. Ipecacuan. gr. vj.; Oxymel. Scillæ, Mucilag. Acaciæ, Syrup. Althææ, āā ʒvj. Fiat Linctus, de quo lambat pauxillum sæpè.

Form. 289. Linctus Oleosus. (1.)

℞ Olei Amygdalarum, Syrupi Mori, āā f. ℥jss.; Confectio. Fruct. Rosæ Caninæ ℥ij.; Pulv. Tragacanth. Comp. ʒiij. Misce. Cochlear. minim. subindè deglutiatur.

Form. 290. Linctus Oleosus. (2.)

℞ Olei Olivæ ℥jss.; Oxymellis Scillæ, Syrupi Papaveris, āā f. ℥j. Dosis, Cochlear. parv. j. urgenti tusse. (In common Catarrhal Cough, attended with abrasion of the Fauces, and thin copious Expectoration.)

Form. 291. Linctus Opiatus.

℞ Syrupi Papaveris f. ℥ij.; Mucil. Acaciæ Ver. ℥jss.; Conf. Fruct. Rosæ Caninæ, unc. j.; Acid. Sulph. Dilut. f. ʒij. Misce. Dosis, Cochlear. minim. subindè.

Form. 292. Linctus Opiatus cum Scilla.

℞ Syrupi Papaveris, f. ℥j.; Syrup. Mori ʒvj.; Syrup. Limonis ℥ss.; Oxymellis Scillæ, f. ℥ss. Misce. Dosis, Cochlear. minim. tusse urgenti.

Form. 293. Linctus Pectoralis.

℞ Pulv Sem. Anisi, Pulv. Sem. Fœniculi, Extr. Glycyrrh., āā ℥ss.; Pulv. Sem. Carui ʒij.; Potassæ Nitratis ʒj.; Ol. Anisi ʒss.; Syrup. Althææ ℥vss. M. Fiat Linctus. Capiat ʒj. pro re natâ.

Form. 294. Linctus Potassæ Nitratis.

℞ Potassæ Nitratis Contr. ʒjss.; Mellis Rosæ f. ℥j.; Oxymellis Simplicis f. ℥jss. M. Capiat Coch. minim. pro re natâ.

Form. 295. Linimentum Ammoniæ cum Oleo Terebinthinæ.

℞ Liquoris Ammoniæ, f. ℥ss.; Olivæ Olei, f. ℥j.; Olei Terebinthinæ, f. ℥ss.; Olei Limonis, ʒss. Agita simul donec misceantur.

Form. 296. Linimentum Ammoniæ et Terebinthinæ Comp.

℞ Liquoris Ammon. ℥j.; Olei Olivæ ℥ij. Misce benè, et adde Spirit. Camphoræ ℥ij.; Olei Terebinth. ℥iij.; Saponis Duri ʒv. Misce benè. Olei Cajeputi ʒj.; Olei Limonis ʒjss. M.

Form. 297. Linimentum Anodynum. (1.)

℞ Opii ℥j.; Camphoræ ℥ij.; Liq. Ammoniæ ℥iv.; Saponis Duri ℥iv.; Olei Terebinthinæ ℥viij.; Olei Limonis ℥ss.; Spirit. Rosmarini et Spir. Lavandul. āā ℥xij. Misce.

Form. 298. Linimentum Anodynum. (2.)

℞ Linimenti Saponis Comp. ℥j.; Liquoris Ammoniæ, ʒiij.; Olei Caryophylli ʒj.; Tincturæ Opii ℥ss. M. Fiat Liniment.

Form. 299. Linimentum Camphoræ Fortius.

℞ Camphoræ rasæ ʒijss.: solve in Tinct. Cantharidis ʒij. et Tinct. Capsici Annui ʒjss.; dein adde Liniment. Saponis Comp. ℥ss.; et gradatim, miscendo, Liquoris Ammoniæ ʒvj.; Olei Olivæ ʒxj. M. Fiat Linimentum, cum quo illinatur pars affecta bis terve quotidiè.

Form. 300. Linimentum Cantharidum Terebinth.

℞ Tinct. Cantharid. ʒiij.; Olei Terebinth. ℥j.; Ammoniæ Liq. ʒjss.; Saponis Duri ʒj.; Olei Cajeputi ʒss. M. Fiat Linimentum. (Altered from Augustin.)

Form. 301. Linimentum Febrifugum.

℞ Antimonii Tartarizati gr. xxv.: solve in Aquæ Destil. ʒij. vel q. s.; deinde tere benè cum Adipis Præpar. ℥j. et fiat Linimentum. (The antimony is partially absorbed without producing any Phlogosis. (Vide Unguent. Antimon. Tart.)

Form. 302. Linimentum Iodini.

℞ Linimenti Saponis Co. ℥j.; Iodini gr. viij. vel. x.; Misce.

Form. 303. Linimentum Phosphoratum.

℞ Olei Olivarum Optimi ℥viij.; Phosphori excisi gr. xx. Solve cum calore, cola ex frigido, et fiat Linimentum. (In Paralyse locale, Marasmo, Rheumatismo, et Arthritide Chronico.)

Form. 304. Linimentum Pyrethri.

℞ Tincturæ Pyrethri, ʒvj.; Linimenti Camphoræ ʒiv.; Liquoris Ammoniæ ʒij. Misce; ft. Linimentum.

Form. 305. Linimentum Rubefaciens.

℞ Camphoræ ʒj.; Olei Olivæ et Liq. Ammon. āā ℥j.; Olei Macis ♏xxxv. Misce. (Externally to parts in deep-seated Inflammation.)

Form. 306. Linimentum Saponis et Camphoræ Comp.

℞ Saponis Med. ℥j.; Alcoholis Rect. ℥vj.; Aquæ Destil. et Camphoræ āā ℥j. Solve leni cum calori, et adde Olei Rosmarini ℈iv.; Olei Thymi ℈j.; Liquor. Ammoniæ ʒij. Misce benè.

Form. 307. Linimentum contra Spasmos.

℞ Olei Olivæ, Obei Terebinthinæ, Liquoris Ammoniæ, Tinct. Opii, Liniment. Saponis Composit., āā ℥ss. Fiat Linimentum.

Form. 308. Linimentum Stimulans.

℞ Linimenti Camphoræ Compositi, Linimenti Saponis Compositi, āā ℥jss.; Olei Cajeputi, ℥j. Fiat Linimentum stimulans.

Form. 309. Linimentum Sulphuro-Saponaceum. (Jadelot.)

℞ Sulphureti Potassæ ℥iij; Saponis Albi, Olei Olivæ, āā ℔j.; Olei Volat. Thymi ʒj. M.

Form. 310. Linimentum Tabacci.

℞ Tabacci Foliorum ℥j.; Axungiæ Porcinæ ℔j. Melt together, and simmer until the leaves become friable; then express. (Amst. Ph.)

Form. 311. Linimentum Terebinthinæ Comp.

℞ Liniment. Saponis Co., Liniment. Camphoræ Co., āā ℥jss.; Olei Terebinth. ℥ij.; Saponis Duri ʒij.; Olei Limonis et Ol. Cajeputi ℥j.—ʒij. M. Fiat Linimentum.

Form. 312. Linimentum Terebinthino-Phosphoratum.

℞. Olei Terebinth. ℥ij.; Camphoræ rasæ ʒij.; Liniment. Ammon. Fort. ℥ij.; Saponis Medicin. ℥ij.; Phosphori Puri gr. x.—xij. Soluti in Olei Cajeputi, vel in Olei Caryophyl. ʒij. vel q. s. M. (In Chronic Rheumatism and Epidemic Cholera.)

Form. 313. Linimentum Thebaiacum Compositum.

℞ Opii Puri ℈ij.; Camphor., Succini, āā ʒss.; Spirit. Vini ℥vj. Misce pro Linimento.

Form. 314. Linimentum Volatile.

℞ Olei Olivæ ℥iv.; Camphoræ ʒij.; Aquæ Ammoniæ ʒijss. Misce.

Form. 315. Liquor Acetatis Morphinæ.

℞ Morphinæ Acetatis gr. xvj.; Aquæ Destillat. f. ʒvij.; Acidi Acetici ♏v.; Spirit. Vini Rectif. f. ʒj. Solve. (Dosis a ♏v. ad ♏xx.)

Form. 316. Liquor Antimonii Tartarizati.

℞ Antimonii Tartarizati gr. xxxij.; Aquæ Destillatæ ℥xiv.; Spiritûs Rectificat. ℥ij; Uvarum Passarum, demptis acinis, unc. ij. Macera per hebdomadam, et cola.

Form. 317. Liquor Balsamico-Aromaticus. — *Balsamum Vitæ Hoffmanni.*

℞ Balsam. Peruvian. ʒj.; Olei Succin., Olei Rutæ, Olei Rosmarini, Olei Lavand., Olei Caryoph., Olei Pimentæ, āā ʒss.; Spirit. Vini Rectificat. ℥xjss. Misce benè. (In doses of from 10 to 30 drops on Sugar, or in a suitable vehicle.)

Form. 318. Liquor Boracis Sodæ Comp.

℞ Sub-boracis Sodæ ʒvj.; Potassæ Supertart. ℥ss.; Aquæ Distil. Oj. (Dosis ʒj.—ʒiij. pro Infantibus; et ʒss.—ʒiij. ter die pro Adultis.

Form. 319. Liquor Calcis Muriatis. (Beddoes.)

℞ Acidi Muriatici, Aquæ Destillatæ, āā ℥iv.; Marmoris Albi Pulv. q. s. ad saturandum.

Form. 320. LIQUOR CAMPHORÆ ÆTHEREA.

℞ Camphoræ rasæ ʒ j. ; Ætheris Sulphurici ℥ j. Solve. Capiat ♏ xx.—xl. super Saccharum vel in Vini Hispan. Cyatho. (Proposed by BANG, and adopted in most of the continental Pharm.)

Form. 321. LIQUOR FERRI OXYGENATI. (BEDDOES.)

℞ Ferri Sulphatis ℥ ss. ; Acidi Nitrosi Fortissimi (per pond.) ℥ ss. Tere probè simul in mortareo vitreo donec effervescentia peracta ; dein adde gradatim Aquæ Destillatæ ℥ jss. Afterwards filter the liquor through *white* paper, placed in a *glass* funnel. The dose is from four to ten drops, three or four times a day, in an Infusion of Ginger, or Infusion of Quassia and Cloves. — (In Worms, Hæmorrhages, &c.)

Form. 322. LIQUOR HYDRARGYRI OXYMURIATIS.

℞ Hydrargyri Oxymuriatis gr. iv. ; Acidi Muriatici ♏ vj. ; Aquæ Destillatæ, f. ℥ j. ; Spirit. Tenuioris ʒ vj. ; Tincturæ Croci ʒ ij. Tere probè simul in mortario vitreo ut fiat solutio. Incip. sumendo ♏ xx. nocte maneque ex haustu Infusûs Lini, vel Decocti Glycyrrhizæ ; posteaque pro re natâ augeatur. (SPRAGUE)

Form. 323. LIQUOR HYDRIODATIS POTASSÆ.

℞ Potassæ Hydriodatis gr. xxiv. ; Aquæ Destillatæ ℥ j. M. Solve terendo in vase vitreo. (Dosis ♏ x.—xxx.)

Form. 234. LIQUOR HYDRIODATIS POTASSÆ IODURETUS.

℞ Potassæ Hydriodatis gr. xxxvj. ; Iodini gr. x. ; Aquæ Destillatæ, f. ʒ x. Solve terendo in vase vitreo. (In doses of 10 gtt. to 30. ter die.)

Form. 325. LIQUOR MORPHINÆ CITRATIS.

℞ Morphinæ Puræ gr. xvj ; Acidi Citrici Crystal. gr. viij. ; Aquæ Destil. f. ℥ j. ; Tinct. Cocci q. s. Solve. (Dosis ♏ v.—xxv.)

Form. 326. LIQUOR PLUMBI ACETATIS DILUTUS.

℞ Liquor Plumbi Acetatis, f. ʒ j. ad ʒ ij. ; Acidi Acetici Diluti, ʒ iij. ; Spirit. Rectificati, ℥ jss. ; Aquæ Destillatæ ℥ xiv. Misce.

Form. 327. LIQUOR POTASSÆ CHLORATIS.

℞ Potassæ Chloratis ʒ j. ; Aquæ Destillat. ℥ xij. (In indolent Sores as a lotion, and internally in three times its bulk of vehicle.)

Form. 328. LIQUOR POTASSÆ HYDRIODATIS IODURETÆ CONCENTRATUS. (LUGOL.)

℞ Iodinæ ℈ j. ; Potassæ Hydriodatis ℈ ij. ; Aquæ Destillat. ℥ vij. Solve. (This solution contains one twenty-fourth part of Iodine. Dose for an Adult, six drops in sugared water in the morning fasting, and six an hour before dinner ; increasing the dose, every week, two drops, until it reaches to thirty or thirty-six daily.)

Form. 329. LIQUOR POTASSÆ HYDRIODATIS IODURETÆ. DILUTUS. (LUGOL.)

	No. 1.	No. 2.	No. 3.
℞ Iodinæ	gr. ¼	gr. j.	gr. j. ¼
Potassæ Hydriodatis	gr. jss.	gr. ij.	gr. ijss.
Aquæ Destillatæ	℥ viij.	℥ viij.	℥ viij.

Solve.

Form. 330. LIQUOR ZINCI ACETATIS.

℞ Zinci Sulphatis Purif. gr. xxiv. ; Aquæ Destillatæ ℥ iv. Solve.

℞ Plumbi Superacetatis gr. xxxij ; Aquæ Destillatæ ℥ iv. Solve. Misceantur solutiones ; quiescant paulisper ; dein coletur *liquor*.

Form. 331. LOTIO ACIDI HYDROCYANICI.

℞ Acidi Hydrocyanic. f. ℥ ss. ; Spiritûs Rectificati, f. ʒ j. ; Aquæ Destillatæ, f. ℥ xss. Misce, et fiat Lotio diligenter utenda.

Form. 332. LOTIO ANTIPHLOGISTICA.

℞ Liquoris Plumbi Subacetatis ʒ vj. ; Liquoris Ammoniæ Acetatis ℥ iv. ; Aquæ Puræ ℔ ij. Misce.

Form. 333. LOTIO ANTIPSORICA.

℞ Potassæ Sulphureti ℥ iv. ; Aquæ O j. ; Acidi Sulphurici ℥ iv. Misce. Fiat Lotiò, bis terve quotidiè utenda. (DUPUYTREN.)

Form. 334. LOTIO BORACICA.

℞ Sub-boracis Sodæ ʒ j. ; Aq. Rosar., Aq. Flor. Aurantii, āā ℥ iij M. Fiat Lotio.

Form. 335. LOTIO EVAPORANS.

℞ Ætheris Sulphur., Liquor. Ammon. Acet., Spirit. Vini Rect., āā ℥ jss. ; Aquæ Rosarum ℥ iijss. M. Fiat Lotio.

Form. 336. LOTIO EVAPORANS ASTRINGENS.

℞ Ammoniæ Muriatis ʒ ij. ; Liquoris Ammoniæ Acet. ℥ iij. ; Aquæ Puræ ℥ xij. Misce.

Form. 337. LOTIO FLAVA.

℞ Hydrargyri Oxymuriatis gr. xv. ; Liquoris Calcis ℔ j. Misce.

Form. 338. LOTIO HYDRARGYRI CAMPHORATA.

℞ Hydrargyri ʒ ij. ; Acidi Nitrici ℥ iv. ; Aquæ Destil. O x. Treat the Mercury with the Nitric Acid, and add the distilled Water ; afterwards add from ℥ ss. to ℥ ijss. of Camphor. (In Chronic Cutaneous Affections, applied twice daily.)

Form. 339. LOTIO SEDATIVA.

℞ Acidi Hydrocyanici ʒ j.—ʒ ij. ; Mist. Amydal. Amar. ℥ vijss. ; Hydrarg. Oxymur. gr. iij.—v. Fiat Lotio, ope spongiæ partibus affectis applicanda.

Form. 340. LOTIO TEREBINTHINÆ ET CAMPHORÆ.

℞ Camphoræ ℥ iv. ; Spirit. Vini Rect., Olei Terebinthinæ, āā ℥ iv. M. Fiat Lotio, in Morbis Cutaneis Chronicis utenda.

Form. 341. LOTIO TEREBINTHINATA.

℞ Olei Terebinthinæ, Alcoholis, āā ℥ iv. ; Camphoræ ʒ vj. Fiat Lotio. (In Pthiriasis, &c.)

Form. 342. MISTURA ACETATIS MORPHINÆ.

℞ Morphinæ Acetatis gr. ij. ; Acidi Acetici ʒ ss. ; Mist. Camphoræ ℥ vss. ; Tinct. Humuli ʒ iij. ; Syrup. Tolutan. ʒ j. M. Fiat Mist., cujus capiat Cochlear. unum amplum 3tiâ vel quartâ quâque horâ.

Form. 343. MISTURA ACIDI BORACICI.

℞ Acidi Boracici ʒ j. ; Mist. Camphoræ ℥ iv. ; Syrup. Aurantii ℥ j. M. Capiat Cochlearia ij. 2dâ vel 3tiâ quâque horâ. (In Cerebral Affections. CHAUSSIER.)

Form. 344. MISTURA ACIDI HYDROCYANICI COMP.

℞ Acidi Hydrocyanici ♏ viij.—xx. ; Vini Ipecacuanhæ ʒ ij. ; Spirit. Ætheris Sulphurici Comp. ʒ iij. ; Mist. Camphoræ, Mist. Amygdal. Dulc., āā ℥ iijss. ; Oxymellis Scillæ ʒ ij.—℥ ss. M. Capiat Cochlear. j. vel ij. vel. iij., ter quaterve quotidiè.

Form. 345. MISTURA ACIDI MURIATICI.

℞ Acidi Muriatici, f. ʒ j. ; Decocti Hordei O j. ; Sacchari Purificati, ℥ ss. Misce. (Dosis à fluidunc. ij. ad iv. bis ter, sæpiusve quotidiè.)

Form. 346. MISTURA ACIDI NITRICI COMP.

℞ Extracti Hyoscyami ʒ ss. ; Acidi Nitrici Diluti ʒ j. ; Aquæ Destillatæ ℥ vss. Syrupi Zingiberis ʒ iij. M. ft. Mistura. (Dosis unc. j. secundis horis, durante paroxysmo.)

Form. 347. MISTURA ALKALINA ANODYNA.

℞ Tincturæ Opii ʒ ij. ; Liquoris Potassæ ℥ ss. ; Spiritûs Myristici ℥ ss. ; Aquæ Puræ ℥ xjss. Misce. (Dosis à ʒ j. ad ʒ ij. bis terve in die.)

Form. 348. MISTURA ALKALINA CARDIACA.

℞ Mist. Camph. ℥ vjss. ; Sod. Sub-carbon. ʒ jss. ; Ammon. Carbon. ℈ j. ; Tinct. Calumbæ ℥ ss. ; Spirit. Anisi, Tinct. Cardamom. Co., āā ℥ ss. M. Mist. Capiat Cochlear. ij. magna, bis terve quotidiè.

Form. 349. MISTURA ALOES ET GUAIACI COMP.

℞ Tincturæ Aloes Comp., Tinct. Guaiaci, Spirit. Ammoniæ Aromat., āā ℥ ss. ; Tinct. Ferri Ammoniati ʒ iij. M. Capiat ʒ j. vel ʒ ij. ter de die, in vehiculo quovis idoneo.

Form. 350. MISTURA AMMONIACI COMP. (1.)

℞ Mist. Ammoniaci ℥ vjss. ; Potassæ Nitratis ʒ j. ; Aceti Scillæ ʒ iij. ; Spirit. Junip. Comp. ℥ j. ; Tinct. Opii ♏ xij. Fiat Mist. cujus capiat Cochlear. amplum 3tiis vel 4tis horis.

Form. 351. MISTURA AMMONIACI COMPOSITA. (2.)

℞ Gummi Ammoniaci ʒ j. ; Oxymellis Scillæ ℥ j. ; Vini Ipecacuanhæ ʒ j. ; Aquæ Flor. Sambuci ℥ ivss. ; Syrup. Papaveris ʒ ij. M. Capiat æger qualibet hora Cochleare unum. (Chronic Pectoral Complaints.)

Form. 352. Mistura Ammoniæ Muriatis.

℞ Muriatis Ammoniæ, Extr. Glycyrrh., āā ʒj.; Decocti Althææ ℥vj.; Oxymel. Simp. ℥j. (vel Oxymel. Scillæ.) M. (Catarrhal Affections.)

Form. 353. Mistura Anodyna.

℞ Magnes. Carbon. ʒjss.; Tinct. Humuli ʒiij.; Aq. Menth. Virid. ℥iij.; Infus. Caryophyl. ℥iijss. M. Fiat Mist., cujus capiat Cochlear. ij. larga pro re natâ, vel urgenti nauseâ.

Form. 354. Mistura Anodyna. — (*Infantilis.*)

℞ Testæ Præparatæ ʒij.; Syrupi Papaveris Alb. ℥j.; Spiritûs Ammon. Fœtid. ʒj.; Olei Anethi, Olei Fœnicul. Dulc., āā ♏iij.; Aquæ Distillatæ ʒiij. Fiat Mistura.

Form. 355. Mistura Anodyna Acetosa.

℞ Mist. Camphoræ ℥iv.; Liquor. Ammon. Acet. ℥iij.; Acid. Acet. ʒij.; Spirit. Æther. Nit. ʒij.; Vini Ipecacuanhæ ʒij.; Extracti Conii gr. xxx.; Syrup. Tolutan. ʒij. M. Fiat Mist., cujus capiat Cochlear. ij. vel iij. larga 4tâ vel quintâ quâque horâ.

Form. 356. Mistura Anodyna cum Zinco.

℞ Zinci Sulphatis gr. vj.; Mist. Camphoræ ℥vij.; Acidi Sulphur. Arom. fʒss.; Tinct. Hyoscyami ʒjss.; Tinct. Camphoræ Comp., ʒiij.; Syrup. Limonis ʒij. M Capiat Cochlear. ij. larga ter quaterve quotidiè.

Form. 357. Mistura Anti-emesin.

℞ Magnes. Carbonat. ʒjss.; Spirit. Æther. Sulph. Comp. ʒiij.; Tinct. Cardamom. Co. ℥ss.; Spirit. Anisi, ʒv. Olei Carui ♏x.; Syrup. Zingiberis ʒijss. Mist. Camphoræ ℥jss.; Aquæ Menthæ Viridis ℥vss. Fiat Mist., cujus sumantur Cochlearia duo ampla urgenti flatu vel nausea.

Form. 358. Mistura Antiphlogistica. (1.)

℞ Potassæ Nitratis ʒss.; Liquoris Ammoniæ Acetatis f. ℥jss.; Vini Antimonii Tartarizati f. ʒiij.; Misturæ Amygdalarum f. ℥vj. Fiat Mistura, cujus sit dosis Cochlearia tria magna quartâ quâque horâ.

Form. 359. Mistura Antiphlogistica. (2.)

℞ Liquoris Ammoniæ Acetatis, Aquæ Menthæ Viridis, āā f. ℥ij.; Aquæ Destillatæ f. ℥iijss.; Potassæ Nitratis ℈ij.; Vini Antimonii Tartarizati ʒiij. Fiat Mistura, cujus sit dosis Cochlearia tria ampla tertiâ vel quartâ quâque horâ.

Form. 360. Mistura Antiseptica cum Acido Pyroligneo.

℞ Acidi Muriatici, Ætheris Sulphur., āā ʒij.; Aquæ Pimentæ ℥ivss.; Aquæ Cinnam. ℥ij.; Syrup. Aurantii ℥j. M. Sumantur Coch. duo omni bihorio.

Form. 361. Mistura Aperiens.

℞ Magnesiæ Sulphatis ℥v.; Magnesiæ Sub-carbonatis ʒiijss.; Aquæ Destillatæ O ij.; Spiritûs Cinnamomi, Spiritûs Anisi, āā ʒij. Fiat Mistura. Dosis à ʒj. ad ℥ij.

Form. 362. Mistura Aperiens Salina.

℞ Florum Anthemidis ℥ij.; Radicis Zingiberis concis. ℥j; Aquæ Ferventis O ijss. Macera per noctem; exprime, et adde Magnes. Sulphatis ℥ij.; Sodæ Sulphatis ℥jss.; Potassæ Sulphatis ʒv. M. Capiat Cyathum primo mane. (After each dose take an hour's exercise in the open air, and breakfast afterwards.)

Form. 363. Mistura Aromatica.

℞ Infus. Caryoph. ℥iv.; Aquæ Cinnam. ℥iij.; Tinct. Cinnam. ʒij.; Magnes. Carbon. ʒjss.; Confect. Arom. gr. xij. M. Fiat Mist., cujus sumat Coch. ij. larga.

Form. 364. Mistura Arsenicalis.

℞ Liquor. Arsenicalis ʒjss.; Tinct. Cardam. Comp. ʒv.; Aquæ Cinnam. ℥iij.; Aquæ Destillatæ ℥iv. M. Fiat Mistura. Dosis Cochlear. ij. (f. ℥j.) 3tiis vel 4tis horis.

Form. 365. Mistura Arsenicalis cum Opio.

℞ Liquoris Arsenicalis ♏xl.; Confectionis Opii ℈iv.; Aquæ Menthæ Viridis ℥iv. M. Fiat Mistura. Capiat pars 4ta post jentaculum, prandium, et cœnam. (Dr. Cleghorn.)

Form. 366. Mistura Assafœtidæ.

℞ Assafœtidæ ʒj.; Liquoris Ammon. Acet., Aquæ Pulegii, āā ℥iijss. M. Cap. Cochleare unum vel duo pro dose.

Form. 367. Mistura Assafœtidæ Comp.

℞ Assafœtidæ ʒj.; tere cum Aquæ Menth. Virid. ℥ij.: dein adde Tinct. Castorei ʒiij.; Tinct. Valer. Ammon. ʒij.; Æther. Sulphur. ʒj. Fiat Mist., cujus capiatur Cochleare unum amplum secundis horis.

Form. 368. Mist. Assafœtidæ et Valerianæ Comp.

℞ Tincturæ Assafœtidæ, Tinct. Gentianæ Compos., Tinct. Valerianæ, Spiritûs Ammoniæ Arom., āā f. ℥ss. M. de qua sumatur Cochleare unum minimum ex aquæ tostæ cyatho.

Form. 369. Mistura Balsami Peruviani.

℞ Balsami Peruviani f. ʒij. vel iij; Mellis Despumati, ℥j. Simul diligenter tere, et gradatim adde Aquæ Destillatæ ℥vij. Dosis à fluid. ʒj. ad ʒij. bis, ter, quaterve quotidiè.

Form. 370. Mist. Balsami Tolutani.

℞ Tincturæ Balsami Tolutani ʒij.; Mucilaginis Acaciæ *veræ*, ℥j. Misce; adde gradatim, Aquæ Destillatæ ℥iv.; Tincturæ Opii Camphoratæ *pristin.*, Syrupi Simplicis, āā ʒiij.; Ammoniæ Sub-carbonatis, ʒss. (vel sine.) Misce. Fiat Mistura, cujus capiat Coch. ampl. ij. ter in die.

Form. 371. Mistura Bechica.

℞ Pulveris Tragacanthæ Compos. ʒij.; Aquæ Destillatæ ℥xij.; Syrupi Simplicis ʒvj. Misce. Interdum adde, vel Nitratis Potassæ ℈iv., vel Tincturæ Opii ♏xl., vel Tincturæ Hyoscyami ʒj., vel Tincturæ Camphoræ Comp. ℥ss., vel Oxymellis Scillæ ʒvj., vel alium medicamentum idoneum.

Form. 372. Mistura Camphoræ.

℞ Camphoræ ʒj.: tere cum Spirit. Rectificati ♏xx.; Magnesiæ Sub-carbonatis ℈ij.; et Sacchari Purificati ʒij.: dein adde gradatim, Aquæ Destillatæ Ferventis O j. M. Fiat Mistura.

Form. 373. Mistura Camphoræ Composita.

℞ Camphoræ rasæ gr. xij.; Magnes. ʒj.; Gum. Acaciæ in pulv. ʒj.; Mist. Amygdal. Dulc. ℥vjss.; Tinct. Opii ♏xxx. (vel Tinct. Hyoscyami ʒj.); Syrup. Papaveris Alb. ʒiij. M. (In Affections of Mucous Surfaces, &c.)

Form. 374. Mistura Camphorata.

℞ Camphoræ gr. viij.—xvj.; Alcoholis ♏vj.; Sacchar. Albi, Pulv. Acaciæ, Magnes. Albi, āā ℈ij.; Aquæ Puræ ℥vijss. M.

Form. 375. Mistura Camphorata. (Ph. Dan.)

℞ Camphoræ Pulverizat. ʒss.; Gum. Acaciæ, Sacchar. Albi, āā ʒij.; Magnes. ʒss.; Decocti Althææ Officinalis ℥vijss. M. (Interdum adde Tinct. Opii, vel Tinct. Hyoscyami, vel Vinum Ipecacuanhæ, vel Spirit. Æther. Nit., vel Æther Sulphur., vel Extr. Conii, &c. &c.)

Form. 376. Mistura Carminativa.

℞ Magnesiæ Sulphatis ℥jss.; Magnesiæ Carbonatis ʒijss.; Tincturæ Cardamomi Comp. ʒjss.; Tincturæ Castorei ♏xl.; Olei Anisi ♏x.; Aquæ Anethi ℥xij.; Aquæ Puræ ℥viij. Misce. Dosis à ʒij. ad ℥ss. 4tis vel 6tis horis.

Form. 377. Mistura Carminativa Deobstruens.

℞ Infus. Menthæ Caryophyl. (F. 239.) ℥vij.; Potassæ Super-sulphatis ʒijss.; Acidi Sulphur. Dil. ʒj.; Spirit. Pimentæ, Spirit. Carui, āā ʒjss.; Spirit. Myristicæ ʒij.; Sacchar. Albi ʒij. Fiat Mist. Capiat Cochlearia duo larga 3tiis vel 4tis horis.

Form. 378. Mistura Cathartica.

℞ Olei Cinnamomi ♏viij.; Sacchari Purificati ℥ss. Misce. Adde gradatim Infus. Sennæ ℥x.; Sodæ Sulphatis ℥jss.; Magnes. Sulphatis ℥j.; Tincturæ Jalapæ ℥j.; Tincturæ Sennæ, f. ℥jss. Misce. Fiat Mistura, et per chartam cola. Dosis ℥jss. ad ℥ij.

Form. 379. Mistura Cathartica Ammoniata.

℞ Olei Menthæ Viridis ♏x.; Olei Menthæ Piperitæ ♏v.; Sacchari Purificati ʒiij. Misce; tum adde Infus. Sennæ ℥vij.; Sodæ Sulphatis ℥j.; Tincturæ Sennæ ʒv.; Spiritûs Ammoniæ Aromat. ʒiij. Misce. Fiat Mistura; cujus sumat partem 4tam 3tiis horis, donec alvus responderit.

Form. 380. Mistura Cinchonæ.

℞ Cinchonæ Flavæ in pulv. sublit. ʒ vj.; Confectionis Opii ʒ ij.; Pulv. Cinnam. Comp. ʒ j.; Ammoniæ Carbon. gr. xij.; Vini Rubr. Op. ℥ xij. M.

Form. 381. Mistura Cinchonæ Alkalina.

℞ Myrrhæ in pulv. ʒ jss.; Liquor. Potassæ Sub-carbon. ʒ iij.; Decocti Cinchonæ ℥ vss.; Tinct. Cascarillæ ʒ iij. Fiat Mist., de quâ sum. Cochlear. duo ampla bis de die.

Form. 382. Mistura Cinchonæ Aperiens.

℞ Confectionis Rosæ Gallicæ ℥ j.: contere cum Decocti Cinchonæ Ferventis, ℥ viij.: stent simul per min. hor. decem, et cola.

℞ Liquoris Colati ℥ vij.; Acidi Sulphurici Diluti, f. ʒ j.; Magnesiæ Sulphatis ʒ iv.; Spiritûs Myristicæ, f. ℥ ss. M. Fiat Mistura, cujus sumat Coch. ampl. iij. ter in die.

Form. 383. Mistura Conii Composita.

℞ Extracti Conii ʒ ss.; Sodæ Sub-carbonatis ʒss.—j.; Decocti Glycyrrh. ℥ vss.; Spirit. Pimentæ ʒ iij. M. Dosis ℥ ss. ad ℥ ij. ter quaterve quotidiè.

Form. 384. Mistura Cretæ Comp.

℞ Cretæ Præparat., Gum. Acaciæ, Sacchar. Purif., āā ℥ ss.; Olei Fœniculi ♏ viij.; Aquæ Pimentæ et Aquæ Cinnam. āā ℥ viij.; Tinct. Aurantii ℥ j. M.

Form. 385. Mistura Decocti Cinchonæ Ammoniata.

℞ Decocti Cinchonæ ℥ iv.; Liq. Ammoniæ Acet. ℥ jss.; Spirit. Ammoniæ Aromat. (vel Succinat., vel Fœtid.) ʒ iij.; Spirit. Rosmarini ʒ ij. M. Fiat Mistura.

Form. 386. Mistura Decocti Cinchonæ Composita. (1.)

℞ Decocti Cinchonæ ℥ iv.; Liq. Ammon. Acetatis ℥ ij.; Spirit. Æther. Nit. ʒ ij. M. Fiat Mistura.

Form. 387. Mistura Decocti Cinchonæ Composita. (2.)

℞ Pulv. Cort. Cinchonæ ʒ vj.; coque cum Aq. Fontanæ ℥ xvj. ad reman. unciar. octo; et sub finem coctionis adde Pulv. Radicis Serpentariæ ʒ iij.; Pulv. Radicis Rhei Opt. ʒ jss. Cola cum express.; deinde admisce Liquoris Ammon. Acet. ℥ ij.; Syrup. Cort. Aurantii ℥ j. Misce. Capiat æger alterâ quâque horâ Cochleare unum.

Form. 388. Mistura Decocti Cinchonæ cum Aceto Pyroligneo.

℞ Decocti Cinchonæ ℥ vjss.; Acidi Acetici Fortior. (vel e Ligno destil.) ʒ ij.; Spirit. Rosmarini, Spirit. Pimentæ, āā ʒ ij. M. Fiat Mistura.

Form. 389. Mistura Demulcens.

℞ Pulveris Tragacanthi gr. xv.; Sacchari Albi gr. xij. Tere, et paulatim adde Mist. Amygdal. Dulc. ℥ ij.; Mist. Camphoræ ℥ iijss.; Syrup. Althææ ℥ ss. M. Fiat Mist. Demulcens.

Form. 390. Mistura Deobstruens. (1.)

℞ Extr. Taraxaci, Extr. Humuli, āā ʒ ij. Tartar. Tartarizat. ʒ j.; Aquæ Fœniculi ℥ vss.; Vini Antimonialis Huxh. ʒ ij.; Oxymel. Scillæ ℥ j. M. Fiat Mist., cujus capiat Coch. j. vel. ij. 3tiis vel 4tis horis.

Form. 391. Mistura Deobstruens. (2.)

℞ Radicis Rhei ℥ j.; Fol. Sennæ ʒ vj.; Aquæ Ferv. ℥ xij. Infunde per horas iij. et cola.

℞ Hujus Infusi ℥ x.; Extract. Taraxaci, Ext. Chelid. āā ʒ iij.; Ext. Flor. Calendul. ʒ ij.; Acet. Potassæ ʒ vj.; Tinct. Calumbæ ℥ ss.; Spirit. Junip. Co. ℥ j.; Æther. Muriat. ʒ jss. M. Capiat Cochlear. j. vel ij. larga ter de die. (In Glandular Enlargements, particularly those of the Abdomen.)

Form. 392. Mistura Deobstruens. (3.)

℞ Extr. Taraxaci ʒ ijss.; Ext Sarsæ, vel Spartii Scoparii, ʒ ij.; Potassæ Tart. ʒ jss.; Sub-boracis Sodæ ʒ ss.; Aquæ Fœniculi Dul. ℥ vj.; Vini Antimon. ʒ ij.; Oxymel. Scillæ ℥ j. M. Capiat Coch. ij.—iij. 3tiis vel 4tis horis.

Form. 393. Mistura Diaphoretica.

℞ Liquoris Ammoniæ Acetatis ℥ iv.; Vini Antimonii Tartarizati ℥ ss.; Vini Ipecacuanhæ ʒ ij.; Syrupi Papaveris ℥ ss.; Aquæ Destillatæ ℥ xv. Misce. Dosis à ʒ j. ad ℥ j. 3tiis, 4tis, vel 6tis horis. Interdum adde vel Spiritum Ætheris Nitrici, vel Tincturum Opii.

Form. 394. Mistura Diaphoretica Anodyna.

℞ Liquoris Ammoniæ Acetatis ℥ iv.; Vini Antimonii Tartarizati, Vini Ipecacuanhæ, āā ʒ ij.; Spiritûs Ætheris Nitrici ℥ ss.; Syrupi Papaveris ℥ j.; Extracti Conii gr. xiv.; Aquæ Destillatæ ℥ xij. Misce.

Form. 395. Mistura Digitalis et Colchici Comp.

℞ Infus. Digitalis, Liq. Ammoniæ Acetatis, āā ℥ ijss.; Potassæ Acetatis ʒ ij.; Aceti Colchici ʒ ij.; Opii Tincturæ ♏ vij. Fiat Mist., cujus sumantur Coch. ij. larga bis terve in die.

Form. 396. Mistura Diosmæ Crenatæ.

℞ Infus. Diosmæ Crenatæ ℥ vjss. (F. 231.); Pulv. Tragacanth. ℈ ij.; Tinct. Diosmæ Crenatæ ℥ ss. M. (In Rheumatism, and Affections of the Mucous Surfaces, particularly those of the Urinary Organs.)

Form. 397. Mistura Diuretica. (1.)

℞ Antimon. Tartarizati gr. j.; Potassæ Supertart. ʒ jss.; Sub-boracis Sodæ ʒ ss.; Infus. Juniperi ℥ xijss.; Spirit. Æther. Nit. ʒ iij.; Tinct. Opii Comp. ♏ xxvj.—ad L. M. Capiat Coch. j. larg. 2dâ quâque horâ. (Altered from Augustin.)

Form. 398. Mistura Diuretica. (2.)

℞ Potassæ Supertart. ʒ ij.; Sub-boracis Sodæ ʒ j.; Aquæ Fœniculi ℥ viij.; Spriit. Junip. Comp. et Spirit. Æther. Nit. āā ʒ iij.; Syrup. Papaveris ℥ ss.

Form. 399. Mistura Diuretica. (3.)

℞ Baccarum Juniperi contus. ʒ vj.; Carui Semin. contus. ʒ ijss.; Anisi Semin. cont. ʒ jss.; Aquæ Ferventis O j. Macera per horas tres, et cola.

℞ Colaturæ f. ℥ xij.; Spiritûs Juniperi Compositi f. ℥ ij.; Potassæ Nitratis ℈ ij.; Syrupi Scillæ f. ℥ ss. Fiat Mistura, de qua sumatur Cyathus subindè.

Form. 400. Mistura Diuretica. (4.)

℞ Infus. Digitalis, Aquæ Anethi, āā ℥ iijss.; Potassæ Acetatis ʒ ijss.; Scillæ Aceti (vel Acet. Colchici) ʒ iij.; Tinct. Opii ♏ x. Fiat Mist., cujus capiat Cochlear. ij. larga bis terve quotidiè.

Form. 401. Mistura Diuretica. (5.)

℞ Gum. Acaciæ ʒ v.; Saponis Med. ʒ ss.; Sub-carbonat. Potassæ ʒ ij.; Potassæ Nitratis ℈ ij.; Infus. Juniperi ℔ ij. (In Gout, with double its quantity of Potash, and a stomachic tincture and Tinct. of Colchicum.)

Form. 402. Mistura Emetica Excitans. (1.)

℞ Zinci Sulphatis ℈ ij.; Aquæ Menth. Pip. f. ℥ ivss. Solve, et adde Vini Ipecacuanhæ, Tinct. Serpentariæ, āā f. ℥ ss.; Tinct. Capsici f. ℈ ij.; Olei Anthemidis ♏ xii. Misce; et fiat Mist., cujus capiat partem tertiam vel quartam intervallis brevibus.

Form. 403. Mistura Emetica Excitans. (2.)

℞ Antimon. Tartar. gr. xij.: solve in Aquæ Menthæ Piper. f. ℥ ivss.; et adde Vini Ipecacuanhæ, Tinct. Serpentariæ, āā f. ℥ ss.; Tinct. Capsici f. ℈ ij.; Olei Anthemidis ♏ xii. M. Capiat partem quartam vel tertiam, intervallis brevibus, ad effectum plenum.

Form. 404. Mistura Expectorans.

℞ Misturæ Amygdalæ Amaræ f ℥ v.; Vini Ipecacuanhæ, Tincturæ Scillæ, āā f. ʒ j.; Syrupi Tolutani f. ʒ vj. Misce. Sumat Cochleare magnum urgente tussi. (In Humoral Asthma, and the latter Stage of Catarrh.

Form. 405. Mistura Febrifuga. (1.)

℞ Camphoræ ℈ j.; Pulv. Gum. Acaciæ ʒ j.; Mist. Amygdal. Dulc. ℥ iij.; Potassæ Nitratis ʒ ij.; Aq. Flor. Sambuci Nig. ʒ iv.; Syrup. Papav. Alb. (vel Syr. Limonis) ℥ ss. M. ℥ ss.—ʒ j. 3tiis vel 4tis horis.

Form. 406. Mistura Febrifuga. (2.)

℞ Misturæ Camphoræ ℥ xxiij.; Antimonii Tartarizati gr. iij.; Potassæ Nitratis ʒ vj.; Spiritûs Ætheris Nitrici ℥ ss.; Syrupi Limonum ℥ ss.; Misce. Interdum adde, vel Vinum Ipecacuanhæ, vel Tincturam Digitalis, vel Tincturam Opii, vel Syrupum Papaveris.

Form. 407. Mistura Febrifuga. (3.)

℞ Ammoniæ Muriatis, Succi Glycyrrh. Inspiss., āā ʒ j.; Aquæ Font. ℥ v. Solve, et adde Vini Antimonii ʒ ij.; Oxymel. Scillæ ℥ ss. M. (Hecker.)

Form. 408. Mistura Febrifuga. (Peyson.)

℞ Antimonii Tartarizati gr. j.; Gum. Tragacanth. ℈ j.; Aquæ Commun. ℥ vij.; Tinct. Opii ♏ xx.; Syrup. Papaveris ʒ vij. M.

Form. 409. Mistura Febrifuga Nervina.

℞ Camphoræ rasæ ℈ j.—℈ ij.; Vitel. Ovor. q. s. Subige, et adde Decocti Cinchonæ ℥ vjss.; Tinct. Opii Comp. (Vide Form.) ʒ ss.; Æther. Sulphur. ʒ j. M. Capiat ℥ ss.—℥ jss. 5tis vel 6tis horis.

Form. 410. Mistura Guaiaci Ammoniata.

℞ Guaiaci Gummi Resinæ, Pulveris Acaciæ, āā ʒ ij.; Decocti Glycyrrhizæ, O ss.; Liquoris Ammoniæ Subcarbonatis ʒ ijss. Tere Guaiacum et Pulv. Acaciæ cum Liquore Ammoniæ, et gradatim adde Decoctum.

Form. 411. Mistura Guaiaci Comp.

℞ Gum. Guaiaci, Gum Ammoniaci, Gum. Acaciæ, āā ʒ ij.: solve terendo in Aquæ Fœniculi ℥ vjss., et adde Vini Antimonii Tartar. ℥ ss.; Syrup. Althææ ʒ vj. M. Capiat Cochleare unum amplum tertiis vel quartis horis.

Form. 412. Mistura cum Hydrargyri Oxymuriatis.

℞ Decocti Glycyrrhizæ ℥ v.; Aquæ Cinnamomi ℥ ij.; Liquoris Hydrargyri Oxymuriatis (Form. 322.), Syrupi Aurantii, āā ℥ ss. Misce. Ft. Mistura, cujus sumat Coch. ampl. ij. vel. iij. statim post cibum, bis terve in die. (Sprague.)

Form. 413. Mistura Infusi Cuspariæ Composita.

℞ Cuspariæ Corticis contus. ℥ j.; Aurantii Corticis exsiccati ℥ ss.; Aquæ Ferventis Octarium j. Macera per horas quatuor in vase clauso, et cola.

℞ Colati Infusi, f. ℥ vij.; Tinctur. Cinnamomi, Syrup. Aurantiorum, āā f. ℥ ss.; Cretæ Præparatæ ʒ j. M. Fiat Mistur., de qua sumatur Cyathus (Cochlearia iij.—iv.) ter vel quater quotidiè.

Form. 414. Mistura Infusi Salicis Comp.

℞ Cort. Salicis contus. ʒ iij.; Aquæ O ij. Decoque ad octarium j.; dein adde Caryophyl. contus. ʒ ss., et cola.

℞ Colati Liquoris f. ℥ vij.; Tincturæ Aurantii f. ʒ vj.; Syrupi Aurantii f. ʒ ij. M. Sumat quartam partem ter die.

Form. 415. Mistura Infusi Senegæ Comp.

℞ Rad. Polyg. Senegæ conc. ℥ j.; Rad. Glycyrrhizæ ʒ ss. Coque cum Aquâ Fontan. ℥ xvj. ad remanent. unciarum octo. In colat. dissolv. Flor. Salis Ammon. Depur. ʒ ij.; Pulv. Tamarind. ʒ j.; Tart. Emetici gr. j.; Syrup. Althææ ℥ j. M. Capiat æger alterâ quâque horâ Cochleare unum.

Form. 416. Mistura Infusi Serpentariæ Comp. (1.)

℞ Olei Cinnamomi ♏ vj.; Sacchari Purif. ʒ iij. terentur benè, et ad. Infus. Serpentariæ (F. 262.) ℥ vij.; Spirit. Ætheris Muriatici ʒ ss.; Tinct. Capsici ʒ ss.—ʒ j. M. Fiat Mist., cujus capiat Coch. ij.—iv. tertiis vel quartis horis.

Form. 417. Mistura Infusi Serpentariæ Comp (2.)

℞ Infus. Serpentariæ ℥ vj; Tinct. Opii Camphoratæ ʒ v.; Spirit. Ammoniæ Arom. ʒ ijss.; Syrup. Aurantii ℥ j. M. Capiat partem quartam tertiis vel quartis horis.

Form. 418. Mistura Infusi Uvæ Ursi.

℞ Infusi Uvæ Ursi ʒ xiv.; Potassæ Carbon. gr. xxv.; Extracti Conii, gr. iij., grad. auget. ad vj.; Extract. Papaveris gr. v. ad x.; Syrupi Zingiberis, ʒ ij. M. Fiat Haust. ter in die hauriend.

Form. 419. Mistura Infusi Uvæ Ursi Composita.

℞ Uvæ Ursi Fol. ʒ ijss.; Radicis Rhei concis. et cont. ʒ j.; Aquæ Ferventis ℥ xij. Macera per horas ij. in vase clauso, deinde cola.

℞ Liquoris colat. ℥ vijss.; Sodæ Sub-carbon. ʒ jss.; Tinct. Opii ♏ xlv. (vel Hyoscyami ʒ jss.); Tinct. Camphoræ Comp. ʒ iij.; Syrup. Tolutan. ʒ jss. M. Fiat Mist., cujus capiat Cochlearia duo magna quatuor vices in die.

Form. 420. Mistura Laxans.

℞ Infus. Rosarum Com. ℥ vjss.; Acidi Sulphur. Dil. ♏ xx; Potassæ Sulphatis ʒ iij.; Tinct. Aurantii Comp. ʒ iij. M. Fiat Mist., cujus capiat Cochlear. ij. larga tertiis vel quartis horis.

Form. 421. Mistura Mucilaginis Anodyna.

℞ Mucilaginis Tragacanthæ ℥ ijss.; Oxymellis Scillæ ℥ ss.; Syrupi Papaveris ℥ j. Misce. Ft. Mistura, cujus capiat Coch. amp. sæpius urgenti tusse gradatim deglutiendum.

N. B. — For the sake of expedition, if the mucilage of Tragacanth should not be at hand, its place may be supplied by Pulvis Tragacanthæ Comp. ʒ jss.; Aquæ Destil. ℥ ijss. (Sprague.)

Form. 422. Mistura Myrrhæ.

℞ Myrrhæ ʒ jss.; Decocti Glycyrrhizæ ferventis f. ℥ vss.; Simul terè, et cola. Dosis f. ℥ j. bis vel ter quotidiè. Singulis dosibus interdum adde, Sodæ Subcarbonatis gr. xij., vel Acidi Sulphurici Aromatici minim. xv., vel Tincturæ Opii Camphoratæ f. ʒ ss. Misce. (In the latter stages of Phthisis Pulmonalis, when languor or debility is a very prominent symptom, the above mixture, combined according to circumstances, is an excellent medicine.)

Form. 423. Mistura Nervina. (1.)

℞ Misturæ Camphoræ f. ℥ iij.; Misturæ Assafœtidæ f. ℥ ij.; Tinct. Valerianæ, Spiritûs Ammoniæ Compos., Spiritûs Ætheris Compos., āā f. ʒ ij. M. Fiat Mistura, cujus sumantur Cochlear. duo ampla subindè.

Form. 424. Mistura Nervina. (2.)

℞ Misturæ Camphoræ f. ℥ vij.; Spiritûs Ætheris Sulphurici, Spiritûs Ammoniæ Compos., āā f. ʒ ijss.; Syrupi Croci f. ℥ ss. Fiat Mistura, de quâ sumantur Cochlearia duo vel tria magna, urgente agitatione.

Form. 425. Mistura Oleosa.

℞ Olei Olivæ vel Olei Lini, Aquæ Pimentæ, āā O j.; Potassæ Subcarbonatis ʒ vj. Misce. Dosis ℥ j. ad ℥ jss. *Antiphlogista* fit addendo Liquoris Antimonii Tartarizati, ℥ ss. ad ℥ ij. *Anodyna* fit addendo Tincturæ Opii ♏ xx. ad ʒ ij. *Volatilis* fit usu Spiritûs Ammoniæ Aromatici loco Potassæ Subcarbonatis.

Form. 426. Mistura Pectoralis. (1.)

℞ Rad. Althææ ℥ jss.; Semin. Anisi Cont. ʒ iij.; Aq. Fervent. q. s. ut sit colaturæ ℥ xij. Adde Mur. Ammoniæ ʒ ij.; Succi Insp. Glycyrrh. ℥ ss. M. (Aust. Phar.)

Form. 427. Mistura Pectoralis. (2.)

℞ Decocti Lichenis ℥ xj.; Vini Ipecacuanhæ ʒ ij.; Extr. Conii ℈ j.; Olei Anisi ♏ xij.; Syrup. Althææ et Syrup. Papaveris āā ʒ iij. M. Capiat Coch. iij. vel iv. quater in die.

Form. 428. Mistura Phosphorata.

℞ Phosphori gr. ij.; Olei Terebinth. ʒ ss.; Olei Olivæ ʒ ijss.; Aq. Fervent. q. s.; Gum. Acaciæ ℥ ss.; Aquæ Anethi ℥ iv.; Syrup. Zingiberis ℥ j.; Olei Caryophyl. ♏ vj.

Form. 429. Mistura Purgans. (1.)

℞ Infus. Sennæ f. ℥ ivss.; Magnes. Sulphatis ℥ j.; Aquæ Menthæ Sativ. f. ℥ ijss.; Tinctur. Sennæ f. ℥ ss. M. Sumat Cochlear. iv. primo mane, et repet. post horas tres, si opus sit.

Form. 430. Mistura Purgans. (2.)

℞ Fol. Sennæ, Conservæ Menthæ Sativæ (F. 46.), āā ℥ ss.; Sem. Coriand. contus. ℈ ij.; Aquæ Ferventis ℥ viij. Macera per horas duas, et cola.

℞ Infusi suprapræscrip. ℥ vij.; Sodæ Sulphatis ℥ j.; Tincturæ Sennæ ʒ vj.; Tinct. Cardam. Co. ʒ ij.; Sp. Ammoniæ Arom. ʒ ij. M. Ft. Mistura. Capiat partem 4tam secundis horis, donec benè solutus sit alvus, et pro re natâ repetendam.

Form. 431. Mistura Refrigerans.

℞ Camphoræ rasæ gr. x.—℈ j.: tere cum Mucilag. Acaciæ ʒ iij.; Muriatis Ammon. ʒ j.—ʒ jss.; Aq. Flor. Aurantiar., Aq. Com., āā ℥ iij.; Syrup. Aurantii ℥ ss. M.

Form. 432. Mistura Resolvens.

℞ Flor. Arnicæ ʒ jss.; Aq. Fervid. q. s. ut sint colaturæ ℥ vijss. Adde Potassæ Sub-carbon. ʒ j.; Spirit. Lavandul. Co. ʒ jss. M. (In Engorgements of Glands, &c.)

Form. 433. Mistura Rhei Composita.

℞ Rhei Radicis contritæ ʒ ss.; Sodæ Sub-carbonatis ʒ j.; Decocti Glycyrrhizæ, f. ℥ v. et ʒ ij.; Tincturæ Aurantii, ʒ vj. Misce. Dosis à f. ℥ ss. ad f. ℥ j. semel, bis, vel ter quotidiè. (This is a pleasant and efficacious method of administering small doses of Rhubarb in Dyspepsia. — Sprague.)

Form. 434. Mistura Rhodii Comp. (1.)

℞ Tincturæ Rhodii, ʒ iij.; Mucil. Acaciæ *ver.* ʒ vj. Terentur probè simul; adde gradatim, Infusi Caryophyllorum ℥ iv.; Syrupi Zingiberis ℥ ss. M. Fiat Mistura. Sumat partem 4tam ter in die urgente flatu.

Form. 435. Mistura Rhodii Comp. (2.)

℞ Tincturæ Rhodii ℥ ss.; Mucil. Acaciæ *ver.* ℥ vj. Tere benè, et adde gradatim, Infus. Uvæ Ursi ℥ vj.; Syrupi Papaveris ℥ vj. M. Fiat Mistura. Dosis partem 4tam ter quaterve in die. (In Asthma, and in Chronic Catarrhs, &c.)

Form. 436. Mistura Salina.

℞ Mist. Camphoræ ℥ ivss.; Liq. Ammon. Acet. ℥ iij.; Spirit. Æther. Nit. ʒ iij.; Potassæ Nit. ℈ ij.; Syrup. Limonis ʒ ij. M. Fiat Mist., cujus capiat Cochlearia ij. larga quartâ quâque horâ.

Form. 437. Mistura Salina Antiseptica. (1.)

℞ Infus. (vel Decocti) Cinchonæ ℥ vij.; Sodæ Muriatis ʒ ij.—ʒ iij.; Potassæ Muriatis ʒ ss.—ʒ j. Solve, et adde Tinct. Serpentariæ ℥ ss. M.

Form. 438. Mistura Salina Antiseptica. (2.)

℞ Infus. (vel Decocti) Cinchonæ, Mist. Camphoræ, āā ℥ iijss.; Potassæ Nitratis, Potassæ Muriatis, āā ℈ ij.; Tinct. Serpentariæ ʒ ss. M.

Form. 439. Mistura Salina Antiseptica. (3.)

℞ Mist. Camphoræ ℥ vij.; Potassæ Oxymuriatis ʒ jss.; Sodæ Muriatis ʒ ij.; Tinct. Serpentariæ ℥ ss.; Spirit. Lavand. ʒ ij. M.

Form. 440. Mistura Salina Febrifuga. (1.)

℞ Mist. Camphoræ ℥ ivss.; Liq. Ammon. Acet. ℥ ijss.; Magnesiæ Sulphatis ℥ ss.—℥ j.; (vel Potassæ Sulph. ℥ ijss.;) Spirit. Æther. Nit. ʒ iij. M.

Form. 441. Mistura Salina Febrifuga. (2.)

℞ Mist. Camphoræ ℥ ivss.; Liq. Ammon. Acet. ℥ iij.; Sodæ Sulphatis (vel Sodæ Phosphatis) ʒ vj.; Spirit. Æther. Nitrici ʒ iij. M.

Form. 442. Mistura Sedativa.

℞ Magnesiæ Subcarbonatis, Cretæ Præparatæ, Pulv. Acaciæ, āā ʒ ij.; Spiritûs Ammoniæ Aromat. ʒ jss.; Tinct. Assafœtidæ ʒ iij.; Syrup. Papaveris ℥ ss.; Aquæ Destillatæ O j. Misce. Dosis à ℥ ss. ad ℥ j. 3tiis, vel 4tis, vel 6tis horis. Interdum adde Tinct. Catechu, &c. &c.

Form. 443. Mistura Strychninæ.

℞ Strychninæ Purissimæ gr. j.; Sacchar. Purif. ʒ jss.; Aquæ Destil. ℥ ij.; Acidi Acetici gtt. ij. M. Capiat Cochlearia minima ij. mane nocteque.

Form. 444. Mist. Terebinthinæ Venetæ. (Clossius.)

℞ Terebinthinæ Venet. ʒ j.—ʒ jss.; Vitelli Ovorum q. s.; et adde Aquæ Menthæ Piperitæ ℥ ivss. Capiat Cochlear. j. vel ij. pro re natâ. (Against Worms and Chronic Affections of the Mucous Surfaces.)

Form. 445. Mistura Tonica. (1.)

℞ Infus. Cascarillæ (vel Gentianæ Comp.) ℥ vij.; Potassæ Sub-carb. ʒ j.—ʒ jss.; Tinct. Aurantii Comp., Spirit. Pimentæ, āā ʒ iij. M.

Form. 446. Mistura Tonica. (2.)

℞ Infusi Cascarillæ O jss.; Acidi Sulphurici Aromat. ʒ ij. Misce. Dosis à Cochlear. ij. parv. ad Cochl. iij. magna bis die.

Form. 447. Mistura Vermifuga.

℞ Rad. Valer. Min., Semin. Santon., āā ℥ ss. Infunde Aq. Font. Fervid. ℥ viij.: digere per horam, dein cola. Liq. colat. adde Assafœtidæ ʒ j. in Vitell. Ovi solutæ. Fiat Mistura.

Form. 448. Mistura Vinosa.

℞ Vini ℥ vj.; Ovorum duorum Vitellos; Sacchari Purificat. ℥ ss.; Olei Cinnamom. ♏ iv.; Tinct. Capsici ℈ j. M. Dosis ℥ jss. ter quaterve, aut sæpius quotidiè, urgentibus Languoribus.

Form. 449. Oleum Camphoræ.

℞ Acidi Nitrici quantum velis; Camphoræ q. s. s. ad Acidi saturandum. Decant, and preserve in a closely stopped bottle. (Fer.)

Form. 450. Pilulæ Aloes cum Ferro.

℞ Aloes Spicati Extracti ʒ jss.; Myrrhæ Gummi Resinæ pulv. ʒ ij.; Extracti Gentianæ ℈ iv.; Ferri Sulphatis ℈ ij.; Theriacæ Purificat. q. s. Simul contunde, et in Pilulas cxx. divide. Dosis à ij. ad iv. semel vel bis quotidiè.

Form. 451. Pilulæ Aloes cum Ferro Compositæ.

℞ Massæ Pilul. Aloes cum Myrrhâ, Pilul. Ferri Comp., Pilul. Galban. Comp., āā ℈ ij.; Sodæ Sub-carbon. exsic. ℈ j.; Olei Junip. Sabin. ♏ iv. Contunde simul, et fiat massa æqualis, in Pilulas xxx. distribuenda. Capiat ægra binas, manè nocteque.

Form. 452. Pilulæ Aloes et Ferri.

℞ Ferri Sulphatis, Potassæ Subcarbonat, āā ℈ j.; Myrrhæ pulver. ʒ j.; Aloes pulver. ʒ ss. M. Et divide in Pilulas xxx.; ij. vel iij. pro dose nocte maneque.

Form. 453. Pilulæ Aloes et Moschi Compositæ.

℞ Pilul. Aloes cum Myrrhâ ʒ j.; Camph. rasæ gr. xij.; Moschi gr. xxviij.; Balsam. Peruvian. q. s. M. Fiant Pilulæ xxiv., quarum capiat binas omni nocte.

Form. 454. Pilulæ Aloes et Scammoniæ Comp.

℞ Aloes Spicat. ℈ j.; Scammon. gr. xij.; Extr. Rhei ℈ ijss.; Baccar. Capsici pulv. gr. viij.; Olei Caryoph. ♏ vj. M. Fiant Pilulæ xviij., quarum sumantur binæ horâ decubitus, p. r. n.

Form. 455. Pilulæ Alterativæ. (1.)

℞ Massæ Pilul. Hydrarg. Sub-mur. Comp. ℈ ij.; Saponis Castil. ʒ ss.; Extr. Sarsæ et Ext. Taraxaci āā ʒ jss. Misce benè, et divide in Pilulas lx. quarum capiat binas vel tres, ter quotidiè.

Form. 456. Pilulæ Alterativæ. (2.)

℞ Scillæ Radicis exsic. gr. vj.; Fol. Digitalis gr. xij.; Hydrarg. Sub-mur. gr. vj.; Myrrhæ pulv. ℈ j. Tere simul, et adde Assafœtid. ʒ ss.; Extr. Gentianæ q. s. Fiat massa æqualis, et divide in Pil. xviij., quarum capiat unam manè, meridiè, et nocte.

Form. 457. Pilulæ Ammoniaci Compositæ.

℞ Gummi Ammoniaci ʒ j.; Saponis Castil., Fellis Bov. inspissat., Pilulæ Hydrarg., Pulv. Folii Conii., Extracti Conii, āā ʒ ss.; Extr. Taraxaci ʒ ij.; Sulphur. Antimonii Aurat. ℈ j.; Theriacæ Purif. q. s. Contunde in massam æqualem, et divide in Pilulas lxxx.; quarum capiat binas vel tres, ter quotidiè. (Deobstruent, dissolvent, &c.)

Form. 458. Pilulæ Ammoniæ et Anthemidis.

℞ Ammoniæ Sub-carbonatis Pulver., Extracti Anthemidis, āā ʒ ss. Fiat massa in Pilulas xij. dividenda, quarum sumatur una bis vel ter die.

Form. 459. Pilulæ Ammoniareti Cupri et Zinci.

℞ Ammoniareti Cupri, Oxydi Zinci, āā gr. vj.—xij.; Sacchari Albi, Pulv. Tragacanthæ, āā gr. xij.; Mucilag. Acaciæ q. s. ut fiant Pilulæ xij., quarum capiat unam bis terve quotidiè. (Epilepsy, Chorea, &c.)

Form. 460. Pilulæ Anodynæ.

℞ Camphoræ rasæ gr. ij.—vij.; Potassæ Nitratis v.—viij.; Extr. Hyoscyami gr. iij.—gr. viij.; Syr. Papaveris q. s. Misce. Fiant Pilulæ iij.—vj., h. s. sumendæ.

Form. 461. Massa Pilularum Anodynarum.

℞ Opii *Crudi* in pulv. subtiliss. ʒ ss.; Extracti Hyoscyami ʒ ijss.; Saponis Duri, Iridis Flor. pulv., āā ʒ j. Contunde, ut fiat massa, in Pilulas sexaginta æquales distribuenda.

N. B. — Ten grains of the mass contain *one* grain of *opium* and *five* of the *extract of henbane.*

Form. 462. Pilulæ Anodyno-Aperientes. (1.)

℞ Pulv. Ipecacuanhæ gr. x.; Extracti Colocynthidis Comp. ʒ j.; Extracti Hyoscyami ʒ ss.; Pilulæ Hydrarg. ℈ j.; Saponis Castil. gr. x.; Olei Caryoph. ♏ iij. Contunde in massam æqualem, et divide in Pilulas xxx., quarum capiat unam, duas, vel tres pro dose.

Form. 463. Pilulæ Anodyno-Aperientes. (2.)

℞ Pulv. Ipecacuanhæ gr. viij.; Extr. Colocynth. Comp. ℈ ijss.; Extr. Hyoscyami ʒ ss.; Fellis Taur. inspiss. ℈ j. Contunde simul, et divide massam in Pilulas xxiv., quarum capiat unam, duas, vel tres pro dose.

Form. 464. Pilulæ Antimonii Alterativæ.

℞ Sulphur. Aureat. Antimon. ℈j.; Florum Sulphuris ʒ ij.; Camphoræ rasæ ℈j.; Extracti Taraxaci (vel Extr. Sarsæ) ʒ iijss. Fiat massa æqualis, et divide in Pilulas xcv. Capiat binas vel tres ter quotidiè.

Form. 465. Pilulæ Antimonii et Guaiaci Compositæ.

℞ Sulphuret. Aur. Antimonii ℈j.; Florum Sulphur. ʒ iij.; Resin. Guaiaci, Extr. Conii, āā ʒ ij.; Syrup. Althææ q. s. Fiat massa æqualis, et divide in Pilulas cxx. Capiat binas vel tres ter die.

Form. 466. Pilulæ Antimonii Sulphureti Comp. (1.)

℞ Antimonii Sulphur. Præcip. gr. v.; Pilul. Hydrargyr., Extract. Hyoscyami, āā ℈j. Misce ut fiat massa æqualis in Pilulas decem dividenda, quarum sumatur una ter die.

Form. 467. Pilula Antimonii Sulphureti Comp. (2.)

℞ Sulphureti Antimonii Præcipitati, Hydrargyri Submuriatis, āā gr. ss.; Extracti Conii gr. iv. Fiat Pilula ter die sumenda.

Form. 468. Pilulæ Antispasmodicæ.

℞ Gum. Ammoniaci ʒj.; Benzoini, Pulv. Myrrhæ, āā ℈ ij.; Assafœtidæ ℥ ss.; Camphoræ ℈ j.; Tinct. Opii ♏ xij. Misce. Divide in Pilulas lx., quarum capiat æger, omni trihorio, pilulas duas vel tres.

Form. 469. Pilulæ Antispasmodicæ Pierquinii.

℞ Camphoræ, Potassæ Nitratis, Digitalis Purpur., āā ʒ ss.; Pulv. Cinchonæ Flav. ʒj.; Extract. Gentianæ ʒ ij.; Syrup. Simp. q. s. M. Fiant Pilulæ lx.

Form. 470. Pilulæ Aperientes Comp.

℞ Pilul. Hydrarg., Pilul. Aloes cum Myrrhâ, āā ℈j.; Pilul. Cambog. Comp. gr. xvj.; Pulv. Mastiches gr. vj.; Olei Caryophil. ♏ ij. M. Fiat massa æqualis, et divide in Pilulas xxiv., quarum capiat binas horâ somni quotidiè.

Form. 471. Pilulæ Aperientes Alterativæ.

℞ Pilul. Hydrarg. ℈j.; Antimonii Tartarizati gr. jss.; Extr. Jalapæ ʒ jss.; Fellis Tauri inspissati ʒ ss.; Saponis Castil. gr. xv. Contunde in massam æqualem, et divide in Pilulas xl.; quarum capiat binas vel tres omni nocte.

Form. 472. Pil. Argenti Nitratis et Belladonnæ.

℞ Argenti Nitratis pulv. gr. ij.; Pulv. Radicis Belladonnæ ℈ j.; Extr. Glycyrrh. ʒ j. Misce bene, et divide in Pilulas xxxvj.; quarum capiat unam ad tres bis terve quotidiè. (In Pertussis and Epilepsy. M. Borius.)

Form. 473. Pilulæ Argenti Nitratis Compositæ.

℞ Nitratis Argenti pulv. gr. v.; Opii Puri gr. x.; Camphoræ rasæ, Nucis Myristicæ, āā ℈ jss.; Pulv. Acaciæ ʒ ss.; Syrup. Simp. q. s. M. Divide in Pilulas xxxvj., quarum capiat unam ad tres bis terve quotidiè.

Form. 474. Pilulæ Argenti Nitratis et Gentianæ.

℞ Argenti Nitratis gr. ix.; Opii Puri gr. v.; Extr. Gentianæ, Extr. Glycyrrh., āā ʒ jss. Divide in Pilulas lv., quarum unam ad tres vel quatuor, bis terve quotidiè. (Niemann.)

Form. 475. Pilulæ Argenti Nitratis Opiatæ.

℞ Argenti Nitratis pulv. gr. x.; Moschi ʒj.; Opii ℥ jss.; Camphoræ ʒ ij.; Pulv. Acaciæ ʒ ss.; Syrup. Simp. q. s. Misce bene, et divide in Pilulas lxxx., quarum capiat unam ad quatuor bis terve quotidiè. (Van Mons, Cadet de Gassicourt, et Ratier.)

Form. 476. Pilulæ Arsenicales. (1.)

℞ Arsenici Albi gr. ij.; Opii Puri gr. viij.; Saponis Medic. gr. xxxvj. Divide in Pilulas xxiv., quarum capiat j.—iij. pro dose.

Form. 477. Pilulæ Arsenicales (2.)

℞ Arsenici Albi gr. vj.; Opii gr. xij.; Ammoniæ Mur. ʒ ss.; Mucilag. Acaciæ ℈ ij.; Syrup. Simp. q. s. M. Divide in Pilulas xxx., quarum capiat unam vel binas ter die.

Form. 478. Pilulæ Arseniatis Ferri. (Biett.)

℞ Proto-Arseniatis Ferri gr. iij.; Extr. Humuli ʒ ij.; Pulv. Althææ ʒ ss.; Syrup. Auran. q. s. M. Divide in Pilulas xlviij., quarum capiat unam in die.

Form. 479. Pilulæ Assafœtidæ cum Cinchona.

℞ Assafœtidæ Gummi Resinæ ℥j.; Extracti Cinchonæ Opt. ʒ ij. Saponis Duri, ʒ ss.; Olei Pulegii ♏ xij. Theriac. Purificat. q. s. ut fiat massa: in Pilulas xlviij. divide; quarum capiat iij. vel iv. nocte manèque.

Form. 480. Pilulæ Assafœtidæ Compositæ.

℞ Assafœtid., Castore, Valerianæ, Succini, āā pulveriz. ʒ ss.; Camphoræ gr. x.; Olei Cajeputi q. s. M. Fiant Pilulæ xxxvj.; quarum capiat binas pro dose.

Form. 481. Pilulæ Assafœtidæ cum Felle.

℞ Assafœtid., Fell. Tauri inspissat., āā ʒj.; Pulv. Rhei ℈j.; Syrup. q. s. M. Fiant Pilul. xl.

Form. 482. Pilulæ Assafœtidæ et Valerianæ Comp.

℞ Gum. Assafœtidæ, Pulv. Valerianæ, āā ℥j.; Extr. Aconiti gr. vj.; Pulv. Scillæ gr. viij.; Castorei ʒ ss.; Ammoniæ Subcarbon. gr. xvj.; Syrup. Papaveris q. s. M. Fiant Pilulæ xlviij., quarum capiat binas ad quatuor pro dose. (In Spasmodic Affections of the respiratory Organs. — Richter.)

Form. 483. Pilulæ Astringentes.

℞ Extr. Cinchonæ, Ferri Ammoniati, Aluminæ Sulph., Pulv. Aromat., āā ℥jss. Olei Caryoph. q. s. M. Fiant Pilulæ lxxxiv.; quarum j.—ij. pro dose.

Form. 484. Pilulæ Balsamæ Comp.

℞ Myrrhæ Gummi Resinæ pulv. ℈ ij.; Galbani, Assafœtidæ, āā ℈ j.; Capsici Annui Pulv. gr. xv.; Balsami Peruviani ℥j. M. Fiant Pilulæ xxx.; è quibus sumantur binæ vel tres, bis terve de die.

Form. 485. Pilulæ Balsamicæ. (1.)

℞ Extr. Aloes ʒ ij; Extr. Rhei ℥j.; Balsam. Peruv. et Benzoini, āā ʒ ss.; Croci Stigmat. et Myrrhæ, āā ℈ j.; Extr. Opii gr. v.; Spirit. Vini et Syrup. q. s. ♏ lxxx.; quarum capiat unam ad quatuor pro dose.

Form. 486. Pilulæ Balsamicæ. (2.)

℞ Terebinthinæ Chiensis, Spermaceti, āā ʒ ij.; Pulv. Myrrhæ ℥j.; Olibani Pulver. q. s. ut fiat Pilulæ lxx.; quarum capiat unam vel duas omni tertiâ vel quartâ horâ.

Form. 487. Pilulæ Balsamicæ Camphoratæ.

℞ Acidi Benzoini ʒj.; Camphoræ, Croci Stig., Balsam. Peruvian., G. Ammoniaci, āā ℈ j.; Mucilag. Acaciæ q. s. M. Fiat massa æqualis; divide in Pilulas xxxvj, quarum capiat binas pro dose.

Form. 488. Pilulæ Belladonnæ.

℞ Extr. Belladonnæ gr. vj.; Pulv. Rad. Glycyrrh. ʒ ss.; Succi Inspissat. Sambuci Nig. q. s. ut fiant Pilulæ xij. Capiat unam ad tres pro dose.

Form. 489. Pilulæ Benzoinæ et Terebinthinæ Comp.

℞ Myrrhæ, G. Ammoniaci, āā ʒ jss.; Benzoini ʒ j.; Extr. Gentianæ ℈ ij.; Terebinth. Venet. ʒ jss.; Pulv. Rhei q. s. Fiat Massa æqualis, et divide in Pilulas gr. iv. pond. (In Hypochondriasis, Habitual Constipation, &c.)

Form. 490. Pilulæ Bismuthi.

℞ Bismuthi Sub-nit., Castorei, āā gr. j. — ij.; Pulv. Glycyrrh. et Mellis q. s. ut fiant Pilulæ ij., tertiis vel quartis horis sumendæ.

Form. 491. Pilulæ Brucinæ.

℞ Brucinæ Puræ, gr. xii.; Conserv. Rosar. ℈ ij. Misce benè, et divide in Pilulas xxiv. æquales. Capiat unam ad quatuor pro dose.

Form. 492. Pilulæ Cambogiæ Compositæ.

℞ Cambogiæ ʒ j.: solve in Olei Ricini pauxillo, et adde Pilul. Aloës cum Myrrhâ, Pilul. Galban. Comp., Pilul. Hydrarg., āā ℈ ij. Contunde benè simul, divide in xlviij. Capiat unam ad tres pro dose.

Form. 493. Pilulæ Camphoræ et Antimonii Thebaiacæ.

℞ Camphoræ rasæ gr. iv.; Pulv. Jacobi Veri gr. iij. Opii Puri gr. ss.; Syrup. Simp. q. s. Fiant Pilulæ ij. quartâ vel sextâ quâque horâ sumendæ.

Form. 494. Pilulæ Camphoræ Comp. (Brera.)

℞ Camphoræ, ℈ j.; Potassæ Nitratis ℈ ij.; Kermes Mineralis gr. vj.; Pulv. Glycyrrh. et Mellis, āā q. s. M. Divide in Pilulas xviij., quarum capiat duas tertiâ quâque horâ.

Form. 495. Pilulæ Camphoræ et Ipecacuanhæ Comp.

℞ Pulv. Ipecacuanhæ Comp. gr. iv.; Camphoræ rasæ gr. j—iij.; Syrup. Papaveris q. s. M. Fiant Pilulæ iij., quartâ quâque horâ sumendæ.

Form. 496. Pilulæ Camphoræ et Nitri.

℞ Camphoræ Subactæ, Potassæ Nitratis, āā gr. ij.—v.; Conserv. Rosar. q. s. M. Fiant Pilulæ ij. vel. iij.

Form. 497. Pilulæ Castorei Thebaiacæ.

℞ Opii gr. ss.; Castorei Rossici gr. vjss.; Pulveris Digitalis gr. j.; Syrup. q. s. Fiant Pilulæ duæ, bis vel ter die sumendæ. (In Spasmodic Asthma, and Dyspnœa.)

Form. 498. Pilulæ Catharticæ. (1.)

℞ Hydrarg. Submur. gr. viij.; Extr. Res. Jalap. gr. xvj; Gum. Guaiaci gr. xxiv.; Mucilag. Acaciæ q. s. M. Divide in Pilulas xij. Capiat binas vel tres pro re natâ.

Form. 499. Pilulæ Catharticæ. (2.)

℞ Cambogiæ Gum. ʒ jss.; Scammon. ʒ j.: solve terendo in pauxillo Olei Junip: dein adde Aloës Socot. ʒ ijss.; Gum. Ammoniaci ʒ jss.; Potassæ Sulphatis ʒ j.; Oxymel. Scillæ q. s. ut fiat massa æqualis. Capiat pro dose gr. x. ad gr. xxx.

Form. 500. Pilulæ Colocynthidis Compositæ.

℞ Colocynthidis Pulpæ ℥ss.; Aloës Spicatæ Extracti Scammoniæ Gummi Resinæ, āā ʒ j.; Saponis Duri ʒ ij.; Olei Caryophylli ʒ j. Aloë, Scammonia, et Colocynthis pulpa in pulverem redigantur; tum cum Sapone atque Oleo conterantur; denique cum Mucilagine Acaciæ subigantur in massam.

Form. 501. Pilulæ Colocynthidis cum Hydrargyro.

℞ Massa Pil. Colocynth. Composit. ʒ iv.; Hydrargyri Protochlorid. (Calomel) ʒ j. Simul contunde in mortario lapideo, donec massa æqualis sit; et in pilulas lx. æquales distribuenda. Dosis, ab j. ad iv. pro re natâ.

Form. 502. Pilulæ Cupri Sulphatis cum Opio.

℞ Cupri Sulphatis gr. vj.; Opii Puri gr. iv.; Pulv. Tragacanth. Comp. ℈ j.; Mucilag. Acaciæ q. s. ut fiant Pilulæ xij.; quarum capiat unam ter die, postea quater quotidiè, vel tertiis aut quartis horis. (Chronic Diarrhœa and Dysentery.)

Form. 503. Pilulæ Deobstruentes. (1.)

℞ Antimonii Tartarizati gr. iv.; Pilul. Hydrarg. ℈ j.; Saponis Castil., Gum. Ammoniaci, Assafœtidæ, Extr. Aloës Purif., āā ʒ ss. Misce benè, et divide in Pilulas lxxv.; quarum capiat binas ter die.

Form. 504. Pilulæ Deobstruentes. (2).

℞ Extr. Aquosæ Aloës ʒ ij; Gum. Ammoniaci ℈ ij.; Myrrhæ, Mastiches, Benzoini, Rhei, āā gr. ℈ j.; Croci Stigm. gr. xvj.; Potassæ Sub-carbon. ℈ ijss.; Mellis q. s. ut fiat massa æqualis. Capiat gr. x. ad xx. pro re natâ.

Form. 505. Pilulæ Deobstruentes. (Barthez.) (3).

℞ Kermes Mineral. gr. j.; Hydrarg. Submur. gr. ij.; Extr. Fumariæ (Extr. Taraxaci) gr. x. Fiant Pilul. iij., pro dose.

Form. 506. Pilulæ Deobstruentes. (Recamier.) (4).

℞ Saponis Castil. ʒ ijss; Gum. Ammoniaci ʒ j.; Aloës Extr. Purif. gr. xv.; Assafœtidæ ʒ ss.; Pulv. Rhei ʒ j.; Croci Sativi ʒ ss.; Syrup. q. s. M. Fiant Pilulæ lxxxiv., quarum capiat binas bis quotidiè.

Form. 507. Pilulæ Deobstruentes. (5).

℞ Saponis Hisp. ʒ iij.; Gum. Ammoniaci ʒ j.; Aloës ʒ j.; Rhei Pulv. ʒ j.; Assafœtidæ, Croci, āā ʒ ss.; Syrup. q. s. M. Divide in Pilulas c. Capiat binas ad quatuor bis terve in die.

Form. 508. Pilulæ Deobstruentes. (6.)

℞ Saponis Medicinalis ʒ iv.; Gum. Ammoniaci ʒ ij.; Extracti Conii, Extr. Aconiti Napel., āā ʒ jss.; Massæ Pilul. Aloës cum Myrrhâ ʒ j. Contunde in massam æqualem, et divide in Pilulas granarum quatuor. Capiat binas manè nocteque, augendo unam quotidiè donec xv. vel xx. sumantur in die. (Dr. Lowarby, in Glandular Tumours and Scirrhous Formations.)

Form. 509 Pilulæ Deobstruentes. (Stoll.) (7).

℞ Antimonii Sulphureti Præcipitati ℈ j.; Saponis Venetii ʒ ij.; Gummi Acaciæ ʒ j.; Mucilag. Gum. Tragacanth. q. s. Fiant Pilulæ L. Sumat tres manè et nocte. (For Cutaneous Eruptions, Rheumatism, &c.)

Form. 510. Pilulæ Deobstruentes. (8.)

℞ Hydrarg. cum Cretâ gr. xvj.; Sodæ Sub-carbon. exsic. ℈ j.; Extracti Taraxaci ʒ j. M. Fiant Pilulæ xx.; quarum capiat binas vel tres omni nocte.

Form. 511. Pilulæ Deuto-Iodureti Hydrargyri.

℞ Hydrarg. Deuto-Iodureti gr. ij.; Extr. Humuli ℈ ij. Pulv. Glycyr. q. s. Misce benè, et divide in Pilulas xvi.; quarum capiat binas manè nocteque, et augeat dosin ad tres vel quatuor.

Form. 512. Pilulæ Diaphoreticæ.

℞ Oxydi Zinci, Extracti Aconiti, āā xij.; Sulphureti Antimonii Aurat. gr. vi.; Extracti Humuli ʒ j.; Syrup. Papaveris q. s. Contunde benè simul, et divide in Pilulas xviij.; quarum capiat unam secundâ vel tertiâ quâque horâ. (In Chorea, Sciatica, Hysteria, and Rheumatism.)

Form. 513. Pilulæ Diaphoreticæ Sedativæ.

℞ Kermes Mineral., Extr. Opii, āā gr. ij.; Potassæ Nitratis gr. v.; Syrup. q. s. Fiant Pilulæ ij. pro dose.

Form. 514. Pilulæ Digitalis et Camphoræ Comp.

℞ Pulveris Digitalis gr. vj.; Camphoræ gr. xv.; Extracti Hyoscyami ℈ jss. Fiant Pilulæ duodecim. Sumat tres omni nocte. (In Maniacal and Spasmodic Affections.)

Form. 515. Pilulæ Digitalis et Myrrhæ Comp.

℞ Myrrhæ G. R. gr. ij.—iv.; Pulv. Digitalis gr. j.; Extr. Hyoscyami gr. iij.—v.; Syrup. q. s. Fiant Pilulæ ij., bis terve quotidiè sumendæ.

Form. 516. Pilulæ Diureticæ.

℞ Scillæ Rad. pulver. gr. ij; Pulv. Foliorum Digitalis gr. j.; Pilulæ Hydrargyri gr. vj.; Olibani Pulver. ℈ ss.; Olei Juniperi ♏ iv. Fiat massa in Pilulas quatuor dividenda, è quibus capiat ij. horâ somni, superbibendo haustulum Misturæ Diureticæ, No. 398 vel 399.

Form. 517. Pilulæ Diureticæ Alterativæ.

℞ Potassæ Supertart. ʒ j.; Sub-boracis Sodæ ℈ jss.; Pulv. Rad. Polygalæ Senegæ ʒ j.; Pulv. Radicis Colchici exsic. ℈ ij.; Pulv. Scillæ gr. xvj.; Extr. Taraxaci ʒ iij. Fiat massa æqualis, et divide in Pilulas c.; quarum capiat tres ter quotidiè.

Form. 518. Pilulæ Dulcamaræ et Antimonii.

℞ Antimonii Sulphurat. Nig., Pulv. Stip. Dulcamaræ, āā ʒ j.; Extr. Dulcamaræ ʒ ij.; Syrup. Tolutan. q. s. M. Fiant Pilulæ lx. (Richter, in Scrofula. Also in Cutaneous Diseases.)

Form. 519. Pilulæ Emmenagogæ.

℞ Aloës Socot., Myrrhæ, āā ʒ jss.; Galban., Gum. Ammoniac., āā ℈ ij.; Sub-boracis Sodæ ʒ jss.; Ferri Sulphatis ʒ ss.; Ferri Oxydi ℈ j.; Rhei ℈ j.; Olei Rutæ et Olei Sabinæ, āā ♏ xij.; Saponis q. s. Fiat massa æqualis, et divide in Pilulas cxx.; quarum capiat binas vel tres bis terve quotidiè.

Form. 520. Pilulæ Extr. Gentianæ et Humuli Comp.

℞ Extracti Gentianæ ʒ ij.; Saponis Medicin. ʒ jss.; Fell. Tauri inspiss.; Ext. Aloës Purif. āā ʒ j.; Ext. Humuli ʒ jss. Misce, et divide in Pilulas pond. gr. iij.; quarum capiat binas vel tres manè nocteque.

Form. 521. Pilulæ Ferri Ammoniati.

℞ Ferri Ammoniati ʒ j.; Extracti Aloës, Extracti Gentianæ, āā ʒ ss. Contunde simul, et divide massam in Pilulas triginta; quarum sumat duas ter quotidiè. (In Dyspepsia, Hysteria, Scrofula, and Mesenteric Obstructions.)

Form. 522. Pilulæ Ferri Ammoniati Compositæ.

℞ Ferri Ammoniati ʒ j.; Extr. Gentian. et Extr. Aloës āā ℈ ij. Contunde simul, et divide massam in Pil. xxxvj.; è quibus binæ, bis terve quotidiè, sumantur.

Form. 523. PILULÆ FERRI APERIENTES. (1.)

℞ Ferri Sulphatis, Potassæ Sulphatis, āā ʒ j.; Galbani, Assafœtidæ, āā ʒ jss.; Ammoniæ Muriatis ʒ ij.; Massæ Pilul. Aloës cum Myrrhâ ʒ iij.; Theriacæ Purif. q. s. Contunde in massam æqualem, et divide in Pilulas cl.; quarum capiat binas bis terve quotidiè.

Form. 524. PILULÆ FERRI APERIENTES. (2.)

℞ Ferri Sulphatis, Potassæ Sulphatis, āā ʒ j.; Galbani, Assafœtidæ, āā ʒ jss.; Extr. Gentianæ ʒ ij.; Massæ Pilul. Aloës cum Myrrhâ ʒ iij.; Theriacæ Purif. q. s. Contunde in massam æqualem, et divide in Pilulas cl.

Form. 525. PILULÆ GUAIACI COMP. (1.)

℞ Gum. Guaiaci ʒ ij.; Saponis Venet. ʒ j.; Calomelanos, Sulphur. Antimonii Aur., Pulv. Rad. Senegæ, Camphoræ, āā gr. xvj.; Aceti Scillæ q. s. Fiat massa æqualis, et divide in Pilulas lxxx.; quarum capiat duas vel tres bis terve quotidiè.

Form. 526. PILULÆ GUAIACI COMP. (2.)

℞ Gum. Guaiaci ʒ ij.; Calomel., Sulph. Antimonii Aur., āā ʒ ss.; Mucilag. Acaciæ q. s. M. Fiant Pilulæ l. capiat ij.—iv. pro dose (Cutaneous Affections.)

Form. 527. PILULÆ GUAIACI COMPOSITÆ. (3.)

℞ Guaiaci Gummi Resinæ pulv. ʒ ij.; Pulv. Opii Crudi gr. vj.; Hydrargyri Protochlorid. (Calomel) gr. xij.; Antimonii Tartarizati gr. iv.; Tincturæ Myrrhæ q. s. ut fiat massa, in Pilulas xxxvj. dividenda. Dosis, ij. vel iij. nocte manèque.

Form. 528. PILULÆ GUAIACI ET ANTIMONII COMP.

℞ Pulv. Jacobi Veri ʒ j.; Resin. Guaiaci in Pulv., Massæ Pilul. Aloës cum Myrrhâ, āā ʒ jss.; Syrup. Simp. q. s. Fiat massa æqualis, et divide in Pilulas xlviij. Capiat binas ad quatuor pro dose. (Emmenagogue, Stomachic, Aperient, and Antirheumatic.)

Form. 529. PILULÆ HELLEBORI ET ALOES COMP.

℞ Extr. Rad. Hellebor. Nig., Aloës Ext. Purif., Ferri Ammoniati, āā ʒ j.; Croci Stigmat. ʒ ss.; Opii Puri gr. v.; Syrup. q. s. M. Fiant Pilulæ l., quarum capiat binas vel tres.

Form. 530. PILULÆ HYDRARGYRI ANODYNÆ.

℞ Pilul. Hydrargyri, Pulveris Ipecacuanhæ Compos., Extract. Hyoscyami, āā gr. v.; Fiat massa in Pilulas iij. dividenda. Sumantur horâ somni.

Form. 531. PILULÆ HYDRARGYRI OXYMURIATIS.

℞ Hydrargyri Oxymuriatis, Ammoniæ Muriatis, āā gr. v.; Aquæ Destillatæ, f. ʒ ss.; Glycyrrhizæ Radicis Pulveris ℈ iv.; Mellis Opt. ʒ ss. Cogantur in massam, quam divide in Pil. xl.; è quibus sumatur una ter die.

Form. 532. PIL. HYDRARGYRI PHOSPHATIS COMPOSITÆ.

℞ Hydrargyri Phosphatis gr. ix.; Antimonii Tartarizati gr. j.; Opii Crud. in pulv. subtiliss. gr. vj.; Confectionis Fructi Rosæ Caninæ q. s. ut fiat massa, in Pilulas sex æquales distribuenda. Quarum una, horâ decubitûs sumenda.

Form. 533. PILULÆ HYDRARGYRI ET SCILLÆ.

℞ Sodæ Sub-carbon. exsic. ʒ ss.; Saponis Duri ℈ ij.; Pilul. Hydrarg. gr. xxiv.; Pulv. Scillæ Rad. exsic. gr. xij.; Olei Juniperi q. s. M. Fiant Pilulæ xxiv., quarum capiat unam ter die.

Form. 534. PILULÆ HYDRARGYRI SUBMURIATIS COMPOSITÆ, SEU PILULÆ PLUMMERI.

℞ Hydrargyri Submuriatis ʒ ss.; Antimonii Sulphureti Præcipitati ʒ j.; Guaiaci Gummi Resinæ contritæ ʒ ij.; Saponis ʒ ss.; Olei Juniperi, ♏ xxx.; Theriac. Purificat. (Treacle) q. s. ut fiat massa, in Pilulas sexaginta dividenda.

Form. 535. PILULÆ HYDRIODATIS FERRI.

℞ Ferri Hydriodatis gr. xxx.; Croci Stigm. pulveriz. ʒ j.; Sacchari Albi ʒ iij.; Mucilag. Tragacanth. q. s. Misce. Contunde in massam æqualem, et divide in Pilulas xc.; quarum capiat unam binas vel tres, bis terve quotidiè. (Chlorosis, Amenorrhœa, Scrofula, &c.)

Form. 536. PILULÆ KINO COMPOSITÆ.

℞ Kino, ℈ ij.; Camphoræ rasæ et subactæ ʒ ss.; Oxid. Zinci ℈ ss.; Confect. Aromat. ℈ j. M. Divide in Pilulas xx. Capiat binas manè nocteque. (AUGUSTIN in Diabetes. Also in Affections of Mucous Surfaces.)

Form. 537. PILULÆ MORPHINÆ CUM DIGITALE.

℞ Acetatis Morphinæ gr. j.; Pulv. Fol. Digitalis gr. vj.; Camphoræ rasæ gr. x.; Pulv. Acaciæ gr. viij.; Syrup. Tolutan. q. s. Fiat massa æqualis. Divide in Pilulas vj., quarum capiat unam tertiis horis.

Form. 538. PILULÆ MYRRHÆ ET BALSAMI COMP.

℞ Myrrhæ ʒ jss.; Benzoini ℈ ij.; Balsam. Copaibæ ʒ j.; Extr. Glycyrrh. ℈ iv. Fiant Pilulæ xliv. secundùm artem. Capiat æger binas bis terve quotidiè. (Asthma, Chronic Bronchitis.)

Form. 539. PILULÆ NERVINÆ. (STOLL.)

℞ Gummi Ammoniaci, Gummi Assafœtidæ, āā ʒ jss.; Saponis Venet. ʒ ss.; Pulv. Castorei, Ammoniæ Carbon., āā gr. xxv.; Mucilag. Acaciæ q. s. M. Fiant Pilulæ lxxx.; è quibus sumantur binæ tertiis vel quartis horis, vel ter die.

Form. 540. PILULÆ NERVINÆ ANTIMONIATÆ.

℞ Gummi Galbani ʒ jss.; Gummi Sagapeni, Saponis Venetian., āā ʒ j.; Pulv. Rhei ʒ ss.; Antimon. Tartarizat. in aqua font. q. s. sol. gr. vj.—x.; Succi Liquoritiæ ʒ j. Misce. Fiant Pilulæ gr. iij.: sumat unam ad tres ter quotidiè.

Form. 541. PILULÆ NUCIS VOMICÆ.

℞ Extr. Res. Nucis Vomicæ ℈ ss.; G. R. Assafœtidæ gr. ʒ jss. Syrup. q. s. Fiat massa æqualis, et divide in Pilulas xxx. Capiat unam bis terve in die. (Cardialgia Spasmodica, &c.)

Form. 542. PILULÆ NUCIS VOMICÆ COMPOSITÆ.

℞ Morphinæ Acetatis gr. j.; Ext. Nucis Vomicæ gr. ij.; Olei Olivæ gr. x. Solve; et adde Extr. Rad. Hellebori Nig. (*Ed. Ph.*) ℈ j.; Pulv. Glycyrrh. gr. viij.; Mellis, q. s. Fiat massa æqualis, et divide in Pilulas xij.; quarum capiat unam bis terve in die. (In Chlorosis, Amenorrhœa, &c.)

Form. 543. PILULÆ CUM OLEO CROTONIS.

℞ Pilul. Aloës cum Myrrhâ ʒ jss.; Saponis Castil. ℈ j.; Olei Crotonis Tiglii ♏ vj.; Pulv. Glycyrrhizæ q. s. M. Fiant Pilulæ xxx. Capiat binas vel tres omni nocte. (In Amenorrhœa.)

Form. 544. PILULÆ PLUMBI ACETATIS ET DIGITALIS.

℞ Plumbi Acetatis gr. iv.; Pulveris Digitalis gr. vj; Pulveris Opii gr. iij.; Confectionis Rosæ Caninæ, q. s. Misce, et divide in Pilulas sex æquales; quarum sumatur una ter in die.

Form. 545. PILULÆ PLUMBI ACETATIS ET COLCHICI.

℞ Plumbi Acetatis gr. xii.; Pulveris Colchici gr. xxv.; Pulveris Opii gr. iii.; Mucilaginis Acaciæ q. s. Misce optimè, et divide in Pilulas æquales duodecim. (In active Hæmorrhages, in Phthisis, &c.)

Form. 546. PILULÆ PLUMBI SUPERACETATIS.

℞ Plumbi Superacetatis gr. viij.; Opii Crudi pulver. gr. iv.; Confect. Fruct. Rosæ Caninæ q. s. In Pilulas viij divide. Dosis, j. ij. vel. iij. semel, bis sæpiusve in die.

Form. 547. PILULÆ PURGANTES.

℞ Fel. Tauri inspissat., Aloës Extr. Purificat., āā ʒ j., Extr. Colocynth. Comp., Saponis Castil., āā ℈ j. M. Fiant Pilulæ xxxvj.

Form. 548. PILULÆ RHEI RESOLVENTES.

℞ Pulv. Rhei, Sodæ Acetatis, Fellis Tauri inspiss. āā ʒ ij.; Pulv. Gum. Acaciæ q. s. Fiat massa Pilularis. (*Ph. Dan.*)

Form. 549. PILULÆ RHEI BALSAMICÆ.

℞ Pulv. Rhei, Pulv. Gum. Acaciæ, āā partes equales; Balsam. Copaibæ q. s. ut fiat massa pilularis.

Form. 550. PILULÆ SCAMMONIÆ.

℞ G. R. Scammon. gr. xv.; Sacchar. Albi gr. x. Tere probe; deinde adde Ol. Carui ♏ iv. Fiant Pilulæ vj., quarum sumat ij. omni horâ.

Form. 551. Pilulæ Scillæ Compositæ.

℞ Rad. Scillæ recent. ℥ ss; Gum. Ammoniaci, Succi Glycyrrh., āā ʒj.; Sulphur. Antimonii Aur., Pulv. Nucis Myristici, āā ℈j.; Syrup. Papaveris q. s. M. Fiant Pilulæ l., quarum capiat binas ad tres ter quaterve in die.

Form. 552. Pilulæ Scillæ cum Ipecacuanha.

℞ Scillæ Radicis Pulveris, Zingiberis Radicis Pulveris, āā ʒj.; Ipecacuanhæ Radicis Pulv. ʒ ss.; Saponis Duri, ℥jss.; Olei Juniperi, ♏ xxx. Contunde, ut fiat massa, in Pilulas lx. dividenda.

Form. 553. Pilulæ Sedativæ. (1.)

℞ Extr. Opii gr. j.; Nitratis Potassæ gr. vj.; Camphoræ rasæ gr. v.; Syrup. Papaver. q. s. ut fiant Pilulæ iij. pro dose.

Form. 554. Pilulæ Sedativæ. (2.)

℞ Camphoræ Subactæ ℈j.; Potassæ Nitratis ℥ss.; Extr. Hyoscyami, Extr. Anthemidis, āā ℈ij.; Syrup Papaveris q. s. M. Fiant Pilulæ xxxvj., quarum capiat binas 4tis vel 6tis horis.

Form. 555. Pilulæ Sedativæ. (3.)

℞ Camphoræ rasæ et subactæ gr. x.; Extr. Hyoscyami ℈j.; Extr. Papaveris Alb. gr. xij. M. Divide in Pilulas xij., quarum capiat binas vel tres horâ somni.

Form. 556. Pil. Sodæ Carbonatis cum Hyoscyamo.

℞ Camphoræ ʒ ss.; (Sp. Rect. q. s. ft. terendo pulv.) Sodæ Carbonatis ℥jss.; Extracti Hyoscyami, ℈ ij.; Saponis Duri ʒj.; Olei Juniperi ♏ xxx.; Pulveris Irid. Flor. q. s. ut ft. massa, in Pil. xxx. æquales distribuenda; quarum sumat iij. nocte manèque, cum Infus. Lini vel Decoct. Althææ, pro potu communi.

Form. 557. Pilulæ Stahlii.

℞ Peroxid. Antimonii, Aloes Socot., Resin. Guaiaci, āā ʒj.; Croci Stig., Myrrhæ, ℥ss.; Bals. Peruv. q. s. ut fiat massa æqualis. Divide in l.

Form. 558. Pilulæ Stomachicæ. (1.)

(*Frank's Grains of Health: — Grana Vitæ Mesue.*)

℞ Aloes ʒiij.; Mastiches, Petal. Ros. Rub., āā ʒj.; Fellis Tauri inspissat. ʒ jss. Misce benè; divide in Pilulas c.; quarum capiat ij. vel iij. antè prandium.

Form. 559. Pilulæ Stomachicæ. (2.)

℞ Extr. Gentianæ ʒ ij.; Fellis Bovinæ inspiss. ʒ jss.; Scammoniæ ʒj. Contunde in massam æqualem, et divide in Pilulas lxxx.; quarum capiat binas quotidiè, vel primo manè, vel antè prandium.

Form. 560. Pilulæ Stomachicæ. (3.)

℞ Limat. Ferri ʒ ij.; Pulv. Canellæ ʒj.; Fellis Bov. insp. ℥ss.; Syrup. q. s. M. Fiat massa Pilularis. (Chlorosis, &c.)

Form. 561. Pilulæ Stomachicæ. (4.)

℞ Limaturæ Ferri ʒj.; Pulv. Rhei, Extr. Gentianæ, Fellis Tauri insp. āā ʒiij. M. Fiat massa Pilularis.

Form. 562. Pilulæ Stomachicæ. (5.)

℞ Fellis Tauri inspissat., Extr. Aloës purif., Extr. Gentianæ, Saponis Venet., āā ʒ ss. M. Fiant Pilulæ xxx., quarum capiat binas bis in die.

Form. 563. Pilulæ Stomachicæ Aperientes.

℞ Ext. Fumariæ Officinalis, Extr. Jalapæ, āā ʒj.; Pulv. Capsici Annui, gr. xvj.; Sodæ Sub-carbon. exsic. ʒ ss. Misce secundùm artem, et divide in Pilulas xxxvj.; quarum capiat duas vel tres hora et semisse antè prandium.

Form. 564. Pilulæ Stramonii.

℞ Extracti Stramonii ʒj.; Saponis Duri ʒij.; Acaciæ Gummi pulv. ℈j.; Glycyrrhizæ Radicis pulv. ℈ ij.; Mucilag. Tragacanth. q. s. ut ft. massa, in Pilulas lx. dividenda. Dosis, j. nocte manèque, vel ter die.

Form. 565. Pilulæ Strychninæ.

℞ Strychninæ Purif. gr. ij.; Conserv. Rosarum ʒj. Misce benè, et divide in Pilulas xxiv.

Form. 566. Pilulæ Styracis Compositæ.

℞ Styracis ʒ jss.; Olibani, Benzoini, Croci, Extr. Glycyrrh, Mastiches, āā ʒ ss.; Opii Puri ℈ ij.; Myrrhæ ℈ ij.; Balsam. Tolutan. ℈j. Tere benè simul, ut sit massa æqualis. Divide in Pilulas lxxx., quarum capiat unam binas vel tres pro dose. (Each pill contains half a grain of opium.)

Form. 567. Pilulæ Sudorificæ. (1.)

℞ Hydrargyri Protochlorid. (Calomel) gr. xij.; Antimonii Tartarizati gr. jss. ad gr. iij.; Opii Crudi in pulv. subtiliss. gr. vj. Misce; tum adde Confect. Fruct. Rosæ Caninæ q. s. ut ft. massa. In Pilulas vj. æquales divide, quarum capiat j. horâ somni.

Form. 568. Pilulæ Sudorificæ. (Dumeril.) (2.)

℞ Kermes Mineral. (F. 636), Sulphur. Aurat. Antimonii, āā ℈j.; Extr. Opii gr. xij.; Extr. Hyoscyami ʒ ij. Divide in Pilulas lx. Capiat j.—ij. bis terve in die.

Form. 569. Pilulæ Sulphatis Strychninæ.

℞ Strychninæ Sulphatis gr. ij.; Confect. Rosar. ʒj.; Misce probè, et divide in Pilulas xxiv. æquales. Capiat unam pro dose.

Form. 570. Pilulæ Terebinthinatæ.

℞ Gum. Guaiaci ʒj.; Terebinthinæ Vulg. ʒjss.; Pulv. Glycyrrh. q. s. ut fiant Pilulæ xxxvj., quarum capiat binas vel tres ter quotidiè.

Form. 571. Pilulæ Terebinthinæ et Camphoræ cum Opio.

℞ Extr. Opii ℈j.; Pulv. Rad. Glycyrrh. ʒjss.: tere cum aquæ pauxillo, et adde Terebinth. Venet ℈ij.; Camphoræ rasæ gr. xv.; Croci Stigmata ℈j.; Mastiches gr. x.; Pulv. Acaciæ gr. x.; Olei Juniperi q. s. Tere benè simul, et fiat massa æqualis. Divide in Pilulas lx.; quarum capiat binas ad tres bis terve quotidiè.

Form. 572. Pilulæ Tonicæ Aperientes. (1.)

℞ Quininæ Sulphatis ʒ ss.—ʒ j.; Potassæ Sulphatis ʒ jss; Gum. Galbani ℈ iv.; Extr. Gentianæ, vel Anthemidis, ʒ j.; Massæ Pilul. Aloës cum Myrrhâ ʒ iij.; Theriacæ Purif. q. s. Contunde in massam æqualem, et divide in Pilulas cxx; quarum sumantur binæ vel tres, bis terve quotidiè.

Form. 573. Pilulæ Tonico-Aperientes. (2.)

℞ Quininæ Sulphatis ℈ j.; Aloës Extr. purif. ʒ ss.; Extr. Gentianæ ʒj. M. Fiant Pilulæ xxiv., quarum sumat unam vel binas omni meridie.

Form. 574. Pilulæ Tonicæ Aperientes. (3.)

℞ Ferri Sulphatis ʒ j.; Extracti Absinthii (vel Gentianæ), Extr. Aloës Purif., āā ʒjss.; Syrup. Croci q. s. M. Divide in Pilulas lxxxv., quarum capiat binas, tres, quaterve pro dose.

Form. 575. Pilulæ Tonico-Aperientes. (4.)

℞ Quininæ Sulphatis, Extr. Aloës Purif., āā ℈ ij.; Extr. Gentianæ, āā ʒ jss.; Syrup. Simp. q. s. Divide in Pilulas xlviij.; quarum capiat duas vel tres pro dose.

Form. 576. Pilulæ Tonico-Aperientes. (5.)

℞ Quininæ Sulphatis ℈ j.; Massæ Pilul. Aloës cum Myrrhâ ℈ ij.; Extr. Gentianæ ʒ j. M. Fiant Pilulæ xxx., quarum capiat binas bis quotidiè.

Form. 577. Pilulæ Tonicæ cum Cupro.

℞ Cupri Sulphatis gr. x.; Pulv. Rhei ʒj.; Extr. Anthemidis ʒij.; Syrup. Simp. q. s. M. Fiant Pilulæ xl., quarum capiat j. ad iij. (In Leucorrhœa, &c. by Augustin; and in Gleet, Chorea, &c. The Ammoniated Copper is substituted for the Sulphate in Chorea by Niemann.)

Form. 578. Pilulæ Tonicæ cum Sulphate Zinci.

℞ Zinci Sulphatis ℈j.; Extracti Gentianæ ℈iv.; Extr. Anthemidis ℈ ij. Contunde massam, et divide in Pilulas xl.; quarum sumantur duæ bis die, cum Haustu infra præscripto.

℞ Infus. Gentianæ Composit. ℥ x.; Acidi Sulphurici Aromat. ♏ xij.; Tincturæ Zingiberis ʒj. M. Fiat Haustus.

Form. 579. Pilulæ Tonico-Emmenagogæ.

℞ Quininæ Sulphatis, Massæ Pilul. Galban. Comp., āā ʒ ss.; Massæ Pilul. Aloës cum Myrrhâ ʒj.; Olei Junip. Sabinæ q. s. M. Divide massam in Pilulas xxx., quarum capiat binas manè nocteque.

Form. 580. Pilulæ Uvæ Ursi et Rhei.

℞ Pulv. Uvæ Ursi, Pulv. Rhei, āā ʒss.; Saponis Castil. gr. xxv.; Mucilag. Acaciæ q. s. M. Fiant Pilulæ xx.; capiat binas bis quotidiè.

Form. 581. Pilulæ Uvæ Ursi et Sodæ.

℞ Pulv. Fol. Uvæ Ursi, Sodæ Sub-carbon exsic., Saponis Duri, āā ʒj.; Mucilag. Acaciæ q. s. M. Fiant Pilulæ xl., quarum capiat binas bis terve quotidiè.

Form. 582. Pilulæ Valerianæ Compositæ.

℞ Pulv. Valerianæ gr. xxx.; Castorei gr. xx.; Oxidi Zinci gr. xx.; Syrup. Simp. q. s. M. Fiant Pilulæ xviij., quarum capiat tres ter quotidiè. (Dupuytren.)

Form. 583. Pilulæ Valerianæ et Zinci.

℞ Pulv. Valerianæ ℈ ij.; Castorei gr. xv.; Oxid. Zinci ℈ j.; Olei Cajeputi ♏ v.; Syrup. Simp. q. s. Divide in Pilulas xviij., quarum capiat tres quater in die. (Nearly the same as those used by Dupuytren.)

Form. 584. Pilulæ Zinci et Myrrhæ.

℞ Zinci Sulphatis gr. xij.; Myrrhæ in pulverem tritæ ʒ jss.; Confect. Rosæ q. s. ut fiant Pilulæ xxiv.; è quibus sumantur binæ bis quotidiè.

Form. 585. Pil. Zinci cum Myrrha et Ipecacuanha.

℞ Zinci Sulphatis gr. xij.; Myrrhæ in pulv. trit. ʒ j.; Pulv. Ipecacuanhæ gr. xvj.; Extr. Hyoscyami ℈ j. Syrup. Papaveris q. s. M. Fiant Pilulæ xxiv.; è quibus sumatur una ter quaterve quotidiè.

Form. 586. Pilulæ Zinci Sulphatis Compositæ. (1.)

℞ Zinci Sulphatis gr. xij.; Moschi ʒ jss.; Camphoræ ʒ ss. M. et divide in Pilulas xxxvj., quarum sumantur duæ bis vel ter in die.

Form. 587. Pilulæ Zinci Sulphatis Compositæ. (2.)

℞ Zinci Sulphatis gr. xij.; Pulv. Ipecacuanhæ gr. vj.; Pulv. Myrrhæ ℈ ij.; Extr. Lactucæ ℈ ijss.; Syrup. Tolutan. q. s. Contunde in massam æqualem, et divide in Pilulas xxiv.

Form. 588. Potus Antiphlog. Diureticus.

℞ Decocti Asparagi Officin. ℔ ij.; Potassæ Nit. ʒ ij.; Spirit. Æther. Nit. ʒ iij.; Oxymel. Scillæ ℥ ss. Sit pro Potu communi.

Form. 589. Potus Decocti Sarsæ Comp. (Tisane de Feltz.)

℞ Antimonii Sulphureti ℥ iv.; Aquæ Com. ℔ xij.; Rad. Sarsaparillæ ℥ iij.; Radicis Chinæ Orientalis, Corticis Lig. Buxi, Ichthyocollæ, āā ℥ jss.; Oxymuriatis Hydrarg. gr. iij. (Enclose the Antimony in a muslin bag; and boil the whole, excepting the Corrosive Sublimate, until the water is reduced to one half: strain the decoction, and add the Sublimate. The properties of this decoction will not be materially affected by omitting the Radix Chinæ and Cort. Buxi; or Sassafras or Guaiacum may be substituted, and Extractum Taraxaci added.)

Form. 590. Potus Diureticus. (1.)

℞ Decocti Tritici Repen. ℔ ijss.; Potassæ Acetat. ℥ jss.; Spirit. Æther. Nit. ℥ iij.; Aceti Colchici ℥ ss.; Vini Xeres ℥ vj.; Oxymel. Scillæ ℥ jss. Fit pro Potu communi.

Form. 591. Potus Diureticus. (2.)

℞ Decocti Tritici Repentis O ijss.; Potassæ Supertart. ʒ j.; Potassæ Nit. ʒ iij.; Sodæ Sub-boracis ʒ ij.; Sacchar. ʒ iv. Sit pro Potu ordinario.

Form. 592. Potus Febrifugus. (1.)

℞ Potassæ Nitratis ʒ iij.; Seri Lactis O iij.; Succi Limonis ℥ ijss. M. Sumat pro Potu ordinario.

Form. 593. Potus Febrifugus. (Stoll.) (2.)

℞ Pulpæ Tamarindorum ℥ ss. vel ʒ vj.; Potassæ Nitratis ʒ ij. vel ʒ iij.; Seri Lactis O ijss. M. Omni bihorio vasculum coffeanum.

Form. 594. Potus Mannæ et Tamarindorum.

℞ Mannæ, Conserv. Tamarind. Indic., āā ℥ jss.; Seri Lactis ℔ jss. Digere et cola. Capiat cyathum subindè.

Form. 595. Potus Refrigerans.

℞ Acidi Muriatici ʒ j.; Spirit. Æther. Nit. ʒ iiijss.; Decocti Hordei Comp. ℥ xxiv. M. Capiat cyathum pro re natâ. (In Febrile Affections.)

Form. 596. Pulvis Acidi Benzoini et Camphoræ.

℞ Acidi Benzoici gr. vj.; Camphoræ gr. ij.; Sacchari Albi ℈ j. M. Fiat Pulvis. Dispens. tales doses tres. Capiat æger alterâ quâque horâ unum.

Form. 597. Pulvis Aluminæ et Quininæ.

℞ Aluminæ Sulphatis gr. viij.—xij.; Quininæ Sulphatis gr. j.—iij.; Gum. Arab., Sacchar. Albi, āā gr. xij. Fiat Pulvis. Dispens. tales duodecim. Capiat æger tertiâ quâque horâ pulverem unum. (In Adynamic Fevers, Hæmatemesis, Passive Hæmorrhages, &c.)

Form. 598. Pulvis Ammoniareti Cupri cum Zinco.

℞ Cupri Ammoniareti, Oxydi Zinci, āā gr. ss.—j.; Sacchari Albi gr. x. M. Fiat Pulvis. (Epilepsy and Chorea.)

Form. 599. Pulvis Antihydropicus.

℞ Potassæ Supertart. ℥ j.; Potassæ Nitratis, Sub-boracis Sodæ, āā ʒ ij.; Pulv. Fol. Digitalis ℈ j. Tere bene simul, et divide in Cartulas xij.; quarum capiat unam bis terve quotidiè, in quovis decocto vel infuso.

Form. 600. Pulvis Antimonii et Camphoræ.

℞ Sulph. Aurat. Antim., Radicis Ipecacuanhæ, āā gr. j.; Camphoræ rasæ gr. j—iij.; Sacchari Albi ʒ j. M. Pulv. Dispen. tales doses sex: sumat æger altera quâque horâ Pulverem unum. (In Chronic Inflammations of the Respiratory Organs.)

Form. 601. Pulvis Antimonialis Compositus.

℞ Pulveris Antimonialis ʒ v.; Antimonii Sulphureti præcipit. ʒ j. M. Dosis gr. v. pro ætate adultâ.

Form. 602. Pulvis Antiphlogisticus.

℞ Potassæ Nitratis ℥ iij.; Potassæ Tartratis ℥ ivss.; Acidi Boracici ℥ j.· Tere in pulv. subtiliss. (In doses of ʒ ss. in Cutaneous Affections, &c.)

Form. 603. Pulvis Antispasmodicus. (Stahlii.)

℞ Kermes Mineral. gr. j.; Potassæ Nitratis, Potassæ Sulphatis, āā gr. x. Misce benè.

Form. 604. Pulvis Aperiens.

℞ Pulveris Jalapæ ℥ iij.; Submuriatis Hydrargyri ʒ j.; Pulveris Zingiberis ʒ ij. Misce. Dosis, à gr. iv. ad gr. xx.

Form. 605. Pulvis Asari Compositus.

℞ Asari Folior. exsiccat. ℥ iij.; Origani Folior. exsiccat., Lavandulæ Florum exsiccat., āā ʒ j. Simul terentur, et fiat Pulvis. (In Chronic Ophthalmia and Toothach, as a sternutatory, &c.; to produce a secretion from the Schneiderean membrane.)

Form. 606. Pulvis Belladonnæ.

℞ Pulv. Rad. Belladonnæ gr. iv.; Pulv. Rad. Glycyrrh. et Sacchar. Albi, āā gr. xxviij. Tere benè simul. Dosis gr. iv.—xx., bis in die.

Form. 607. Pulvis Belladonnæ Compositus.

℞ Pulv. Rad. Belladonnæ gr. vj.; Pulv. Ipecacuanhæ gr. vj.; Pulv. Rad. Glycyrrh., Pulv. Sacchar. Albi, āā ʒ ss.; Sulphur. Præcipit. ℈ ij.; Olei Anisi, Olei Succini, āā ♏ iij. Misce. In dosis gr. v.—xx.

Form. 608. Pulvis Belladonnæ Compositus. (Hecker.)

℞ Pulv. Fol. Belladonnæ gr. j.—iij.; Moschi, Camphoræ, āā gr. v.; Sacchar. Albi ʒ ss. Tere benè, et divide in Cartulas viij. (Antispasmodic. Pertussis, &c.)

Form. 609. Pulvis Bismuthi.

℞ Bismuthi Sub-nit. gr. j.; Magnes. Calcinat., Sacchar. Albi, āā gr. x. M. Fiat Pulvis; tertiâ vel quartâ quâque horâ sumendus. (Odier.)

Form. 610. Pulvis Bismuthi Compositus.

℞ Bismuthi Sub-nitrat., Moschi, āā gr. j.; Extr. Hyoscyami gr. ss.; Magnes. Sub-carbon. gr. v. M. Fiat Pulvis, tertiâ quâque horâ sumendus. (Marcus.)

Form. 611. Pulvis Boracis et Sabinæ.

℞ Pulveris Foliorum Sabinæ, Pulv. Zingiberis, āā gr. vij.; Sodæ Boracis ℈ j. Fiat Pulvis, bis die sumendus. (In Amenorrhœa with a languid pulse.)

Form. 612. Pulvis Calomelanos cum Digitale.

℞ Hydrargyri Submuriatis, Sacchari Albi, āā ℥ j.; Pulveris Digitalis ℥ ss. Misce. Dosis, à gr. j. ad gr. v.

Form. 613. Pulvis Calumbæ Compositus.

℞ Pulveris Calumbæ ʒ j.; Pulv. Rhei ℥ ss.; Sodæ Subcarbonatis ʒ iijss. Misce. Dosis, à gr. vj. ad ʒ ss. bis de die.

Form. 614. Pulvis Camphoræ.

℞ Camphoræ ʒss.; Sp. Rectif. q. s. Ft. terendo pulv.; dein adde, Sacchari Purificat. ʒj.; Pulv. Acaciæ ʒjss. M. Fiat Pulvis, et in cart. x. æqualis distribuendus.

Form. 615. Pulvis Camphoræ et Zinci.

℞ Camphoræ rasæ ℈j.; Zinci Oxidi gr. xv. M. In Cartulas iv. distribue; quarum sumat unam horâ somni. (In Epilepsy supervening about puberty, and connected with venereal desires and indulgences.)

Form. 616. Pulvis Carminativus. (1.)

℞ Magnes. gr. viij.; Seminum Anisi contus., Seminum Fœniculi cont., āā gr. ij.; Croci gr. j.; Sacchari Albi gr. vij. Contunde bene simul, et sit pulvis. Capiat dimidium statim, et alterum post horam. (For the Termina of infants, &c.)

Form. 617. Pulvis Carminativus. (2.)

℞ Magnes., Sacch. Albi, āā ʒj.; Pulv. Corticis Canellæ, Semin. Fœniculi cont. gr. xx.; Olei Anisi ♏ viij. Tere benè simul, et divide in Cartulas xij.; quarum capiat unam bis terve quotidiè, vel urgent. torminibus.

Form. 618. Pulvis Carminativus. (3.)

℞ Sem. Anisi, Sem. Carui, Sem. Coriand., Sem. Fœniculi, āā ℥j.; Cort. Auran., Rad. Zingib., āā ʒvj.; Cretæ Præpar. ℥jss.; Magnes. ℥ss.; Macis ʒjss.; Sacchar. Alb. ℥ij.: tere benè simul. Dose, ʒj.—ʒij.

Form. 619. Pulvis Catharticus.

℞ Submuriatis Hydrargyri, Pulveris Cambogiæ, Pulv. Jalapæ, Pulv. Rhei, Pulv. Cinnamomi, āā ʒij. Misce. Dosis, à gr. v. ad ℈j.

Form. 620. Pulvis Cinchonæ Compositus.

℞ Pulv. Cinchonæ ℥jss.; Pulv. Mosch. gr. xv.; Camphoræ ℈j.; Ammoniæ Carbon. gr. xxv.; Olei Succini et Olei Menthæ āā ♏ vj. Misce probè, et divide in Pulv. viij.

Form. 621. Pulvis Cinchonæ cum Soda.

℞ Pulveris Cinchonæ, Sodæ Subcarbonatis, āā partes æquales. Dosis, à gr. v. ad ℈ss. bis terve in die.

Form. 622. Pulvis Corticis Cuspariæ Comp.

℞ Pulv. Cort. Cuspariæ gr. x.; Cinnam. Comp. gr. vj.; Olei Pimentæ ♏ j. M. Fiat Pulvis, ter de die capiendus.

Form. 623. Pulvis Cretæ et Rhei Compositus.

℞ Cretæ Præpar. ℥ss.; Saponis Amygdal., Pulv. Rhei, āā ʒj.; Hydrarg. cum Cretâ ℈j.; Olei Fœniculi ♏ viij.; Sacchar. Albi ʒij.: tere benè simul. Capiat gr. vj. ad ʒss. pro dose bis vel ter die. (Pro Infantum Diarrhœa.)

Form. 624. Pulvis Cretaceus.

℞ Cretæ Preparatæ, Acaciæ Gummi Ver. pulv., āā ℥iv.; Sacchari Purificati contriti, ℥iij. Misce. Ft. Pulvis.

Form. 625. Pulvis Cyanureti Zinci.

℞ Zinci Cyanureti gr. vj.; Magnesiæ Calcinatæ gr. iv.; Pulvis Cinnamomi, gr. iv. M. Fiat Pulvis, quartâ quâque horâ sumendus. (In Gastrodynia, Dysmenorrhœa, Dyspepsia.)

Form. 626. Pulvis Deobstruens.

℞ Gum. Guaiaci ʒij.; Flor. Sulphur. ʒjss.; Calomelanos ℈j.; Radicis Ireos Flor., Semin. Fœniculi, āā ʒjss.; Opii Extr. gr. ij.; Sacchar. Albi ℥ss. Tere benè simul, et divide in Pulv. vj.

Form. 627. Pulvis Diureticus. (1.)

℞ Potassæ Nit., Potassæ Supertart., āā ℈iv.; Pulv. Scillæ gr. viij.; Pulv. Zing. gr. xvj. Misce benè, et divide in Cartulas viij.

Form. 628. Pulvis Diureticus. (2.)

℞ Potassæ Supertart. ʒjss.; Pulv. Scillæ exsic. gr. ij.; Pulv. Digitalis gr. j.; Pulv. Zingiberis gr. v. Fiat Pulvis, ter quaterve quotidiè sumendus ex theriacâ.

Form. 629. Pulvis Eccoproticus.

℞ Potassæ Supertart. ℥j.; Magnes. Sub-carbon., Flor. Sulphur., āā ℥ss.; Potassæ Nit. ʒij. Misce, et divide in Cart. vj. (In Hæmorrhoids, &c.)

Form. 630. Pulvis Ecphracticus. (1.)

℞ Potassæ Supertart. ℥ss.; Sodæ Sub-boratis, Magnesiæ Sub-carbon., āā ʒij.; Pulv. Flor. Anthemidis, Pulv. Semin. Fœniculi, āā ʒij.; Sacchari Albi ℥ss.; Olei Juniperi, et Ol. Anisi, āā ♏ xv. Tere benè simul. Capiat ʒj.—ʒij. bis terve quotidiè.

Form. 631. Pulvis Ecphracticus. (Sellii.) (2.)

℞ Magnes. Sub-carbon., Potassæ Supertart., Sulphur. Sublimati, Pulv. Rhei, Pulv. Flor. Anthemid., Pulv. Seminum Fœniculi (vel potiùs Sacchari Albi ℥ss.; Olei Fœniculi Dul. ♏ xxiv.), āā ℥ss.; Olei Juniperi ♏ xviij. Tere benè simul. Capiat ʒj.—ʒij. bis terve quotidiè ex vehiculo quovis idoneo. (In Obstructions, Jaundice, Piles, &c.)

Form. 632. Pulvis Excitans.

℞ Boracis Sodæ gr. xv.—℈j.; Pulv. Sabinæ gr. vj.; Pulv. Castorei, Pulv. Rad. Zingib. āā gr. x. M. Fiat Pulvis. Sumat ægra de die Pulveres binos in vino vel cum melle. (Stimulans et emmenagogus in Menstruorum defectu ex Leucophlegmasiâ. Hartmann.)

Form. 633. Pulvis Infantilis.

℞ Rhei Radicis Pulveris ʒij.; Magnesiæ Sub-carbonatis ℥x.; Zingiberis Rad. Pulv. ʒss. M. Fiat pulvis. Capiat gr. vij. ad ʒss. pro dose.

Form. 634. Pulvis Ipecacuanhæ cum Calomelane.

℞ Hydrargyri Sub-muriatis ʒj.; Pulv. Ipecacuanhæ ʒij.; Pulv. Cinnamomi ʒjss.; Sacchari Albi ʒijss. M. Dosis, à gr. ij. ad gr. x.

Form. 635. Pulvis Jalapæ Compositus.

℞ Jalapæ Radicis Pulveris ℥j.; Potassæ Super-tartratis ℥ij.; Capsici Baccarum Pulv. gr. xij. Omnia, seorsim trita, permisce. Dosis à ʒss. ad ʒj. manè.

Form. 636. Pulvis Jalapæ et Calomelanos.

℞ Pulv. Rad. Jalapæ gr. xv.—xx.; Hydrarg. Submur. gr. ij.: tere probè cum Sacchar. Alb. ʒss.; et adde Pulv. Acaciæ ℈j.; Ol. Carui ♏ ij. M. Fiat Pulvis, statim sumendus.

Form. 637. Pulvis Kermes Mineralis. (*Hydro-Sulphuret of Antimony.* Berzelius.)

℞ Aquæ Pluvial. part. 280; Sub-carbon. Sodæ part. 128; Sulphureti Antimonii pulver. part. 6. Dissolve the Soda in the water whilst boiling; and boil the Sulphuret in the solution for half an hour, stirring it frequently. Filter the boiling liquor in a vessel containing warm water which had been previously boiled. Decant the water after it is cooled. Wash the precipitate which is formed, first with cold water, afterwards with warm water, until it passes off quite insipid. Lastly, press it, and dry it in the shade. (Stimulant, Emetic, Diaphoretic, Alterative, Becchic, Expectorant. Dose j.—iv. gr.)

Form. 638. Pulvis Kermes Mineralis et Camphoræ.

℞ Kermes Mineral. gr. ij.; Camphoræ Subact. in Pulv. gr. iij.; Potassæ Nit. gr. v.—xij. M.

Form. 639. Pulvis Kermes Mineralis Camphoratus.

℞ Kermes Mineral. gr. iij.; Camphoræ Pulverizat. gr. viij.; Potassæ Nitratis gr. xxiv.; Sacchar. Albi ʒss. Tere benè, et divide in Pulv. iv. Capiat unam, quater in die.

Form. 640. Pulvis Lenitivus Hypochondriacus. (Klein.)

℞ Flavedinis Cort. Aurant., Radicis Rhei, Potassæ Tartratis, āā ʒss.; Olei Cajeput. ♏ iij. M. Ft. Pulvis pro unâ dose.

Form. 641. Pulvis Lientericus.

℞ Pulveris Tragacanth. Comp., Pulv. Rhei, āā ʒiij.; Pulv. Ipecacuanhæ comp. ʒj.; Hydrargyri cum Cretâ ʒj. Misce. Dosis, à gr. v. ad ʒss. 3tiis, 4tis, vel 6tis horis. Interdum adde Extract. Catechu, &c.

Form. 642. Pulvis Nitro-Opiatus Ipecacuanhæ, vel Pulvis Doveri.

℞ Ipecacuanhæ Radicis contritæ ʒj.; Opii Crudi contriti gr. xlv.; Potassæ Nitratis ʒviij. et gr. xv.

Tere simul, et fiat pulvis. (A scruple of this powder contains one grain and a half of opium, two grains of ipecacuan, and sixteen grains and a half of nitrate of potass.)

Form. 643. PULVIS PURGANS.

℞ Hydrarg. Sub-mur., Cambog. G. R. pulveriz., Pulv Zingiberis, āā ʒ ss.; Sacchar. Purif. ℈ j. Tere benè simul; et adde Olei Fœniculi Dulcis ♏ xx. Dosis gr. v. ad xv.

Form. 644. PULVIS REFRIGERANS. (1.)

℞ Acidi Boracici ʒ ss.; Potassæ Nitratis ℥ j.; Potassæ Supertart. ℥ ij. Misce benè. Capiat ℈ j.—ʒ j. pro dose.

Form. 645. PULVIS REFRIGERANS. (2.)

℞ Potassæ Supertartratis pulverizati uncias duas; Nitratis drachmas tres. Misce, et divide in partes xij. æquales.

Form. 646. PULVIS RESOLVENS, VEL DEOBSTRUENS.

℞ Potassæ Supertartratis pulverizati ℥ ivss.; Sodæ Subboracis ℥ jss.; Antimonii Tartarizati gr. iij. Misce probè, et divide in partes æquales viginti.

Form. 647. PULVIS RHEI COMPOSITUS.

℞ Pulvis Rhei ʒ iijss.; Hydrargyri cum Cretâ ʒ j.; Potassæ Subcarbon. ʒ jss.; Pulv. Cinnamomi ʒ ss. Misce. Dosis, à gr. v. ad ℈ j. bis vel ter die.

Form. 648. PULVIS RHEI ET MAGNESIÆ.

℞ Pulv. Rhei ℈ j.—ʒ ss.; Magn. Sub-carb. gr. xvj.—ʒ ss.; Semin. Fœniculi, Sacchari Albi, āā gr. x.; Olei Cassiæ Cinnam. ♏ j. M. Fiat Pulvis.

Form. 649. PULVIS RHEI ET SULPH. POTASSÆ.

℞ Pulv. Rhei gr. vj.—x.; Potassæ Sulphatis gr. x.—℈ j.; Pulv. Sem. Anisi gr. vj.; Olei Fœniculi ♏ j. M. Fiat Pulvis, bis terve quotidiè sumendus.

Form. 650. PULVIS SCAMMONIÆ CUM CALOMEL. (1.)

℞ Scammon. Gum. Resinæ pulv. ʒ ij.; Hydrarg. Submur. (Calomel), Sacchari Purificati, āā ʒ j. M. Fiat Pulvis. Dosis gr. x. ad gr. xx. manè.

Form. 651. PULVIS SCAMMONIÆ CUM CALOMEL. (2.)

℞ Scammon. Gummi Resinæ pulv., Hydrarg. Protochlorid. (Calomel), Potassæ Supertart., āā ʒ ij. Misce benè simul, et sit Pulvis.

Form. 652. PULVIS SCAMMONIÆ ET JALAPÆ.

℞ G. R. Scammoneæ gr. xij.; Pulv. Rad. Jalapæ gr. xviij.; Potassæ Supertart. gr. xxv. Tere probè in pulverem tenuissimum; dein adde Pulv. Zingiberis gr. viij.: divide in partes tres æquales, quarum sumat j. secundâ vel tertia q. q. hora, donec plenè dejecerit alvus.

Form. 653. PULVIS SEDATIVUS.

℞ Hydrarg. cum Cretâ ʒ j.; Pulv Ipecacuanhæ Comp. ℈ ij.; Magnes. Carbon ʒ ss. Tere benè simul. Dosis gr. iv.—xij., pro Infantibus.

Form. 654. PULVIS SENEGÆ ET CAMPHORÆ.

℞ Pulv. Rad. Senegæ, Sacch. Alb., āā gr. xij.; Camphoræ rasæ gr. ij. M. Fiat Pulvis. Dispensentur tales doses tres. Capiat æger, interjectis duabus horis, pulverem unum. (In Chronic Affections of the Chest.)

Form. 655. PULVIS SODÆ COMPOSITUS.

℞ Sodæ Sub-carbon. exsiccat. ʒ vj.; Hydrargyri Submuriatis ʒ j.; Pulv. Cretæ comp. ℥ j. Misce. Dosis, à gr. v. ad ℈ j.

Form. 656. PULVIS SODÆ CUM HYDRARGYRO.

℞ Sodæ Sub-carbon. exsic. ʒ iv.; Hydrarg. cum Cretâ ʒ ij. Misce benè. Dosis, gr. vj.—ad gr. xij. pro Infantibus bis quotidiè.

Form. 657. PULVIS SPECIFICUS STOMACHICUS. (POTERII.)

℞ Protoxid. Ferri, Antimon. Crud., āā partes æquales vel unam; Potassæ Nitr. part. vj. Detona seu deflagra, et lava.

Form. 658. PULVIS SULPHATIS POTASSÆ ET FERRI.

℞ Ferri Sulphatis ʒ vj.; Potassæ Sulphatis ℥ xij. Tere benè simul, et adde Acidi Sulphurici ♏ xxxvj. M. Dosis ℈ j.—ʒ jss. bis, ter, quaterve in die.

Form. 659. PULVIS SULPHATIS QUININÆ ANTIMONIATI.

℞ Quininæ Sulphatis gr. xij.; Antimonii Tartarizat. gr. ij. Misce benè, et divide in partes vj. æquales. Capiat unam 2dis vel 3tiis horas inter paroxysmos.

Form. 660. PULVIS SULPHATIS QUININÆ ET MORPHIÆ.

℞ Quininæ Sulphatis gr. iv.—xij.; Morphinæ Sulphatis, gr. j—ij. Misce, et divide in dos. iv. vel vj.

Form. 661. PULVIS SULPHURET. AURAT. ANTIMONII, VEL DEUTO-SULPHURET. ANTIM. (BERZELIUS.)

℞ Liquoris restantis post præcipitat. Mineralis Kermes dict. quantum velis; infunde Acid. Acetici quantum sufficiat, vel donec nil amplius præcipitationis appareat. Lave benè materiam præcip. et exsicca. (N. B. the Precipitated Sulphuret of Antimony of the Lond. Ph. is an admixture of Kermes Min. and the Golden Sulph.)

Form. 662. PULVIS TONICUS.

℞ Ferri Sulphatis exsiccati ʒ iij.; Potassæ Sulphatis ℥ ij.; Pulveris Cascarillæ ℥ ijss. Misce. Dosis, à gr. iij. ad gr. x. bis terve in die.

Form. 663. PULVERES TONICÆ.

℞ Pulv. Cinchonæ, Extr. Glycyrrh., āā ʒ iij.; Pulv. Rad. Valerian. ℈ ij.; Sacchar. Albi ʒ ss. Tere benè simul, et divide in Cartulas ix. Capiat unam ter quotidiè. (HELLER and NIEMANN.)

Form. 664. PULVERES TONICO-APERIENTES.

℞ Pulv. Cinchonæ ℥ j.; Pulv. Rhei ʒ ijss.; Ammoniæ Muriatis ʒ jss. Misce benè, et divide in Cartulas xij. (BANG et JADELOT.)

Form. 665. PULVIS VALERIANÆ ET ZINCI.

℞ Valerianæ Pulv. ℥ j.; Oxid. Zinci ℈ j.; Moschi, Sacchari Purif., āā gr. x.; Olei Cajeputi ♏ xii. Tere simul, et divide in Cartulas vj.; quarum capiat unam ter die.

Form. 666. PULVIS ZINCI OXYDI COMPOSITUS.

℞ Oxydi Zinci gr. xij.; Magnes. Calcinatæ ʒ ss.; Pulv. Calumbæ ʒ j. Tere benè simul, et divide in Cartulas xij.; quarum capiat unam ter quaterve in die. (DE HAEN.)

Form. 667. PULV. ZINCI SULPHATIS COMP.

℞ Myrrhæ G. R. ʒ j.; Pulv. Ipecac. gr. vj.; Zinci Sulphatis gr. vj.; Pulv. Glycyrrh., Sacchar. Albi, āā ʒ jss.; Tere optime simul ut fiat Pulvis. Divide in Cartulas ix., quarum capiat unam ter quaterve in die ex theriacâ.

Form. 668. SAPO OLEI CROTONIS TIGLII.

℞ Olei Crotonis Tiglii partes ij.; Lixivii Saponarii pars j. Contere, et fiat Sapo. Dosis gr. ij. vel iij.

Form. 669. SAPO TEREBINTHINÆ.

℞ Potassæ Causticæ ℥ j.; Liquefac lento igne, et adjice Olei Terebinthinæ ℥ iij. Misce benè donec refrixerat. (Used both externally and internally.)

Form. 670. SAPO TEREBINTHINATA.

℞ Saponis Castil. ℥ j.; Olei Terebinthinæ ℥ ijss.: adde Solutioni Potassæ Sub-carbon. ℥ ij.; Camphoræ rasæ ℈ ij. Misce benè. (Used externally and internally.)

Form. 671. SOLUTIO IODINÆ. (LUGOL.)

℞	No. 1.	No. 2.	No. 3.
Iodinæ - - - -	gr. ij.	gr. iij.	gr. iv.
Potassæ Hydriodat. -	gr. iv.	gr. vj.	gr. viij.
Aquæ Destil. - - -	℔ j.	℔ j.	℔ j.

Solve. (Chiefly for external use; for injections in Scrofulous Fistulæ, &c.)

Form. 672. SOLUTIO IODINÆ CAUSTICA. (LUGOL.)

℞ Iodinæ ℥ j.; Potassæ Hydriodatis ℥ j.; Aquæ Destillatæ ℥ ij. Solve.

Form. 673. SOLUTIO IODINÆ RUBEFACIENS. (LUGOL.)

℞ Iodinæ ʒ iv.; Potassæ Hydriodatis ℥ j.; Aquæ Destillatæ ʒ vj. Solve.

Form. 674. Solutionis Muriatis Morphinæ.

℞ Muriatis Morphinæ gr. x.; Aq. Destillat. Calid. ♏ 1000. Solve. (Dose twenty-five minims — equal to ¼ of the Muriate.)

Form. 675. Solutio Sulphatis Morphinæ.

℞ Sulphatis Morphinæ Ver. gr. iv.; Aquæ Destillatæ ℥j.; Solve. (Of the same strength as Laudanum.)

Form. 676. Spiritus Ætheris Muriatici.

(*Olim, Spiritus Febrifug. Cluttoni.*)

℞ Acidi Sulphurici, ℔j. ℥xij. (per pond.); Acidi Muriatici ℔j. (per pond.); Spiritûs Rectificati cong. j. Distilletur liquor, secundùm artem.

Form. 677. Spiritus Ammoniæ Anisatus.

(*Ph. Cont. Omn.*)

℞ Olei Anisi ʒiij.; Spirit. Ammoniæ ℥vj. Solve.

Form 678. Spiritus Castorei Ammoniati.

℞ Castorei contr. ℥iij.; Croci Stigm. ʒj.; Herb. Artemisia ℥vj.; Potassæ Sub-carbon. ʒij.; Spirit. Tenuior. ℥xxx. Macera per dies vj. et cola. Dein adde Spirit. Ammoniæ, Liquoris Ammoniæ, āā ℥vj. M. Dosis ʒj.—ʒij.

Form. 679. Spiritus Castorei Comp.

℞ Castorei contr. ℥iij.; Croci Stigm. ʒj.; Herb. Artemisiæ ℥vj.; Spirit. Tenuior. ℔ijss. Macera per dies sex, et cola. Deinde adde Olei Anisi, Olei Juniperi, Olei Rutæ, āā ʒj. M. Dosis ʒss.—ʒjss. 3tiis vel 4tis horis.

Form. 680. Spiritus Terebinthinatus.

℞ Olei Terebinthinæ ℥jss.; Spirit. Vini Rect. ℥vj. Distilla leni cum calore. Dosis in ♏ vj.—xx. (In Jaundice.)

Form. 681. Spiritus Terebinthinatus Comp.

℞ Saponis Albi ℥ij.; Opii ʒss.; Spirit. Vini Junip. (vulgò Hollandii) ℥xijss.; Spirit. Terebinth. Rect. ℥iv.; Camphoræ ʒvj. Macera benè, et cola. (Externally as a Liniment; and internally in Colics and Nephritic Complaints, in doses of from 10 to 20 drops, and in Dropsies.)

Form. 682. Suppositorium Opiatum.

℞ Opii Puri gr. ij.; Saponis Duri Hisp. gr. iv. Simul contunde, et fiat massa pro Suppositorio.

Form. 683. Suppositorium Plumbi Compositum.

℞ Emplastrum Plumbi part. viij.; Abietis Resinæ cont. part. ij.; Opii Puri pulveriz. part. ss.—j. Solve emplastrum et resinam; deinde adde Opium, et forma in Supposit.

Form. 684. Syrupus Belladonnæ.

℞ Fol. Belladonnæ ʒij.; Rad. Bellad. ʒj.; Sacchar. Albi ℔j. Aquæ q. s. ut sit decocti ℔j.

Form. 685. Syrupus Morphinæ Acetatis.

℞ Morphinæ Acetatis gr. iv.; Syrupi Clarificati ℥xvj. Misce ut fiat Syrupus. (In doses of from two tea-spoonsful to a table-spoonful every three hours, or only at bed-time.)

Form. 686. Syrupus Morphinæ Sulphatis.

℞ Morphinæ Sulphatis gr. iv.; Syrupi Clarificati ℥xvj. Misce. (In the same doses as the Acetate. May be given alternately with the Acetate.)

Form. 687. Syrupus Papaveris.

℞ Extracti Papaveris Veri (in vacuo præp.) ℥j. Solve in Aquæ Destillatæ Ferventis O j.; cola, et adde Sacchari Purificati ℔ijss.

Form. 688. Syrupus Potassæ Sulphureti.

℞ Sulphureti Potassæ ʒj.; Aquæ Hysopi vel Fœniculi ℥ij. Solve, et adde Sacchar. Albi ℥iv.; et macera in Baln. Aren.

Form. 689. Syrupus Quininæ.

℞ Syrupi Simplicis ℥viij.; Quininæ Sulphatis gr. xxxij. Capiat Cochlear. ij. minima, bis terve de die.

Form. 690. Syrupus Rhei Compositus.

℞ Rad. Rhei concis. et contus. ℥iij.; Fol. Sennæ ℥ij.; Canellæ Corticis cont. ℥ss.; Semin. Fœniculi cont. ℥j.; Potassæ Sub-carbon. ʒij.; Rad. Zing. concis. ʒj.; Aquæ Ferventis ℔ij. Macera per horas viginti quatuor loco in calido, et cola. Liq. colati adde Mannæ ℥iij.; Sacch. Purif. ℔iijss. Fiat Syrupus.

Form. 691. Syrupus Sennæ et Mannæ.

℞ Fol. Sennæ ℥iv.; Semin. Fœniculi cont. ℥jss.; Sem. Anisi cont. ʒiij.; Radicis Zingiberis ʒjss.; Aquæ Ferventis O iij. Digere per horas quatuor; exprime et cola. Dein colaturæ adde Mannæ Optimæ ℥vj.; Sacchari Albi ℥xxij.; et fiat Syrupus.

Form. 692. Syrupus Sulphureti Sodæ.

℞ Sodæ Puræ (cum Alcoh. præp.) ʒj.; Aq. Destillat. ʒv.; Liquefac leni igne, et adde Sulphur. Puri quantum solveri potest. ℞ Liquoris ʒj.; Syrup. Communis ℥xxxj. Misce benè in vase benè obturato. (Doses of ʒj.—ʒij. for infants, ʒj.—ʒiij. for adults.)

Form. 693. Tinctura Acetatis Ferri Comp.

℞ Acetatis Plumbi ℥ss.; Ferri Sulph. ʒiij.; Aceti, Alcoholis, āā ℥ij.; Aq. Rosar. ʒvj. Solve Acet. Plumbi in aceto cum leno igne; dein adde Sulph. Ferri in Pulv., cujus, post solutionem, infunde Alcohol. cum Aq. Rosar. permistum.

Form. 694. Tinctura Acetatis Morphinæ Composita.

℞ Morphinæ Acetatis gr. xvj.: solve in Aquæ Destil. ʒiij.; Acidi Acetici ♏ v.; Spirit. Lavandul. Co. f. ʒvj.; Spirit. Myristicæ, vel Tinct. Cinnamom. Comp. ʒvij. M. Dosis ♏ x.—ʒj.

Form. 695. Tinctura Ætherea Valerianæ.

℞ Radicis Valerian. pulver. ℥j.; Ætherici Sulphurici non-rectificat. ℥vj.; Alcohol. rectif. ℥j. Macera per triduum et cola.

Form. 696. Tinct. Aloetica Alkalina. (Saxon Ph.)

℞ Croci Stigmat. in pulv. pars j.; Aloës Socot. in pulv. part. jss.; Myrrhæ pulv. part. ij.; Sub-carb. Potassæ part. iv. Misce, et pone in locum humidum ut deliquescat; dein infunde Aquæ Ferventis part. xij. Macera per horas duodecim, et adde Alcoholis Concent. part. duodecim. Digere leni cum calore per dies tres, et cola. In dos. ʒss—ʒjss.

Form. 697. Tinctura Alkalina Potassæ.

℞ Potassæ Causticæ ℥ss.; Alcoholis Concent. ℥iv. Macera per dies septem in balneo arenario.

Form. 698. Tinctura Alkalina Stibiatæ.

℞ Antimonii Crudi ℥j.; Potassæ Sub-carbon. ℥ij. Melt in a crucible, and reduce them to yellowish scoriæ; then powder them immediately in a hot iron mortar, and pour upon them rectified Alcohol ℥vj. Macerate for three days, and filter.

Form. 699. Tinctura Amara.

℞ Aloës Socot. ℥iv. vel v.; Gum. Myrrhæ, Mastiches, Benzoës, Rad. Calumbæ concis. āā ℥ij.; Rad. Gentianæ ℥jss.; Croci Stigm. ℥j.; Spirit. Vini Gallicæ (Brandy) ℔ix.; Spirit. Vini Hollandiæ (Hollands) ℔iij. Macera per mensem, et cola. (The celebrated “Drogue Amère” of the Jesuits, and an excellent tonic and aperient.)

Form. 700. Tinctura Ammoniaci Alkalina.

℞ Gummi Ammoniaci ʒiij.; Liq. Potassæ Sub-carbon. ℥ijss.; Myrrhæ ℥j.; Alcoholis O j. Macera per dies septem, et cola. Dosis ʒss.—ʒjss.

Form. 701. Tinctura Balsamica. (1.)

℞ Olei Terebinthinæ ℥j.; Tinct. Myrrhæ ℥ij.; Tinct. Benzoini Comp. ℥iv. Macera in loco calido. (Internally, and to Indolent Sores, &c.)

Form. 702. Tinctura Balsamica. (2.)

℞ Balsam. Tolutan. ℥ss.; Balsam. Peruvian., Styracis Balsam., Flor. Benzoës, Myrrhæ, āā ʒiij.; Croci Stigmat. ℥ij.; Spirit. Vini rect. ℥xx. Macera per dies tres, et cola. (*Wirtemburgh Ph. nearly.*)

Form. 703. Tinctura Balsami Tolutani.

℞ Balsami Tolutan. ℥ j.; Semin. Anisi cont. ℥ j; Flor. Benzoës ℥ ss.: Spirit. Rectificat. O j. Digere, donec solvatur Balsamum; dein cola.

Form. 704. Tinctura Belladonnæ.

℞ Belladonnæ Foliorum exsiccatorum ℥ ij.; Spiritûs Tenuioris O j. Macera per dies quatuordecim, et cola.

Form. 705. Tinctura Benzoica Anodyna.

℞ Camphoræ rasæ ʒ jss.; Ipecacuanhæ, Balsam. Tolutan., āā ℥ ss.; Acidi Benzoini āā ʒ ij.; Opii Puri, Croci Stig., ʒ ijss.; Olei Anisi ʒ j.; Spirit. Vini Ten. ℔ ij. Macera benè, et cola. Dosis ♏ vj.—xxx. (The Tinct. Opii Benzoica Compos. of the Aust. Phar. and *Tinct. Anodyno-Sudorific.* of various foreign Pharmacopœias.)

Form. 706. Tinctura Brucinæ.

℞ Brucinæ Puræ gr. xij.; Alcoholis (s. g. 837) f. ℥ j. Solve. (ʒ j. contains gr. jss. of Brucine. Dose ʒ ss.—℥ ij)

Form. 707. Tinctura Calami.

℞ Calami Radicis contusi ℥ iv.; Spiritûs Tenuioris O ij. Macera per dies quatuordecim, et per chartam cola.

Form. 708. Tinctura Camphoræ Thebaicæ.

℞ Opii Pulveriz. ʒ iij.; Camphoræ ʒ vj.; Corticis Canellæ contus., Croci Stigmat., āā ʒ ij.; Caryophyllorum, Pulv. Capsici, āā ʒ jss.; Potassæ Sub-carbon. ʒ ij.; Olei Anisi ʒ jss.; Spirit. Vini Tenuior. (vel Sp. Vini Gallicæ, vel Sp. Vini Hollandiæ), O ij. Macera leni cum calore per dies viij. ad xij.; dein exprime et cola.

Form. 709. Tinctura Caryophyllorum.

℞ Caryophyllorum contus. ℥ iij.; Spirit. Vini Tenuior. O ij. Macera benè, et cola.

Form. 710. Tinctura Cascarillæ Alkalina.

℞ Corticis Cascarillæ cont. ℥ iv.; Potassæ Sub-carbon. ℥ ss.; Spirit. Tenuior. ℔ ij. Macera benè, et cola. Dosis ʒ j.—ʒ iij.

Form. 711. Tinctura Castorei Alkalina.

℞ Castorei contus. ℥ iij.; Potassæ Sub-carbon. ʒ iij.; Croci Stigm. ʒ ij.; Spirit. Rosmarini ℔ ij. Macera per triduum, et cola. M. Dosis ʒ ss.—ʒ ij.

Form. 712. Tinctura Centaurii Cacuminum.

℞ Centaurii Cacumin. (flowering tops of Centaury), ℥ iij.; Spiritûs Tenuioris O ij. Digere per dies quatuordecim, et cola.

Form. 713. Tinctura Cinchoninæ Sulphatis.

℞ Cinchoninæ Sulphatis gr. xxxvj.; Alcoholis Rect. ℥ iij; Solve. Dosis ʒ j.—ʒ iij.

Form. 714. Tinctura Conii.

℞ Conii Foliorum exsiccatorum ℥ ij.; Cardamomi Seminum contusorum ʒ iij.; Spiritûs Tenuioris O j. Digere per dies septem, et per chartam cola.

Form. 715. Tinctura Digitalis Ætherea.

℞ Fol. Digitalis exsic. et pulv. part. j.; Æther. Sulphur. part. iv. Macera per triduum, et cola. (Dosis, ♏ xx.—xxx. ter die. (Several continental Pharmacopœias.)

Form. 716. Tinctura Diosmæ Crenata.

℞ Fol. Diosmæ Crenatæ ℥ ij.; Spirit. Tenuioris O j. Macera per dies septem, et cola. (Dose ʒ j.—ʒ iij.)

Form. 717. Tinctura Diuretica.

℞ Olei Juniperi ʒ ss.; Ætheris Nitrici, Tincturæ Digitalis Æthereæ, āā ʒ iij. M. (Dosis ʒ ss.—ʒ j. ter quaterve in die. Hufeland.)

Form. 718. Tinctura Ferri Ætherea.

℞ Acidi Muriatici ℥ ij.; Acidi Nitrici dilut. ℥ jss.; Ferri Rimaturæ q. s. Dissolve the iron in the acids, evaporate to dryness; afterwards deliquesce the residue by exposure to the air, and mix the deliquesced liquor with double its weight of Sulphuric Æther; agitating the mixture frequently until it assumes a golden yellow colour: then decant, and add double the quantity of rectified Alcohol. This Tincture may be used previously to the addition of the Alcohol, or subsequently. In the state of Æther the dose is from 16 to 20 drops; in that of Æthereal Tincture, from 20 to 30 drops; in diseases of Debility, and Spasmodic Affections.

Form. 719. Tinctura Fructus Vanillæ.

℞ Fructûs Vanillæ concis. et contus. pars j.; Alcoholis part. vj. Macera leni cum calore per dies octo, et cola (Nervine, Analeptic, Excitant, &c. Pfaff.)

Form. 720. Tinctura Galbani Composita.

℞ Galbani Gummi Resinæ ℥ jss.; Pimentæ Baccarum contus. ℥ j; Cardamomi Semin. contus. ℥ ss.; Spirit. Rectif. O j.; Aquæ Destil. O ss. Macera dies quatuordecim, et cola.

Form. 721. Tinctura Gallæ.

℞ Gallarum contus. ℥ ij.; Spirit. Tenuioris O ij. Macera per dies octo, et per chartam cola.

Form. 722. Tinctura Iodinæ Fortior.

℞ Iodinæ ℈ ij.; Spirit. Rectificat. ℥ j. Solve, terendo in vase vitreo. ʒ j. contains five grains of Iodine. Dose ♏ vj.—xxiv.

Form. 723. Tinctura Iodinæ Mitior.

℞ Iodinæ gr. xxiv.; Spirit. Rectif. f. ℥ j. Solve, terendo in vase vitreo. M. ʒ j. gr. iij.

Form. 724. Tinctura Lobeliæ Inflatæ.

℞ Herb. Lobeliæ Inflatæ exsic. ʒ ij.; Spirit. Vini Ten. O j. Digere per dies decem, et cola. (Emetic in doses of ʒ j. to ʒ ij.; Antispasmodic in doses of ♏ xx. to ʒ ss.; and Diuretic in smaller quantities.)

Form. 725. Tinctura Myrrhæ Alkalina.

℞ Myrrhæ ℥ j.; Potassæ Sub-carb. ʒ vj.; Aquæ Ferventis ℥ iij. Tere; dein macera in balneo aren. ad mellis crassitud., et adde Spirit. Tenuior. ℥ x. Macera benè, et cola. Capiat ʒ j.—ʒ ij. ex Infus. Anthemidis. (In Scrofula, &c.)

Form. 726. Tinctura Nervosa. (Riemeril.)

℞ Spirit. Cornu Cervi Rect. part. iv.: adde gradatim Alcohol. Rect. part. xvj.; Camphoræ part. ij.; Olei Junip. pars j. Solve.

Form. 727. Tinctura Nucis Vomicæ.

℞ Extracti Nucis Vomicæ exsic. gr. iv.; Alcoholis (36°) f ℥ j. Solve. (ʒ j. Tincturæ ad gr. ss. Extracti.)

Form. 728. Tinctura Opii Camphorata. (*Sive Elixir Paregoricum Pharm. Pristin.*)

℞ Camphoræ ℈ ij.; Opii Crud. in pulv., Acidi Benzoici, āā ʒ j.; Olei Anisi ʒ ss., Potass. Sub-carbon. ʒ j. Omnia in mortario simul optimè terentur; paulatim affunde Spiritûs Tenuioris O ij.: stent in digestione per dies decem: tum adde Radicis Glycyrrhizæ incisæ ℥ iv.; digere iterum per dies septem, et cola.

Form. 729. Tinctura Opii Composita. (*Vel Laudanum Liquidum Verum Sydenhamii.*)

℞ Opii Puri contrit. ℥ ij.; Croci ℥ j.; Cort. Canellæ, Caryophyllorum, āā ʒ jss.; Spirit. Vini Rect. ℥ iv.; Vini Hispan. ℔ j. Macera cum leni calore per dies xvj.; dein exprime et cola. (♏ xv. equal to 1 grain of pure Opium.)

Form. 730. Tinctura Phellandrii. (Marcus.)

℞ Semin. Phellandrii Aq. ℥ ss.; Alcoholis ℥ vj. Macera per horas xxiv., et adde Vini Burgundiæ ℥ vj. Macera per dies tres, et cola. Capiat ♏ x.—lx. (In chronic Bronchial, and Pulmonary Affections.)

Form. 731. Tinctura Quininæ Sulphatis.

℞ Quininæ Sulphatis gr. viij.; Spiritus Vini ℥ j. M. Fiat Tinctura.

Form. 732. Tinctura Quininæ Sulphatis Acid.

℞ Quininæ Sulphatis gr. xlviij.; Tinctura Aurantii Comp. ℥ vss.; Acidi Sulphurici Dilut. ʒ ij. M. Fiat Tinctura. (Dosis ʒ ss. ad ʒ ij.)

Form. 733. Tinctura Rhataniæ. (Sprague.)

℞ Rhataniæ Radicis contus. ℥ iij.; Spiritûs Tenuioris O ij. Digere per dies octo, et per chartam cola. This Tincture is strongly impregnated with the medicinal virtues of the root. It is a very grateful tonic, when given according to the following formula: —

℞ Infus. Rosæ ʒ x.; Acid. Sulph. Aromat. ♏ xv.; Tinct. Rhataniæ, Syrup. Rhœados, āā ʒ j. M. Fiat haustus, ter in die hauriendus.

Form. 734. Tinctura Rhataniæ Aromatica. (Sprague.)

℞ Rhataniæ Radicis contusæ ℥ iij.; Canellæ Corticis contusæ ʒ ij.; Spiritûs Tenuioris O ij. Digere per dies decem, et per chartam cola. The following is an agreeable method of exhibiting this tincture:—

℞ Infus. Aurantii Compositi ℥ vj.; Tincturæ Rhataniæ Aromat., Syrup. Zingiberis, āā ℥ j. Misce. Fiat mistura; cujus sumat coch. ampl. iij. ter in die, urgente languore vel flatu.

Form. 735. Tinctura Rhei Anisata.

℞ Radicis Rhei concis., Radicis Glycyrrhizæ concis., āā ℥ ij.; Seminum Anisi contus., Sacchari Purif. āā ℥ j.; Spiritûs Tenuioris octarios ij. Macera per dies quatuordecim, et cola.

Form. 736. Tinctura Rhodii.

℞ Rhodii Ligni ras. ℥ iv.; Spiritûs Rectificati O j. Macera per dies quatuordecim, et per chartam cola.

Form. 737. Tinctura Sabinæ Alkalina.

℞ Olei Essent. Sabinæ ʒ ij.; Tinct. Alkalinæ ℥ vij. et ʒ ij. (F. 696). Solve. Dosis ♏ xx.—xxx.

Form. 738. Tinctura Sennæ Amara.

℞ Fol. Sennæ part. vj.; Radicis Gentianæ concis. part. iv.; Corticis Aurantii exsic. part. ij.; Cardamom. Semin. contus. part. j.; Spirit. Vini Ten. partes xlv. Macera per dies quatuordecim, et cola.

Form. 739. Tinctura Stramonii.

℞ Daturæ Stramonii Seminum contus. ℥ ij.; Spiritûs Tenuioris O j. Macera per dies quatuordecim, et cola.

Form. 740. Tinctura Strychninæ.

℞ Strychninæ Puræ gr. ij.; Alcoholis (sp. gr. 838.) f ℥ j. Solve. Dosis ♏ viij. ad xxx.

Form. 741. Tinctura Tabacci.

℞ Fol. Nicot. Tabacci ℥ ij.; Alcohol. Rect. O j. Macera per dies septem; exprime et cola.

Form. 742. Tinctura Tabacci Composita.

℞ Tabacci Foliorum concis. ℥ ss.; Camphoræ rasæ ʒ ij.; Spirit. Rectif., Aquæ Destil., āā ℥ iv. Macera per dies octo, et cola.

Form. 743. Trochiscus Catechu Extracti.

℞ Catechu Extract. Pulv. ℥ iij.; Cinnamomi Corticis in pulv. ʒ jss.; Olei Cinnamomi ♏ v.; Sacchari Purificati ℥ xiv.; Mucil. Tragacanth q. s. Fiat massa in Trochiscos formanda. (Sprague.)

Form. 744. Trochiscus Ipecacuanhæ.

℞ Ipecacuanhæ Radicis Pulv. ʒ iv.; Sacchari Purificati ℔ ij.; Mucil. Tragacanth. q. s. Misce secundùm artem ut fiat Troch. 480. (Each lozenge contains half a grain of Ipecacuanha. In recent Coughs and in Diarrhœa.)

Form. 745. Trochiscus Lactucæ.

℞ Extract. Lactucæ Concentrat. (Probart's), Extracti Glycyrrhizæ, Pulv. Acaciæ Ver., āā ʒ iv. Hæc optimè terantur simul, et cum aquâ fiat massa, in Trochiscos formanda.

Form. 746. Trochisci Nitro-Camphorati.

℞ Extr. Opii gr. vij.; Camphoræ rasæ gr. xxvj.; Potassæ Nitratis ℈ ijss.; Sacchar. Purif. ʒ iij.; Mucilag. q. s. Misce benè, et divide in Tabulas l.; quarum capiat vj.—x. per diem. (Chaussier.)

Form. 747. Trochiscus Potassæ Nitratis.

℞ Potassæ Nitratis Pulv. ℥ iv.; Sacchari Purificati ℔ j.; Hæc optimè terantur simul, et cum Mucil. Tragacanth. fiat massa in Trochiscos formanda.

Form. 748. Trochiscus Zinci Sulphatis.

℞ Zinci Sulphatis Purif. ʒ iv.; Sacchari Purificati ℔ ij. Hæc optimè terantur simul, et cum Mucil. Tragacanth. fiat massa in Trochiscos formanda. (This mass should be equally divided, so that each lozenge may contain gr. ½ of the Zinc.)

Form. 749. Unguentum Antimonii Tartarizati, vel Febrifugum. (1.)

℞ Antimonii Tartarizati gr. xxv. Solve in Aquæ Destil. q. s.; dein adde Antimonii Tartarizati in pulv. subtiss. redacti ʒ jss.; Adipis Præparat. ʒ x. Misce benè, et fiat Unguentum. (Produces Phlogosis, and its antimony is partially absorbed.)

Form. 750. Unguentum Antimonii Tartarizati. (2.)

℞ Antimonii Tartarizati in pulv. ʒ j.; Adipis Præparat. ℥ j; Camphoræ rasæ et subact. ℈ j.; Olei Cajeputi ♏ xv.; Moschi gr. iij. Misce benè.

Form. 751. Unguentum Antimonii Tartarizati. (3.)

℞ Antimonii Tartarizati ʒ jss.; Adipis Præparati ℥ j.; Balsami Peruviani ♏ xv. M.

Form. 752. Unguentum Argenti Nitratis.

℞ Argenti Nitratis Pulv. gr. xl.; Adipis Præpar. ℥ j. Liq. Plumbi Acet. ʒ ij. M. Fiat Unguentum.

Form. 753. Unguentum Balsami Peruviani.

℞ Balsami Peruviani, ʒ j.; Unguenti Elemi Comp. ʒ vij. Unguento balneo in aquoso liquefacto; adjice Balsamum Peruvianum, et fiat Unguentum.

Form. 754. Unguentum Belladonnæ. (1.)

℞ Belladonnæ Fol. recent.; Adipis Præparatæ, āā ℥ iv. The leaves are to be bruised in a marble mortar; after which the lard is to be added, and the two incorporated by beating. They are then to be gently melted over the fire; and after being strained through a cloth, and the Belladonna well pressed, the ointment is to be stirred till quite cold. (Sprague.)

Form. 755. Unguentum Belladonnæ. (Chaussier.) (2.)

℞ Ext. Belladonnæ ʒ ij.; Aquæ Destil. ℥ jss. Tere cum Unguent. Simp., vel cum Axungia, ℥ ijss. M.

Form. 756. Unguentum Calomelanos et Camphoræ.

℞ Calomelanos, Camphoræ, āā ℈ j.; Olei Caryoph. ♏ iv.; Unguent. Simp. ʒ ij. M.

Form. 757. Unguentum Calomelanos cum Camphora.

℞ Calomelanos ʒ ij.; Camphoræ ʒ j.; Unguent. Simp. (vel Ung. Sambuci Flor.) ʒ vj. M. Fiat Unguentum.

Form. 758. Unguentum Camphoræ Compositum.

℞ Saponis Albi rasi ℥ jss.; Camphoræ rasæ ʒ iij.; Olei Terebinthinæ ℥ ss. Misce paulatim, et adde Ammoniæ ʒ j. M.

Form. 759. Unguentum Comitissæ.

℞ Olei Pimentæ, Olei Olivæ, āā ℥ ijss.; Ceræ Flavæ ℥ j. Solve, et adde Pulv. Pimentæ ʒ iij.; Pulv. Gallarum, Pulv. Nucis Cupressi, Pulv. Sem. Plantaginis, Pulv. Fol. Toxicodend., āā ʒ jss.; Sulphatis Aluminis ʒ j.; Camphoræ rasæ ʒ j. Misce benè, et sit Unguentum.

Form. 760. Unguentum Cupri Acetatis; *vulgo*, Unguentum Æruginis.

℞ Cupri Acetatis, Hydrargyri Protochlorid. (Calomel.), āā ʒ j.; Cerati Resinæ ℥ j.; Terebinthinæ Vulgaris ℥ ss. Liquefac Resinæ Ceratum in balneo aquoso, et Terebinthinam adjice; tunc Cupri Acetatem et Hydrargyri Protochloridem (prius commistas) insperge, et omnia misce.

Form. 761. Unguentum Deobstruens. (1.)

℞ Ammoniæ Muriatis pulverizat. ʒ j.; Unguenti Hydrarg. Fort. ℥ j.; Extr. Cicutæ ʒ jss. Misce benè, et fiat Unguentum. (Dr. Hunefeld. Tumours, Indurations, &c.)

Form. 762. Unguentum Deobstruens. (2.)

℞ Unguenti Hydrarg. Fort. part. xciv.; Ammoniæ Muriatis pulveriz. part. vj. Misce benè. (M. Dupuytren.)

Form. 763. Unguentum Gallæ Opiatum.

℞ Gallarum in pulv. subtil. ʒ iij.; Opii Crudi Pulver. ʒ j. Unguenti Plumbi Acetatis ℥ iij. M. Fiat Unguentum.

Form. 764. Unguentum Gallæ Opio-Camphoratum.

℞ Pulv. Nucis Gallarum ʒ j.; Camphoræ rasæ et subactæ in pauxillo Alcoholis ℈ j.; Pulv. Opii Puri, Potassæ Nitratis Pulveriz., āā ʒ ss.; Adipis Præparatæ ℥ iij.; Olei Pimentæ ♏ xii.—xvj. Misce benè, et sit unguentum ter quaterve in die applicandum.

Form. 765. Unguentum Hypo-chloridis Sulphuris.

℞ Sulphuris Hypo-chloridis ʒ j.; Unguenti Simplicis ℥j. Misce benè. (Lepra, Psoriaris, and other chronic eruptions.)

Form. 766. Unguentum Hydriodatis Potassæ.

℞ Potassæ Hydriodatis ʒ ss.; Adipis Præparatæ ℥jss.

Form. 767. Unguentum Iodinæ.

℞ Iodinæ gr. xij.; Potassæ Hydriodatis ℈ iv.; Adipis Suillæ recent. præpar. ℥ ij. M.

Form. 768. Unguentum Iodinæ Opiatum.

℞ Iodinæ gr. xv.; Potassæ Hydriodatis ʒ j.; Adipis recent. præp. ℥ ij. Misce benè, et adde Extr. Opii gr. xxx.; Tinct. Opii ʒ j. Fit Unguentum.

Form. 769. Unguentum Iodureti Plumbi.

℞ Iodureti Plumbi ʒ ij.—ʒ iij.; Adipis Suil. recentis præpar. ℥ ij. Misce.

Form. 770. Unguentum Nervinum.

℞ Unguenti Althææ (vel Ung. Sambuci) ℥ iv.; Liq. Ammoniæ ℥ j.; Camphoræ, Petrolei, Spirit. Terebinth., āā ʒ ss.; Olei Rosmarini ʒ ij.; Olei Bergamottæ ʒ j. M. (Hufeland.)

Form. 771. Unguentum Populeum.

℞ Gemmæ, vel Occulor. Populi Balsamiferæ, vel Nigræ contus. ℔ ss.; Butrei recentis ℔ j. Liquefac simul lento igne, vel in balneo arenario, et exprime.

Form. 772. Unguentum Populeum Compositum.

℞ Gemmæ Populi Bals. vel Nig. recentis ℔ jss. Contunde cum Adipis Præparat. ℔ iij., et adde Fol. recentis Hyoscyami Nigri, Fol. recentis Belladonnæ, āā ℥ iv. Contunde simul, et macera leni cum calore donec disipareat humiditas; dein exprime. (All the German Pharmacopœias.)

Form. 773. Unguentum ad Porriginem. (Chapman's.)

℞ Sulphuris Sublimati, Unguenti Picis Liquidæ, āā ℥ jss.; Saponis Mollis, Ammoniæ Muriatis, āā ℥ ss. Misce. Fiat Unguentum.

Form. 774. Unguentum ad Porriginem Galeatam. (Banyer's.)

℞ Hydrargyri Protochlorid. (Calomel.) ʒ ij.; Aluminis Exsiccat., Plumbi Sub-carbonatis, āā ʒ ss.; Terebinthinæ Venet. ʒ vj.; Cerati Cetacei ℥ jss. Misce. Fiat Unguentum.

Form. 775. Unguentum Proto-Iodureti Hydrargyri.

	No. 1.	No. 2.	No. 3.
℞ Proto-Iodureti Hydrarg. -	℈ ij.	℈ iij.	℈ iv.
Adipis Suillæ recent. - -	℥ ij.	℥ ij.	℥ ij.

Misce.

Form. 776. Unguentum Sulphureti Iodinæ.

℞ Sulphuris Iodinæ gr. xv.—xxv.; Axungiæ ℥ j. M.

Form. 777. Unguentum Zinci Iodatis.

℞ Zinci Iodatis ʒ j.; Adipis Præparatæ ℥ j. M.

Form. 778. Vinum Aloes Alkalinum.

℞ Aloës Socot., Croci Stigm., Myrrhæ, āā ℥ j.; Potassæ Sub-carbon. ℥ ij.; Vini Alb. Hispan. ℔ ij. Macera per dies xij. et cola. In dos. ʒ ij.—℥ j. (In Pyrosis, Dyspepsia, &c.)

Form. 779. Vinum Aloes et Sodæ Compositum.

℞ Sodæ Sub-carbonatis ℥ iij.; Ammoniæ Carbonatis ʒ ivss.; Myrrhæ ʒ vj.; Aloës Extracti ʒ vj.; Vini Albi (*Sherry*, Anglicè), f. ℥ xxiv. Macera per dies septem, et cola. (The dose is from one fluid drachm to half a fluid ounce.)

Form. 780. Vinum Anthelminticum.

℞ Extr. Aloës, Assafœtidæ, Radicis Gentianæ, Camphoræ, Corticis Aurantii sic., Castorei, āā ʒ j.; Croci Stig. ℈ j.; Spirit. Vini Ten. ℔ iij.; Vini Oporto ℔ iij.; Macera leni calori, et post horas xij. cola. Capiat ʒ j.—ʒ iij. In Decocti Anthemid., &c.

Form. 781. Vinum Diureticum Anti-arthriticum.

℞ Potassæ Sub-carbon. ʒ ijss.; Pulv. Rhei, Juniperi Baccar. cont., āā ʒ jss.; Rad. Zedoarii concis. et contus. ʒ ij.; Canellæ in pulv. ʒ iij.; Scillæ Rad. exsic. ʒ j.; Vini Xeres ℥ xxxij. Macera benè, et cola. ℥ j.—℥ ij. bis terve quotidie.

Form. 782. Vinum Ferri Citratum. (*Phar. Wirtem. et Niemann.*)

℞ Ferri Limaturæ ℥ iv.; Aurantia Amara, No. iv. Excorticatis Aurantiis, cortices et succulenta caro fructuum cum Limatura Ferri in pastam redigantur mortario in lapideo. Dies post tres infunde Vini Madeirensis ℥ xij.; Tincturæ Aurantii ℥ ij. Macera per diem integrum, et cola. Dosis ʒ ss.—ʒ jss.

Form. 783. Vini Ferri Comp.

℞ Sub-carbonatis Ferri ℥ j., vel Ferri Fragmentor. ℥ iij.; Radicis Calami Arom. ℥ ij. Infunde Vini Albi Hispanici ℔ ij., et stent in digestione per dies 6—8. Exindè sumantur quotidiè uncia una vel duæ, et suppleatur vinum.

Form. 784. Vinum Quininæ.

℞ Vini Madeirensis ℥ viij.; Quininæ Sulphatis gr. xvj. M.

ADDENDA TO APPENDIX OF FORMULÆ.

Form. 785. Balsamum Odontalgicum.

℞ Opii Puri, Camphoræ rasæ, āā ℈ j.: solve in Spirit. Rect. Terebinth. ʒ jss.; Olei Caryoph. et Ol. Cajeputi āā ʒ ss.; Balsam. Peruvian. ʒ ij. Misce benè.

Form. 786. Bolus Camphoræ Compositus.

℞ Camphoræ gr. v.—xv.; Hydrarg. Submur. gr. v.—xx.; Opii Puri gr. j.—iij.; Conserv. Rosarum q. s. ut fiat Bolus.

Form. 787. Bolus Camphoræ et Hyoscyami.

℞ Camphoræ Subactæ gr. v.—xij.; Extract. Hyoscyami gr. v.—x.; Potassæ Nitratis gr. v.—viij.; Conserv. Rosar. q. s. M. Fiat Bolus, horâ somni sumendus. (In Puerperal Mania, and in Mania after evacuations, and accompanied with cold sponging the head.)

Form. 788. Bolus Catechu.

℞ Catechu Extr. gr. viij.—xij.; Confect. Aromat. gr. viij. Syrup. q. s. M. Fiat Bolus.

Form. 789. Bolus Moschi et Camphoræ.

℞ Moschi gr. v.—x.; Camphoræ rasæ gr. iij.—viij.; Spirit. Rect. ♏ j.; Confect. Ros. Gall. q. s. Camphoram cum Spiritu tere, et deinde, secundum artem, fiat Bolus.

Form. 790. Electuarium Deobstruens.

℞ Potassæ Supertart. ℥ j.; Sub-boracis Sodæ ʒ iij.; Sulphur. Præcipit. ʒ vj.; Confectionis Sennæ ℥ jss.; Syrup. Zingiberis ʒ vj.; Syrup. Papaveris ʒ iij. M. Fiat Electuarium, cujus capiat cochlearia duo minima omni nocte.

Form. 791. Electuarium Ferri Sub-carb.

℞ Ferri Subcarbonatis, Syrupi Zingiberis, āā ℥ ss.; Confectionis Aurantiorum ℥ ij. M. Fiat Electuarium, de quo capiatur moles nucis moschatæ bis vel ter quotidiè.

Form. 792. Emplastrum Antimonii Tartariz.

℞ Emplast. Picis Comp. quantum velis; Super Alutam extende, et Antimon. Tartar. pulvere leviter insperge. Fiat Emplastrum.

Form. 793. Emplastrum Picis et Petrolei.

℞ Picis Liquidæ ℥ ij.; Galbani ℥ j; Sulphuris, Succini, āā ʒ ij.; Semin. Cumini cont., Pulv. Flor. Anthemidis, āā ʒ jss.; Petrolei ℥ ss. Liquefac Galbanum cum Aceti q. s., eumque misce cum Pice liquida; dein adde alia, et misce benè.

Form. 794. Enema Commune.

℞ Sodæ Muriatis ʒ vj.—℥ j.; Decocti Avenæ ℥ x.; Olei Lini ℥ jss.—℥ ijss. M. Fiat Enema.

Form. 795. Enema Ipecacuanhæ.

℞ Rad. Ipecacuanhæ Contritæ ʒ j.; Aquæ Ferventis ℥ x. Macera per horâm et fiat Enema.

Form. 796. Fotus Conii.

℞ Conii Folior. exsic. ℥ j. Coque ex aquæ Oijss. ad O ij., et cola.

Form. 797. Gargarisma Capsici.

℞ Capsici Baccarum contus. gr. xv.; Aquæ ferventis ℥ ix. Infunde per horas tres, et cola.

℞ Liquoris Colati ℥ vijss.; Acidi Muriatici ♏ xxv. ad ♏ xxxv.; Tinct. Myrrhæ ʒ iijss.; Mellis Rosæ ℥ ss. M. Fiat Gargarisma. (The Borax Sodæ, Extractum Catechu, or any other astringent, may be substituted, according to circumstances, in the place of the Muriatic Acid.)

Form. 798. Gargarisma cum Chlorureto Sodæ.

℞ Liquoris Chloro-Sodaici (Labarraquii) ʒ xij.; Aquæ Destillat. ℥ vj.; Mellis ℥ ss. M. Fiat Gargarisma sæpe utendum.

Form. 799. Gargarisma Stimulans.

℞ Infusi Petal. Rosæ Gallicæ ℥ vjss.; Acidi Muriatici Diluti ℈ ij.; Tinct. Capsici ʒ jss.; Mellis ʒ iij. Fiat Gargarisma sæpe utendum.

Form. 800. Gargarisma Zinci Sulphatis.

℞ Zinci Sulphatis ℈ j.; Aquæ Rosæ f ℥ vij.; Oxymellis Simpl. f ℥ j. M. Fiat Gargarisma frequenter utendum.

Form. 801. Guttæ Æthereæ.

℞ Camphoræ rasæ ʒ j.; Spiritus Æther. Nit. f ʒ ss.; Tinct. Valerianæ f ʒ ij.; Aquæ Fontanæ ℥ jss. M. Capiat ʒ ss. ad ʒ ij. pro dosi.

Form. 802. Guttæ Ætheris Absinthii.

℞ Olei Æther. Absinthii ʒ ss.; Spirit. Æther. Sulphurici, et Spirit. Vin. Rect., āā ʒ ij. M. Sumat æger gut. xx.—xxx. omni horâ, aut omni bi aut trihorio.

Form. 803. Guttæ Antispasmodicæ.

℞ Spirit. Ammon. Succin. ʒ vj.; Æther. Sulphur. ℥ j.; Olei Anthemidis ʒ j.; Tinct. Opii Comp. ʒ ij.; Extr. Papaveris Albi ʒ j. M. Capiat ♏ xx.—xlv. in cyatho Infus. Anthemidis, vel Infus. Flor. Sambuci, vel Decoct. Hordei Comp., &c. (Grimaud.)

Form. 804. Guttæ Odontalgicæ.

℞ Opii Puri et Camphoræ āā gr. x. Solve in pauxillo Alcoholis, et adde Olei Caryophil. ʒ j.; Olei Cajeputi ʒ j. Misce benè.

Form. 805. Haustus Acidi Oxymuriatis.

℞ Acidi Oxymuriatis Fluid. ℥ ss.; Aquæ Destillat. ʒ xij.; Syrup. Papaveris Albi ʒ ss. M. Fiat Haustus 5tis vel 6tis horis sumendus.

Form. 806. Haustus Arsenicalis.

℞ Confectionis Aromaticæ ℈ j.; Aquæ Menthæ Sativæ f ℥ j.; Tincturæ Opii, Liquoris Arsenicalis, āā ♏ vj. M. Fiat Haustus, ter quotidiè sumendus.

Form. 807. Haustus Balsami Peruviani.

℞ Balsami Peruviani ♏ v. ad ℈ j.; Mucilaginis Acaciæ ʒ jss. Tere simul; et adde, Mist. Camphoræ ʒ vj.; Spiritûs Anisi ʒ jss.; Aquæ Anethi (vel Aq. Cinnam.) ℥ ss. Fiat Haustus, ter quaterve de die capiendus.

Form. 808. Haustus Belladonnæ et Cinchonæ.

℞ Decocti Cinchonæ ʒ xiv.; Extracti Cinchonæ gr. x.; Tincturæ Belladonnæ ♏ xx. (See F. 704.); Tincturæ Aurantiorum ʒ jss. M. Ft. Haustus, ter in die capiendus.

Form. 809. Haustus Diaphoreticus.

℞ Vini Ipecacuanhæ, Vini Antimonii Tartarizati, āā ♏ x.; Liq. Ammon. Acet. ʒ ijss.; Mist. Camphoræ ℥ j.; Tinct. Hyoscyami ♏ xxv.; Spirit. Æther. Nit. ʒ ss.; Syrup. Aurantii ʒ j. M. Fiat Haustus, quartis horis capiendus.

Form. 810. Haustus Emmenagogus.

℞ Decocti Aloës Comp. ℥ j.; Sub-boratis Sodæ ℈ j.; Tinct. Aloës Comp. ʒ j.; Tinct. Castorei ʒ j.; Tinct. Croci ʒ ss.; Aquæ Cinnam. ʒ ij. Fiat Haustus omni nocte sumendus.

Form. 811. Haustus Hyoscyami et Anisi.

℞ Extracti Hyoscyami gr. iij.—v.; Tinct. Scillæ ♏ x.—xij.; Spirit. Anisi ʒ jss.; Aquæ Anisi ℥ jss.; Acidi Nitrici ♏ viij. Fiat Haustus, horis tertiis vel quartis durante paroxysmo Dyspnœæ, &c. capiendus.

Form. 812. Haustus Nervinus.

℞ Spirit. Ammon. Fœtid., Spirit. Colchici Ammoniati, Spir. Æther. Nit., āā ʒ ss.; Liquor. Ammoniæ Acet. ʒ ij.; Mist. Camphoræ ℥ j.; Syrup. Croci ʒ j. M. Fiat Haustus, bis terve in die sumendus.

Form. 813. Haustus Pectoralis.

℞ Balsam. Peruvian. (vel Bals. Tolutan.) ℈ ss—ʒ ss.; *Olei* Anisi ♏ v.—x.; Extr. Conii gr. iij.—vj.; Mucilag. Gummi Acaciæ ℥ ij.; Aquæ Pimentæ et Aq. Fœniculi āā ℥ ss. M.

Form. 814. Haustus Quassiæ et Ferri.

℞ Tincturæ Ferri Muriatis ♏ vj.—xij.; Infusi Quassiæ, Aquæ Cinnam., āā f ʒ vj.; Tincturæ Calumbæ f ʒ j. M. Fiat Haustus, manè et meridiè sumendus.

Form. 815. Haustus Salinus.

℞ Potassæ Sub-carbonatis ℈ j.; Succi Limonum recentis f. ℥ ss.; Misturæ Camphoræ f ℥ j.; Potassæ Nitratis gr. x.; Syrupi Rhœados f ʒ j. M. Fiat Haustus, quartâ quâque horâ sumendus.

Form. 816. Haustus Salinus Aromaticus.

℞ Potassæ Subcarbonatis ℈ j.; Succi Limonum recentis f ℥ ss. vel q. s.; Aquæ f ℥ j.; Spirit. Myristicæ, Syrupi Aurantii, āā f ʒ j. M.

Form. 817. Haustus Salinus Demulcens.

℞ Mist. Amygdal. Dulc., Mist. Camph., āā ℥ ss.; Vini Ipecac. ♏ x.; Potassæ Carbonatis gr. xv.; Syrup. Scillæ ʒ j. M. Sumatur cum Succi Limonis coch. uno amplo, in effervescentiæ impetu ipso.

Form. 818. Haustus Salinus Sedativus.

℞ Potassæ Nitratis gr. vj.—xv.; Sodæ Sub-carbon. gr. x.—℈ jss.; Tinct. Hyoscyami ʒ ss. (vel Tinct. Camphoræ Comp. pristin. ʒ j.); Mist. Camphoræ, Aquæ Menth. Virid., āā ʒ vi. Syrup. Croci ʒ ss. M. Fiat Haustus tertiis vel quartis horis sumendus.

Form. 819. Haustus Sedativus.

℞ Ammoniæ Carbonatis gr. xv.; Aquæ Destillat. ℥ j.; Spirit. Myristicæ ʒ j.; Syrup. Aurantii ℥ ss.; Extr. Conii gr. iij.—vj. Fiat Haustus, ter quaterve quotidiè sumendus, cum Succi Limonis recentis cochleare uno magno, in effervescentiæ impetu.

Form. 820. Haustus Sedativus cum Magnesia.

℞ Magnes. Sub-carb. ʒ ss.; Aquæ Menth. Virid. ʒ xj.; Spirit. Anisi ʒ jss.; Olei Caryoph. ♏ j.; Syrup. Zingib. ʒ ss. M. Fiat Haustus.

Form. 821. Haustus Sedativus et Refrigerans.

℞ Potassæ Nitratis gr. x.; Tinct. Opii ♏ vj.; Syrup. Papav. Alb. ʒ ij.; Mist. Camphoræ ʒ x. Misce. Fiat Haustus, omni 6tâ horâ sumendus.

Form. 822. Haustus Tonicus Alkalinus.

℞ Potassæ Carbonatis ℈ j.; Infus. Gentianæ Compos., Aquæ Pimentæ, āā f ʒ vj.; Tinctur. Rhæi f ʒ j. M. Fiat Haustus, meridie et horâ somni sumendus.

Form. 823. Infusum Angelicæ Sylvestris.

℞ Radicis Angelic. Sylvest., Calam. Aromatici, āā ʒ iij.: infunde cum Aquæ Font. Ferventis ℥ vj. Stent per horam in vase clauso; cola, et adde Liquoris Ammoniæ Acetat. ʒ jss.; Ætheris Sulphur. ʒ jss.; Syrup. Cort. Aurantii ʒ iij. M. Fiat Mist. Capiat æger quâlibet horâ cochlear. unum.

Form. 824. Infusum Anisi Compositum.

℞ Seminum Anisi ʒ jss.; Foliorum Melissæ Officinalis ʒ j.; Aquæ Communis calidæ ℔ ij. Infunde per quadrantem horæ: cola; et adde Sacchari Albi, quantum libet.

Form. 825. Infusum Gallæ.

℞ Gallarum contus. ℥ ij.; Aquæ Ferventis ℔ j. Macera per horas viginti quatuor, et cola.

Form. 826. Infus. Serpentariæ.

℞ Radicis Serpentariæ ʒ iij.: infunde cum Aquæ Ferventis ℥ viij., ebull. paul. Cola, et adde Æther. Sulphur. ʒ ij.; Tinct. Camphoræ ʒ j. M. Capiat æger quâlibet horâ cochleare unum.

Form. 827. Infusum Turionum Pini Abietis.

℞ Turion. Pini Abietis ʒ iij.: infunde Aq. Fervidæ ℥ x. per semi-hor.; dein exprime, cola, et adde vel Potassæ Sub-carb., vel Potassæ Sulphatem, vel Spir. Æther. Nit., vel Sp. Junip. Comp., ut sit occasio.

Form. 828. Injectio Astringens.

℞ Quercûs Cort. cont. ʒ vj.; Aquæ Destil. ℥ x. Coque per partem horæ sextam, et cola.

℞ Colaturæ ℥ iv.; Infus. Lini ℥ iv.; Extr. Conii ʒ jss.; Sub-boracis Sodæ ʒ j. M.

Form. 829. Linctus cum Ipecacuanha.

℞ Olei Amygdalarum, Syrupi Limonum, sing. f ℥ j.; Pulveris Ipecacuanhæ gr. vj.; Confectionis Rosæ Caninæ ℥ j.; Pulv. Tragacanthæ Comp. ʒ iij. Misce. Cochleare minimum subindè deglutiatur.

Form. 830. Linctus Refrigerans.

℞ Pulpæ Tamarindorum, Syrup. Althææ, āā ℥ ij.; Potassæ Supertart. ʒ ijss.; Potassæ Nitratis ʒ jss. M. Sumat omni trihorio duo cochlearia parva.

Form. 831. Linctus Terebinthinæ.

℞ Olei Terebinth. ʒ ij—ʒ j.; Mellis Despumati ℥ j.—℥ ijss.; Pulv. Radicis Glycyrrh. q. s. ut fiat Linctus: de quo sumatur cochleare parvum vel medium, nocte, manè, meridièque.

Form. 832. Linimentum Opiatum.

℞ Tinct. Opii Comp. ℥ ss.; Camphoræ ʒ ij.; Olei Amygdal. Dulc. ℥ ij. M. Sit Linimentum.

Form. 833. Lotio Acidi Hydrocyanici.

℞ Acidi Hydrocyanici ʒ ij.— Plumbi Acetatis, gr. xvi.; Aquæ Destill. ℥ vijss; Spirit. Vin. Rect. ʒ ij. Fiat Lotio, parte affectæ applicatura. (Thompson, in Cutaneous Eruptions.)

Form. 834. Lotio Acidi Nitro-Muriatici.

℞ Acidi Nitro-Muriatici Diluti (F. 5.) ʒ ij.—ʒ ss.; Aquæ Calidæ ℥ xvj. M. Fiat Lotio, quamprimum præparata sit, ope spongiæ, utenda.

Form. 835. Mistura Alkalina Anodyna.

℞ Sodæ Carbonatis ℈ j. (vel Potassæ Carb. gr. xvj.); Misturæ Amygdalarum f ℥ jss.; Tinct. Hyoscyami ♏ xx.—ʒ ss.; Tinctur. Cardam. compos. f ʒ ss. Fiat Haustus, bis vel ter die sumendus.

Form. 836. Mistura Ammoniaci et Conii.

℞ Acidi Nitrici ʒ j.; Aquæ Pulegii ℥ iv. Misce; dein tere cum Ammoniaci ʒ j., et adde Extr. Conii ʒ ss.; Syrup. Tolutan. ℥ ss. M. Capiat coch. unum in decoct. Althææ, &c.

Form. 837. Mistura Anodyna.

℞ Aquæ Menth. Virid. ℥ vjss.; Potassæ Nitratis ℈ ij.; Spirit. Ætheris Nit. ʒ ij.; Tinct. Hyoscyami ʒ jss.; Succi Inspissati Samb. Nig. ʒ jss.; Extracti Taraxaci, Syrup. Aurantii, āā ʒ ij. M. Fiat Mist. cujus capiat cochlearia duo larga ter quotidiè.

Form. 838. Mistura Anti-Cardialgiam.

℞ Magnesiæ ʒ j.; Aquæ Anethi ℥ ivss.; Potassæ Nitratis ʒ jss.; Liquor. Potassæ ʒ j.; Tinct. Calumbæ ʒ ij.; Spirit. Carui et Spirit. Anisi āā ʒ ijss.; Spirit. Lavand. Comp. ʒ j.; Syrup. Zingiberis ʒ ij. Misce. Capiat cochleare unum amplum subinde in cyatho Decoct. Hordei Comp., prius agitata phiala.

Form. 839 Mistura Antidysenterica. (1.)

℞ Æther. Sulphurici ʒ ij.; Tinct. Opii Comp. ʒ iij.; Sacchar. Alb. ℥ ss.; Gum. Acaciæ ʒ ijss.; Olei Anthemidis ♏ xv.; Extr. Humuli ʒ jss.; Extr. Catechu ℈ j.; Pulv. Canellæ Cort. ʒ j.; Aquæ Menth. Virid. ℥ vjss. Misce benè. Capiat cochlearia dua tertiis vel quartis horis.

Form. 840. Mistura Antidysenterica. (2.)

℞ Mist. Camphoræ ℥ v.; Liq. Ammon. Acet. ℥ ij.; Spirit. Æther. Nit. ʒ ijss.; Vini Ipecacuanhæ ʒ ijss.; Tinct. Humuli ʒ iijss.; Extr. Humuli ℈ j.; Syrup. Papaveris ʒ iij. M. Fiat Mist., cujus capiat cochlearia duo larga tertiâ quâque horâ.

Form. 841. Mistura Anti-Icterica.

℞ Potassæ Acetat., Extract. Taraxaci, āā ℥ ss.; Extr. Conii gr. x.—xx.; Aquæ Fœniculi ℥ vjss.; Syr p. Sarsæ et Syrup. Sennæ āā ʒ ss. M. Capiat cochlear. ij. vel iij. ampla 4tis horis.

Form. 842. Mistura Assafœtidæ et Conii.

℞ Assafœtidæ ʒ ij.: solve in Liquoris Ammoniæ Acet. ℥ jss.; Aquæ Fœniculi ℥ iijss.; Extr. Conii ℈ j.—ʒ ss.; Syrup. Senegæ ℥ ss. Misce.

Form. 843. Mistura Bals. Peruviani Comp.

℞ Balsami Peruviani Ver. ʒ ij.; Mellis Despumati ʒ vj. Misce, et adde gradatim, Misturæ Myrrhæ (F. 422.) ℥ vj.; Tincturæ Aurantii ℥ j. Misce. Fiat Mistura, cujus capiat coch. j. ad iij. ter quaterve in die.

Form. 844. Mistura Belladonnæ.

℞ Extracti Fol. Belladonnæ gr. ij. ad iv.; Moschi optimi gr. vj. ad xij.; Sacchari Albi, satis quantum ut terendo obtineatur pulvis congener: deinde adde, paulatim miscendo, Infusi frigidi Rad. Valerianæ ℥ iv.; Spirit. Æther. Sulphur. ʒ j.; Syrup. Papaveris ʒ iij. M. Capiat æger cochlear. ij. vel iij. larga 3tiis, 5tis, vel 6tis horis.

Form. 845. Mistura Camphoræ Ammoniata.

℞ Camphoræ ℈ j.; Alcoholis ♏ vj.: tere, et adde Moschi ʒ ss.: tere cum Sacchar. Albi ʒ j.; Mist. Amygdal. Dulc. ℥ iv.; Spirit. Ammon. Arom. ʒ ij.; Syrup. Aurantiar. ℥ ss. M. Capiat ℥ ss.—℥ j. 4tis horis.

Form. 846. Mistura Cardiaca.

℞ Potassæ Carbonatis ʒ jss.; Misturæ Camphoræ f ℥ vss.; Confectionis Aromaticæ ʒ ij.; Spiritûs Myristicæ f ℥ ss. M. Fiat Mistura, cujus sumatur cochlearia tria ampla cum cochleare uno Succi Limonum recentis, in actu effervescentiæ.

Form. 847. Mistura Chloridis Potassæ et Sodæ.

℞ Liq. Chlor. Sodæ ℥ ss.; Aquæ Destil. ℥ iv.; Potassæ Chlorid. ʒ j.; Aquæ Pimentæ ℥ iijss. M. Capiat coch. j.—iij. 2dis, 3tiis, vel 4tis horis.

Form. 848. Mistura Cinchonæ cum Acido.

℞ Infus. Cinchonæ ℥ vij.; Acidi Muriatici Diluti ʒ j.; Tinct. Capsici ʒ ss.; Tinct. Croci, vel Serpentariæ, ʒ iij.; Syrup. Papaveris ʒ ijss. M. Fiat Mist. cujus capiat coch. ij. vel iij. ampla, 4tâ q. q. horâ.

Form. 849. Misturæ Cinchonæ et Acidi Sulph.

℞ Decocti Cinchonæ ℥ vss.; Acidi Sulphur. Aromat. ʒ j.; Tinct. Opii ♏ xxx. M. Capiat tertiam partem ter quotidiè.

Form. 850. Mistura Copaibæ.

℞ Copaibæ Ver. ʒ iij.; Mucilaginis Acaciæ Ver. ℥ jss. Misce. Adde gradat. Aquæ Cinnamomi ℥ iijss.; Sodæ Sub-carbonatis ʒj.; Spiritûs Lavandulæ Compositæ ʒ ij. Tincturæ Opii ʒj. ad ʒ jss. Misce. Fiat Mistura, cujus capiat unc. j. ter quaterve in die, agitat. phial.

Form. 851. Mistura Cydoniæ Infusi Comp.

℞ Seminum Cydoniæ contus. ʒij.; Radicis Glycyrrhizæ contus. ℥j.; Fici Caricæ Fructûs ℥j.: Aquæ O j. Coque leni igne per minuta horæ decem; dein cola. Hujus Decocti ℥ vjss.; Potassæ Supertart. ʒij.; Subboratis Sodæ ʒj.; Spirit. Æther. Nit. ʒij.; Syrup. Mori vel Syr. Limonis ℥ ss. M. Fiat Mist.

Form. 852. Mistura Decocti Cinchonæ.

℞ Decocti Cinchonæ ℥ vss.; Tinct. Cinchonæ ʒ iij.; Confect. Arom. ℈ jss.; Spirit. Ammon. Arom. ʒ jss. M.

Form. 853. Mistura Decocti Genistæ.

℞ Spartii Scop. Cacumin. ℥ j.; Aquæ Oj. coque ad ℥ viij., et adde Acetatis Potassæ ʒ ijss. Spirit. Junip. Comp. ʒ vj. M. Capiat Coch. ij. vel iij. larga, ter quotidiè.

Form. 854. Mistura Diaphoretica.

℞ Vini Ipecacuanhæ ʒ jss.; Spirit. Æther. Nit. ʒ ijss.; Liq. Ammon. Acet. ℥ ij.; Liq. Antimon. Tart. ʒ jss.; Mist. Camphoræ ℥ ivss.; Syrup. Papaveris ʒ iij. M. Capiat cochlear. j. vel ij. tertiâ quâque horâ.

Form. 855. Mistura Diaphoretica Anodyna.

℞ Mist. Superscript. (F. 854.) ℥ vijss.; Tinct. Hyoscyami ʒ jss. (vel Tinct. Camphoræ Comp. ʒ vj., vel Extr. Conii ʒ ss.) Fiat Mist.

Form. 856. Mistura cum Digitale et Kerm. Miner.

℞ Kermes Mineral. gr. vj.; Mucilag. Acaciæ ℥ iij.; Infus. Digitalis ℥ iv.; Syrup. Althææ ℥ j. M. Capiat cochleare unum amp. omni bihorio. (In Pneumonia, Pleurisy, &c. by Brera.)

Form. 857. Mistura Expectorans.

℞ Assafœtid. ℈ ijss.: trituratione solve in Aquæ Menth. Virid. ℥ ivss.; et adde Vini Ipecacuanhæ ʒ j.; Spirit. Æther. Nit. ʒ ij.; Tinct. Castorei ʒ ij.; Syrup. Tolutan. ℥ j. Fiat Mist. cujus capiat cochleare unum amplum 2dis vel 3tiis horis.

Form. 858. Mistura cum Hydriodate Potassæ et Acido Prussico.

℞ Aquæ Destil. ℥ ivss.; Solutio Hydriodatis Potassæ ♏ xv.; Acidi Prussici Medicin. ♏ x—xij.; Succi Inspissati Lactucæ gr. xij.; Syrup. Althææ ℥ j. M. Capiat ʒ ij.—ʒ iij. omni horâ, vel ℥ ss. omni bihorio.

Form. 859. Mistura contra Hydropem.

℞ Fol. Digitalis ʒ j.; Corticis Cinchonæ Pulv. ʒ vj.; Aquæ Ferventis ℥ xij. Macera per horam, et cola. Liquori colati adde Potassæ Supertart. ʒ iij.; Subboratis Sodæ ʒ j.; Tinct. Cinnam. Co.; Spirit. Junip. Co., āā ʒ iij.; Tinct. Opii Co. ♏ xxv. M. Capiat cochlearia duo larga ter quaterve quotidiè. (Nearly as Augustin.)

Form. 860. Mistura Infusi Anthemidis Comp.

℞ Flor. Anthemidis ʒ ij.; Pulv. Rad. Valerian. ʒ iij.: infunde Aquæ Fontan. calidæ ℥ viij. Macera paulisper, et cola.

℞ Hujus Infusi ℥ vij.; Tinct. Camphoræ Comp., Tinct. Castorei, āā ʒ ij.; Syrup. Aurantii ℥ ss. M. Capiat æger quâlibet horâ cochleare plenum.

Form. 861. Mistura Infusi Calumbæ et Hyoscyami.

℞ Infus. Calumbæ ℥ vijss.; Tinct. Hyoscyami ʒ ij.; Sodæ Sub-carbon. ʒ jss.; Tinct. Aurant. Comp. ʒ ijss.; M. ℥ ss. ter quaterve in die. (In diseases of Irritability.)

Form. 862. Mistura Infusi Calumbæ Comp.

℞ Infus. Calumbæ ℥ iv.; Aquæ Menthæ Piper. vel Aquæ Anethi ℥ iij.; Spirit. Anisi ʒ ij.; Liquor. Ammoniæ vel Liquor. Potassæ ℈ ij.; Syrup. Cort. Aurantii ℥ ss. M.

Form. 863. Mistura Infusi Valerianæ.

℞ Infus. Valerianæ ℥ vss.; Liq. Ammoniæ Acet. ℥ jss.; Liq. Antimonii Tart. ʒ jss.; Tinct. Hyoscyami ʒ jss.; Aq. Pimentæ ℥ ss. M. Fiat Mist. cujus capiat æger alterâ quâque horâ cochlearia duo.

Form. 864. Mistura Muriatis Ammoniæ.

℞ Ammoniæ Muriat. ʒ jss.; Acidi Muriatici ʒ ss.; Decocti Hordei Comp. ℔ j. M. Capiat cochlear. iij. ampla 2dis vel 3tiis horis.

Form. 865. Mistura Salina Sedativa.

℞ Potassæ Nitratis, ʒ ss.— ʒ ij.; Sodæ Sub-carbon. ʒ j. — ʒ ijss. Mist. Camphoræ, Aquæ Menth. Virid., āā ℥ iijss.; Extr. Humuli ℈ ij.; Syrup. Zingeberis ʒ iij. M. Fiat Mist. (Interdum adde Tinct. Hyosciami, vel Tinct. Camphoræ Co.)

Form. 866. Mistura Sedativa.

℞ Mucilaginis Acaciæ f℥ j.; Olei Amygdalarum, Syrup. Papaveris Albi, āā f℥ ss.; Tinct. Hyoscyami fʒ jss.; Vini Ipecacuanhæ fʒ ij.; Aquæ Destillatæ f℥ vss.; Acidi Citrici q. s. ad gratam acidulat. Misce. Fiat Mist. cujus sumat coch. unum medium subindè.

Form. 867. Mistura cum Sodæ Sub-borate.

℞ Mist. Camphoræ, Aq. Anethi, āā ℥ ijss.; Sub-boratis Sodæ ℈ ij.; Vini Ipecacuanhæ ʒ jss.; Syrup. Papaveris ʒ jss. M. Fiat Mist. cujus capiat cochlearia ij. vel iij. quartis horis.

Form. 868. Mistura cum Soda Tartarizata.

℞ Sodæ Tartarizatæ Pulver. ʒ vj.; Misturæ Amygdalæ f℥ vss.; Spiritûs Myristicæ f℥ ss. M. Sumat tertiam partem secundâ quâque horâ.

Form. 869. Mistura Stomachica. (1.)

℞ Calumbæ Radicis contusæ ʒ ss.; Calami Aromatici cont. ℈ j.; Capsici Annui Bac. cont. gr. x.; Aquæ Ferventis f℥ viij. Macera per horas duas; deinde cola.

℞ Liquoris Colaturæ ℥ vss.; Liquoris Potassæ Subcarbon. ʒ ijss.; Tinct. Myrrhæ ʒ j.; Extract. Conii gr. xv.; Syrup. Cort. Aurantii ʒ ij. M.

Form. 870. Mistura Stomachica. (2.)

℞ Infus. Cascarillæ ℥ vij.; Sodæ Sub-carbon. ʒ ijss.; Tinct. Calumbæ ℥ ss.; Æther. Sulphur. ʒ ij.; Tinct. Aurantii Co. ʒ iij. M. Fiat Mist., cujus capiat cochlear. ij. larga bis quotidiè.

Form. 871. Mistura contra Tenesmum.

℞ Mist. Camphoræ ℥ v.; Liq. Ammon. Acet. ℥ ij.; Tinct. Humuli ʒ ijss.; Tinct. Camphoræ Com. ℥ ss.; Extr. Humuli ʒ ss.; Syrup. Papaveris ʒ iij. M. Fiat Mist., cujus capiat cochlearia duo larga tertiâ quâque horâ.

Form. 872. Mistura Tonico-Aperiens.

℞ Decocti Cinchonæ, Infus. Sennæ, āā ℥ iijss.; Potassæ Sulphatis ʒ iijss.; Tinct. Sennæ ℥ ss. M. Fiat Mist. cujus capiat cochlear. iij. larga bis quotidiè.

Form. 873. Mistura Tonico-Deobstruens.

℞ Extr. Taraxaci ʒ iij.; Extr. Gentianæ ʒ j.; Sodæ Subcarbon. ʒ j.; Aquæ Aurantii ℥ vij.; Spirit. Æther. Sulph. Co., Syrup. Rosæ, āā ℥ ss. M. Capiat ℥ j— ℥ jss., ter die.

Form. 874. Mistura Zinci Composita.

℞ Zinci Sulphatis gr. iv. ad vj.; Infus. Rosarum Comp. ℥ vij.; Vini Ipecacuanhæ ʒ jss.; Extr. Lactucæ ℈ jss.; Syrup. Tolutan. ʒ ij. M. Fiat Mist. cujus capiat cochleare unum vel duo larga tertiis vel quartis horis.

Form. 875. Mistura Zinci Opiatæ.

℞ Aq. Rosarum, Aq. Cinnamom., āā ℥ iijss.; Zinci Sulphatis gr. vij.; Tinct. Opii ♏ xxxvj.; Tinct. Cinnamom. Co. ʒ ij.; Syrup. Aurantii ℥ jss. M. Fiat Mist. cujus capiat cochlearia ij. ampla bis diè.

Form. 876. Pilulæ Alkalinæ Anodynæ.

℞ Sodæ Sub-carbon. exsic. ʒ j.; Saponis Duri ʒ j.; Extracti Hyoscyami ʒ ss.; Olei Junip. q. s. M. Fiant Pilulæ xl., quarum capiat binas vel tres omni nocte. (Nephritic and Calculous Affections.)

Form. 877. Pilulæ Aloes cum Ferro Compositæ.

℞ Aloës ʒ ij.; Assafœtidæ et Myrrhæ, āā ʒ ss.; Ferri Sulphatis ʒ j.; Caryophyllorum in pulv. ℈ j.; Pulv. Capsici gr. xxvj.; Bals. Canad. q. s. M. Fiant Pilulæ lxvj., quarum capiat binas vel tres pro dose. (Chlorosis, &c.)

Form 878. Pilulæ Anodynæ.

℞ Pulv. Jacobi Veri gr. iij.; Extr. Stramonii gr. ss.; Ext. Hyoscyami (vel Conii) gr. iij. Fiant Pilulæ ij. horâ somni sumendæ. (In painful Cutaneous Eruptions.)

Form. 879. PILULÆ ANODYNO-ALTERATIVÆ.

℞ Camphoræ rasæ gr. vj.; Hydrarg. cum Cretâ gr. xij.; Sodæ Sub-carbon. exsic. gr. x.; Pulv. Acaciæ gr. iv.; Extr. Hyoscyami gr. xv.; Syr. Simp. q. s. M. Fiant Pilulæ xij., quarum capiat tres statim, et horâ somni.

Form. 880. PILULÆ APERIENTES.

℞ Pulv. Radicis Rhei ʒss.; Extracti Aloës Aquosi gr. xviij.; Saponis Medicati ʒss.; Syrup. Simp. q. s. M. Fiant Pilulæ xx., quarum sumantur binæ vel tres, bis in die.

Form. 881. PILULÆ APERIENTES CUM HYOSCYAMO.

℞ Extract. Gentianæ ʒss.; Extract. Colocynth. Comp. ℈ ijss; Pulv. Ipecacuanhæ gr. viij.; Pilul Hydrarg. ℈j.; Extr. Hyoscyami ℈ ij.; Saponis Castil. gr. xij. M. Fiat massa æqualis, et divide in Pilulas xxxvj. quarum capiat binas vel tres horâ somni.

Form. 882. PILULÆ ASTRINGENTES.

℞ Aluminis contriti gr. v.; Myristicæ Nucl. contr. gr. iv.; Extr. Gentianæ q. s., (vel adde etiam Opii Puri gr. j.) Fiant Pilulæ duæ pro dose.

Form. 883. PILULÆ BELLADONNÆ EXTRACTI ET CINCHONÆ.

℞ Extracti Belladonnæ gr. j. ad ij.; Extracti Cinchonæ Ver. ℈j. M. Fiat Pilulas viij.: capiat ij. 6tis horis.

Form. 884. PILULÆ CAMBOGIÆ, ALOES, ET AMMONIACI.

℞ Cambogiæ, Aloës, et Ammoniaci, in pulvere, partes æquales: solve in Aceto; dein liquorem cola, et consume donec crassitudinem idoneam habeat. Divide in Pilulas gr. iv. Capiat binas ad quatuor pro dose. (Diuretic, Purgative.)

Form. 885. PILULÆ CAMPHORÆ ET AMMONIACI.

℞ Massæ Pilulæ Aloës cum Myrrhâ ʒj.; Gummi Ammoniaci ℈j.; Camphoræ gr. x.; Syrup. Simplicis q. s. Misce. Fiant Pilulæ xx.; omni mane capiat tres vel quatuor. (STOLL.)

Form. 886. PILULÆ CAMPHORÆ ET OPII.

℞ Camphoræ, Potassæ Nitratis, āā ʒij.; Saponis Hispan. ℥ss.; Extr. Opii Aquos. ʒss.; Syrup. Tolutan. q. s. M. Fiant Pilulæ cxx., quarum binas vel tres ter quotidiè. (CADET DE GASSICOURT.)

Form. 887. PILULÆ CAMPHORÆ ET QUININÆ.

℞ Camphoræ rasæ ℈j.; Quininæ Sulphatis ℈ ij.; Massæ Pilul. Aloës cum Myrrhâ ʒiss.; Syrup. Zingiberis q. s. M. Fiat massa æqualis et divide in Pilulas xxxviij., quarum capiat unam bis quotidiè.

Form. 888. PILULÆ CHALYBEATÆ.

℞ Sub-carbon. Ferri ℥ss.; Pulv. Canellæ Albæ ʒ iij.; Aloës Socot. ʒjss.; Syrup. Croci q. s. M. Fiat massa æqualis.

Form. 889. PILULÆ COLOCYNTHIDIS CUM SULPHURE.

℞ Extr. Colocynth. Comp. ʒj.; Sulphur. Sublimati ʒj.; Potassæ Sulphatis ℈iv.; Syrup. q. s. Divide in Pilulas l.

Form. 890. PILULÆ COLOCYNTHIDIS EXTR. ET HYOSCYAMI.

℞ Extract. Colocynth. Compos. ℈ij.; Extract. Hyoscyami ℈j. Misce, et divide in Pilulas xij. Sumat unam vel duas pro re natâ.

Form. 891. PILULÆ DEOBSTRUENTES. (1.)

℞ Saponis Venet. ʒj.; Pilul. Hydrarg. gr. viij.—xij.; Gummi Ammon. ʒss.; Massæ Pilul. Aloës cum Myrrhâ ℈j.; Terebinth. q. s. M. Fiant Pilulæ xxx.; capiat tres vel quatuor de die.

Form. 892. PILULÆ DEOBSTRUENTES. (2.)

℞ Pulv. Gummi Guaiaci ℈j.; Pulv. Gummi Ammoniaci ʒj.; Ammoniæ Carbonatis gr. xv.; Massæ Pilula. Aloës cum Myrrhâ ℈ ijss.; Tinct. Aloës Comp. q. s. M. Divide in Pilulas xl.; è quibus sumantur tres ter in die cum vasculo infusi Anthemidis. (Altered from STOLL.)

Form. 893. PILULÆ DIURETICÆ ET ANTISPASM.

℞ Pulv. Fol. Digitalis, Pulv. Rad. Scillæ, āā gr. xij.; Extr. Hyoscyami ℈j. Divide in Pilulas xij. Capiat binas tertiis horis. (BRERA.)

Form. 894. PILULÆ DIURETICÆ CUM HYDRARGYRO.

℞ Gummi Ammoniaci, Extracti Taraxaci, Saponis Venet., āā ℈j.; Pulveris Scillæ gr. vj.; Pilulæ Hydrargyri gr. xv.; Olei Junip. q. s. M. Fiant Pilulæ xviij.

Form. 895. PILULÆ EXPECTORANTES.

℞ Pulveris Scillæ ℈j.; Ammoniaci Gum. Res. ʒjss.; Extract. Conii ℈ ij. Contunde simul, et divide massam in Pilulas æquales triginta: quarum sumat duas sextis horis. (In Asthma and Chronic Catarrh.)

Form. 896. PILULÆ GENTIANÆ ET ALOES.

℞ Aloës Ext. Purif., Gentianæ Extr., āā ʒj; Saponis Castil. ℈jss. M. Divide in Pilulas xxxvj.; capiat unam ad tres, pro re natâ.

Form. 897. PILULÆ GUAIACI ET ACONITI.

℞ Ext. Aconiti gr. j.; Pulv. Guaiaci gr. viij.; Olei Cajeputi q. s. ut fiant Pil. ij. Capiat unam manè nocteque.

Form. 898. PILULÆ HUMULI COMP.

℞ Ammon. Sub-carb. gr. vj.; Extr. Rhei gr. viij.; Extr. Humuli gr. xij. M. Fiant Pilulæ vj., quarum capiat tres horâ somni.

Form 899. PILULÆ HYDRARGYRI COMPOSITÆ.

℞ Pilul. Plummeri ʒss.; Pulv. Jacobi Veri gr. xij.; Extracti Conii gr. xxij.; Saponis Castil. gr. vj. Contunde simul, et divide massam in Pilulas xij. æquales, quarum binæ omni nocte sumantur.

Form. 900. PILULÆ IPECACUANHÆ COMP.

℞ Pulv. Ipecacuanhæ gr. vj.; Pulv. Ipecacuan. Comp., Extr. Papaveris, āā ℈j.; Extr. Humuli ʒss.; Olei Anisi q. s. M. Fiant Pilulæ xxiv.; quarum capiat unam quartis horis, vel binas aut tres horâ somni.

Form. 901. PILULÆ MORPHINÆ ET FERRI SULPHATIS.

℞ Sulphatis Morphinæ gr. ij.; Olei Amygdal. q. s.: ad solut. dein adde Ferri Sulphatis gr. vj.; Pulv. Glycyr. gr. viij.; Mellis q. s. ut fiant Pilulæ viij. Capiat unam tertiâ quâque horâ.

Form. 902. PILULÆ MORPHINÆ SULPHATIS.

℞ Sulphatis Morphinæ gr. j.; Pulv. Ipecacuanhæ gr. iij. Extr. Aconiti gr. vj.; Olei Amygdal. Dul. ♏ vj.; Pulv. Glycyrrh. et Mellis āā q. s. ut fiant Pilulæ viij. Capiat unam 3tiis vel 4tis horis.

Form. 903. PILULÆ MOSCHI COMPOSITÆ.

℞ Moschi, Potassæ Nitratis, āā gr. vj.; Camphoræ rasæ gr. vj.; Conserv. Ros. q. s. Fiant Pilulæ vj.

Form. 904. PILULÆ MURIATIS CALCIS ET CONII.

℞ Calcis Muriatis gr. ij.; Extr. Conii gr. iij.—v. Fiant Pilulæ duæ, bis in die sumendæ. (Scrofulous Obstructions.)

Form. 905. PILULÆ NERVINÆ. (1.)

℞ Assafœtidæ ʒss.; Castorei gr. vj.; Extract. Hyoscyami gr. x.: Extract. Anthemidis ℈j.; Syrup. Papaveris q. s. M. Fiant Pilulæ xij.; capiat ægra duas manè nocteque.

Form. 906. PILULÆ NERVINÆ. (2.)

℞ Assafœtidæ ℈ ij.; Camphoræ Subactæ gr. xvj.; Moschi gr. vj.; Mucilag. Acaciæ q. s. M. Fiant Pilulæ xvj., è quibus sumatur una omni bihorio.

Form. 907. PILULÆ NUCIS VOMICÆ ET ALOES.

℞ Pilul. Aloës cum Myrrhâ ℈iv.; Extracti Nucis Vomicæ gr. x. M. Fiant Pilulæ xxxvj.; quarum capiat unam ad duas, manè nocteque.

Form. 908. PILULÆ SARSÆ COMPOSITÆ.

℞ Massæ Pilul. Hydrarg. gr. viij.; Extr. Taraxaci, Extr. Sarsaparillæ, āā ℈v. M. Fiant Pilulæ xlviij., quarum capiat tres quater in die.

Form. 909. PILULÆ SCILLÆ ET GALBANI COMP.

℞ Pilul. Galbani Comp. ʒj.; Pilul. Scillæ Comp. ℈ ij.; Ol. Juniperi ♏ v. M. Divide in Pilul. xxiv., quarum sumat binas ter quotidiè.

Form. 910. PILULÆ SODÆ CUM RHEO ET HYOSCYAMO.

℞ Sodæ Sub-carbon. exsic. ℈ ijss.; Pulv. Rhei ʒj.; Extr. Hyoscyami ℈ ij. M. Divide in Pilulas xxxvj., quarum, ter quotidiè, binæ sumantur.

Form. 911. PILULÆ STOMACHICÆ.

℞ Pulveris Rhei, Pulveris Zingiberis, āā ʒss.; Extracti Anthemidis ʒj.; Olei Anisi q. s. Fiat massa, in Pilulas æquales triginta dividenda, quarum capiat tres antè prandium quotidiè. (In Dyspepsia and Chlorosis, &c.)

Form. 912. Pilulæ Sulphureti Antimonii.

℞ Antimon. Sulphuret. crud., Extract. Dulcamaræ, partes æquales. Sint Pilulæ gr. iij. Capiat iij. vel iv. ter diè.

Form. 913. Pilulæ Thebaicæ Compositæ.

℞ Gummi Ammoniaci ʒj.; Camphoræ ʒss.; Moschi Musc. gr. xx.; Pulv. Opii gr. x.; Bals. Peruviani q. s. M. Fiant Pil. gr. iij. Sumat æger unam horâ undecimâ, iterum vespere horâ quintâ; et cubitum petens sumat tres.

Form. 914. Pilulæ Tonicæ.

℞ Extracti Gentianæ, Pulv. Rhei, āā ʒss.; Saponis Castil. ℈j. M. Fiant Pilulæ xviij., quarum sumantur binæ ter quotidiè.

Form. 915. Potus Aperiens.

℞ Mannæ ℥jss.; Potassæ Supert. ℥ss.; Seri Lacti O ij. M. Capiat cyathum pro re natâ.

Form. 916. Potus Tamarindorum Comp.

℞ Potassæ Tartar., Pulp. Tamarind., Gum. Arab., āā ℥j. Solve in Aq. Font. Fervid. ℔ij. et adde Oxymel. Simp. ℥ij. M.

Form. 917. Pulvis Ammoniaco-Camphoratus.

℞ Ammon. Sub-carbon. gr. iv.; Camphoræ Pulveriz. gr. ij.; Sacch. Alb. gr. xxiv. M. pro dose; vel fiant Pil. ij. cum Mucilag. Acaciæ, omittend. Saccharo.

Form. 918. Pulvis Anticatarrhalis.

℞ Kermes Mineral. gr. iij.; Florum Sulphuris, Pulv. Rad. Glycyrrh., āā gr xij. Fiat Pulvis, ter die sumendus. (Quarin and Barthez.)

Form. 919. Pulvis Aperiens.

℞ Magnes. Sub-carbon. ℈ij.; Potassæ Supertart. ℈j.; Pulv. Rhei, Pulv. Rad. Glycyrrh., āā gr. vj.—xij. Fiat Pulvis omni nocte sumendus in theriacâ communi.

Form. 920. Pulvis Calumbæ et Ferri.

℞ Ferri Tartarizati gr. x.—xv.; Pulv. Calumbæ gr. xij. —℈j. Fiat Pulvis, ter quotidiè capiendus.

Form. 921. Pulvis Camphoræ et Antimonii.

℞ Camphoræ rasæ gr xvj.; Potassæ Tartar. ʒj.; Antimon. Tartarizat. gr. j. M. Probe, et in cartulas viij. divide; quarum sumatur una tertiâ quâque horâ.

Form. 922. Pulvis Diaphoreticus.

℞ Kermes Mineralis, Camphoræ, āā gr. iij.; Gum. Acaciæ, Sacchar. Albi, āā gr. viij.; Olei Fœniculi ♏j. M.

Form. 923. Pulvis Lientericus.

℞ Hydrarg. cum Cretâ gr. iij.; Pulv. Ipecacuan. Comp. gr. vj.; Pulv. Rhei gr. v.; Pulv. Cinnamom. gr. vij. M. Fiat Pulvis, bis vel ter die sumendus.

Form. 924. Pulvis Moschi Compositus.

℞ Moschi gr. vj.—xij.; Pulv. Rad. Valerian. ℈j.; Camphoræ gr. vj. M. Fiat Pulvis.

Form. 925. Pulvis Myrrhæ et Ipecacuanhæ.

℞ Pulv. Myrrhæ gr. xvj.; Pulv. Ipecacuan. gr. iv.; Potassæ Nitratis in pulv. ℈ij.; Pulv. Opii gr. j. Misce benè, et divide in doses æquales quatuor. Capiat unam quartâ quâque horâ.

Form. 926. Pulvis pro Torminibus.

℞ Magnes., Sacchari Albi, āā gr. viij.; Pulv. Canellæ Corticis gr. ij. M. Fiant Pulvis.

Form. 927. Pulvis Resolvens. (Stahlii.)

℞ Pulv. Antimonialis, Potassæ Nitrat., Ocul. Cancror. Præp., āā ʒj.: tere benè simul. Dosis ℈j.

Form. 928. Pulvis Salinus.

℞ Potassæ Chloridis gr. v.—xij.; Sodæ Muriatis gr. viij. —xx.; Sodæ Carbonatis gr. x.—xv.; Olei Pimentæ, vel Cajeputæ, vel Sine, ♏ ij.—v. M. Fiat Pulvis pro re natâ sumendus in decocto Hordei vel jusculo Bov.

Form. 929. Pulvis Sodæ Nitratis Compositus.

℞ Sodæ Nitratis gr. v.—℈j.; Pulv. Cinnam. gr. vj; Pulv. Ipecacuanhæ gr. ss.—j.; Olei Pimentæ ♏j. M Fiat Pulvis ter quaterve in die sumendus. (Diarrhœa, Dysentery.)

Form. 930. Pulvis Valerianæ Compositus.

℞ Pulv. Rad. Valerian. ℈j.—℈ij.; Magnes., Mur. Ammon., āā gr. v.; Olei Cajeputi ♏ ij. M.

Form. 931. Solutio Belladonnæ Extracti.

℞ Extracti Belladonnæ ʒj.; Aquæ Destillatæ ℥j. M. Fiat Solutio.

Form. 932. Solutio Cambogiæ Alkalinæ.

℞ Gum. Res. Cambogiæ ʒss: solve in Liquor. Carbon. Potassæ ℥ss. Hujus solutionis capiat ♏ xx., quater in die, quovis in vehiculo idoneo. (Both Diuretic and Cathartic. Hamburgh Dispensatory.)

Form. 933. Solutio Hydro-Sulphatis Calcis.

A Hydrosulphate of the Protoxide of Calcium.

℞ Sulphur. Pulveriz. ℔j.; Calcis Vivi ℔ij.; Aq. Fontanæ ℔xv. Coque per partem horæ quartam, et cola. (Pierquin's Antipsoric Milk. Hahnemann and Passing recommend it as a gargle in salivation; and a dessert or table spoonful of it is to be taken internally in some soup (mutton or veal broth), in cases of poisoning by mercurials.)

Form. 934. Solutio Refrigerans.

℞ Nitrat. Potassæ ℥ss.; Muriatis Ammoniæ ʒiij.; Aq. Pur. ℥viij. Solve leni cum calore, et adde Camphoræ Pulverizat. ʒjss.; Alcoholis q. s. Macera. Capiat ʒj.—ʒiij. in decocti Hordei cyatho.

Form. 935. Syrupus Antimoniatus.

℞ Kermes Miner. ℈j.; Syrup. Scillæ, Syrup. Althææ, āā ℥jss. M. Capiat Coch. j.—iij. minima, ter quaterve in die.

Form. 936. Tinctura Astringens.

℞ Catechu, Myrrhæ, āā ℥ss.: Pulv. Cinchonæ ʒij.; Balsami Peruvian. ʒjss.; Spirit. Armoraciæ, Spirit. Vini Rectificati, āā ℥jss. Misce, et digere. (For Sponginess of the Gums.)

Form. 937. Trochiscus Astringens.

℞ Catechu ℥ij.; Moschi ʒij.; Sacchar. Albi ℥iijss.; Mucilag. G. Tragacanth. q. s. Misce. Fiant Trochisci parvuli. (For Relaxation of the Uvula, Hoarseness, &c.)

Form. 938. Unguenti Chlorureti Calcis.

℞ Chlorureti Calcis in pulv. subtil. redac. ℥ijss.; Turbith. Mineral. in pulv. ʒij. Misce benè; dein tere cum Axong. ℥ijss.; Olei Amygdal. Dulc. ℥j. M. Fiat Unguentum.

Form. 939. Vinum Ferri.

℞ Tinctur. Ferri Muriatis f℥j.; Vini Albi Hispan. f℥xv. M.

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A

DICTIONARY

OF

PRACTICAL MEDICINE.

ABDOMEN. Syn. *Ventre*, Fr. *Unterleib*, *Bauch*, Ger. *Ventre*, *Pancia*, Ital. *Belly*, Eng. External Examination of the Abdomen in Disease.

Classification.—Pathology. *Semeiology, or Symptomatology ; Diagnosis.*

1. The abdomen may be considered as the fundamental part of the frame, inasmuch as it is never wanting in monstrous fœtuses; and as it contains parts which are the first formed in the embryo, and are the centres and sources of organic life. The number and importance of the viscera contained in its cavity; the number, the diversity, the extreme frequency and complication, of the maladies to which these viscera are liable, are circumstances which pressingly urge upon the practitioner a careful examination of the parietes of this cavity, in order to ascertain the nature and extent of disease. Much, however, will depend upon the manner in which the examination is made, in respect both of acquiring information as to the existing state of disease, and of drawing inferences as to its origin, and the best means of removing it.

2. Pathologists have generally divided the abdomen into certain *Regions*, with the view of describing with more accuracy the seat of morbid actions. These regions are marked out by means of imaginary lines, drawn in horizontal and vertical directions. The horizontal lines, four in number, divide this cavity into three zones. The highest of these lines pass over the xiphoid cartilage; the second, by the margin of the tenth rib; the third, by the anterior and superior spine of the ilia; and the fourth, by the superior margin of the pubis: thus giving three zones, the epigastric, the umbilical, and the hypogastric.

3. For the sake of additional precision, each of these zones is divided into segments by vertical lines, also four in number, drawn from the acromial extremity of the right and left clavicles to the insertion of the ligaments of Poupart; and from the posterior margins of the axillæ, over the most exterior part of the crests of the ilia, to the large trochanters. The spinous processes of the vertebræ may likewise be considered as forming a fifth line of demarcation; as we cannot overlook the posterior parts of the body in our investigation of many of the diseases affecting the abdominal organs. The vertical lines now enumerated, dividing the horizontal lines very nearly at right angles, give us nine regions on the anterior and lateral aspects of the abdomen, and six posterior regions. The *anterior* regions are the epigastric, umbilical, hypogastric, and right and left inguinal; the *lateral* regions are the right and left hypochondriac, and right and left iliac; the *dorsal* regions are the inferior dorsal—right and left, the right and left lumbar, and the right and left gluteal regions.

4. It does not belong to the scope of this work to enumerate the anatomical boundaries of the abdomen; the parts forming its parietes; or the viscera contained in each region. These are matters which are, or ought to be, familiar to all who peruse this work. But it is necessary to remind the reader, that organs which, in the healthy state, are always situate in a particular region, will be so changed in form and bulk by disease as frequently to extend to adjoining regions, where they will often be detected upon a careful examination; or they will be altogether displaced, either by the specific gravity of their contents, or by tumours developed in their structure. The former phenomenon is often remarked in respect of the liver, spleen, kidneys, ovarium, uterus, &c.; the latter, in the stomach, pylorus, gall-bladder, colon, &c.

5. This change of the position of the abdominal viscera is chiefly observed in the more chronic kinds of organic diseases, and is pointed out in the articles in which they are described: it is generally more manifest in one posture of the body than in others; and is to be ascertained, with the other maladies to which these viscera are liable, by the modes of examining the abdomen about to be explained, assisted by other rational or inferential symptoms. These modes may be made the source of much information as to all the relations of abdominal diseases; but attention, repeated observations, and much natural discernment, are required to obtain from them all the knowledge they are capable of conveying. I shall discuse this subject in the brief manner to which I am necessarily driven, by noticing, I., *Inspection;* II., *Manual examination*; III., *Percussion;* and, IV., *Auscultation* of the abdomen.

6. I. Inspection by the sense of sight merely, although the best mode of acquiring an idea of the form, size, and motions of the abdomen, is chiefly valuable as a means of investigating the diseases of its viscera in conjunction with the other modes just enumerated; yet simple inspection furnishes us with the most important information in many diseases, particularly in those of infancy and childhood, as well as in many acute and chronic maladies occurring in adults. The *form* of the abdomen, although necessarily in some measure

changed by marked variation of its bulk, may, nevertheless, be much altered without any decided difference in its size. Thus, it is somewhat changed in severe diseases of the respiratory passages, when the entrance of air into the lungs is obstructed; the epigastrium and hypochondria being then pressed inwards and upwards: whilst in some morbid states of the liver and gall-bladder, of the spleen, and of the ovaria, an unusual prominence in their respective regions is frequently observed. But the most remarkable changes in the form of the abdomen is met with when the *size* of the cavity is also altered. It is scarcely necessary to allude to examples; but, in all those diseases attended with enlargement or diminution of the bulk of this important part of the body, either in one of its regions, in several of them, or in all, inspection should always be performed: it gives greater precision to manual examination; enables us to compare the bulk of a region with the corresponding region on the other side, and with others in its vicinity; and impresses upon the memory the changes which the part may experience during the progress of disease. It should, therefore, never be neglected in all the forms of abdominal dropsy; in peritonitis, chronic or acute; in inflammation of the stomach, liver, spleen, and bowels; in the different kinds of colic, in fevers, in uterine and ovarian diseases; in affections of the kidneys and urinary organs; in all disorders accompanied with obstruction to the excretions; and, in short, in all chronic maladies. It ought never to be overlooked in the diseases of infancy and childhood, of whatever nature they may be.

7. Besides, however, attending in those diseases to the form and size of the abdomen merely, the motions which it presents ought not to be neglected. When rightly interpreted, they often furnish important diagnostic and therapeutic hints. But they require to be viewed in connection with the motions of the thorax, and state of the heart's action. In diaphragmitis, peritonitis, gastritis, enteritis, and certain states of hepatitis, the motions of the abdomen are slight or obscure, whilst the actions of the thorax are increased. On the other hand, in several severe diseases of the respiratory organs, particularly in croup, laryngitis, bronchitis, several varieties of asthma, pleuritis, pneumonia, &c., the parietes of the chest are nearly motionless; whilst the movements of the abdomen, especially at the epigastrium, in croup and asthma, are remarkably increased, or laborious. The motions of the abdomen, also, are often not limited to those caused by respiration; but in some cases, particularly in organic changes of the heart, pericardium, aorta, &c., and even in certain nervous disorders implicating these organs, comprises those occasioned by the action of the heart, increased by the state of the large abdominal vessels, and by the emaciation or other morbid condition of the patient.

8. II. MANUAL EXAMINATION of the abdomen is one of the most important means of diagnosis we possess: but it furnishes information in proportion to the perfection of manner in which it is made. In this very requisite mode of investigation, the temperature of the hand of the practitioner at the time of making it should be attended to, in the great majority of diseases; both as a moderate warmth of the hand is necessary to the greatest delicacy and accuracy of touch, and as its application to the surface of the abdomen will not in that state occasion any disturbance or contraction of the muscular parietes. In entering upon the examination, care should be taken not to excite the alarm of the patient. The hand ought to be applied at first in the gentlest manner possible. By observing this three very important objects will be best obtained; namely, a knowledge of the form, of the temperature, and of the sensibility of the surface of the abdomen.

9. As much more information than this is required from manual examination, the patient should be directed to place himself in a favourable position for a more general and complete investigation. He should be placed on his back, with the head and shoulders slightly and comfortably elevated, and the thighs drawn nearly to a right angle with the trunk. If the bladder be full, it should be emptied. When proceeding to examine, the patient should be told to relax all the muscles, particularly the abdominal muscles. Commencing, therefore, with the utmost gentleness, and passing the hand slightly over the abdomen, we should slowly increase the pressure, with the view of ascertaining the following conditions: — 1st, Its temperature; 2d, Its form and size; 3d, Its sensibility; 4th, Its degree of tension and firmness; 5th, The existence of enlargements, tumours, &c.; 6th, The presence of effused fluids; 7th, The probable existence of accumulated secretions and fæcal matters; 8th, Hernial protrusions and displacements. On each of these I proceed to offer a few remarks.

10. 1st, The *temperature* of the abdomen furnishes most important indications as to the nature of disease. It is generally always higher than natural in diseases of increased action; and is also often higher when the patient is actually complaining of cold, particularly at the commencement of fevers. In many fevers and inflammations of the abdominal viscera, particularly those of a dangerous or malignant character, the increased temperature is accompanied with a peculiar acrid pungency to the sensation of the examiner; a phenomenon which indicates the utmost risk of rapidly supervening disorganisaation. *Diminished temperature* of the abdomen is met with in the period of depression, or cold stage at the commencement of fevers, but very seldom at their termination, even in death, unless in the most malignant or liquescent forms. It is also met with after injuries of the abdomen, particularly blows on the epigastrium, in anæmia, chlorosis, and other disorders of debility.

11. 2d, The *form and size* of the abdomen are frequently altered, as already noticed (§ 6, 7.); but, in order to ascertain the nature of the alteration, various means of investigation are generally required, particularly those which remain to be considered. When proceeding with the manual examination of the abdomen, it is necessary very gently to increase the pressure, and, when acute pain is not complained of, to make it in various directions, — laterally, downwards, upwards, and backwards to the spine, — so that if altered sensibility of any of the contained viscera exist, it may not escape detection, but be accurately ascertained and estimated; and the examination should always be made with a careful observation of its effects upon the expression of the countenance of the patient. It will also often be requisite to per-

form the manual examination, now with the points of several fingers, now with the whole of one, or even of both hands; and occasionally, at the same time that a full inspiration is being made. But it should always be performed with attention to the sensations of the patient, particularly as expressed by the countenance, and to the feelings and ideas it may excite in our own minds. Even the state of action in which the abdominal muscles are often thrown by the examination; the degree of pressure occasioning such action; and the circumstance of tension of those muscles preceding the examination, or being excited by it; as well as the continuance of their contractions, and the periods and occasions of their relaxation, are all important matters in our estimate of the state of the viscera underneath, — more particularly in the various states of inflammation seated in the peritoneum, in the alimentary canal, &c.

12. 3d, The *sensibility* of the parietes of the abdomen is most intimately associated with that of the contained organs, both in health and disease. The sensibility of the epigastric region varies most widely in different persons. It is frequently, even in tolerable health, very great in delicate and thin females. It is always so in inflammation of the viscera, more particularly when the serous membranes are affected; and the more superficial the inflammation, the more tender is the surface. In order to obtain an accurate idea of the state of the sensibility of the abdomen, pressure should be commenced in the gentlest manner, and with the fingers and palm of the open hand. When the patient cannot endure the slightest touch, the disease is then commonly in the parietes, or in the serous membrane reflected over them. When the cause exists more deeply, the tenderness is less acute, and the muscles are almost instinctively brought into action, even before pressure is made, in order to protect the diseased viscera from it.

13. When superficial tenderness is absent, the examination may be made with increased pressure, in order to ascertain the presence of tenderness, pain, or soreness, in any degree or at any part. But caution in thus increasing the pressure is always necessary when the parenchyma of an organ, particularly of the liver or spleen, is enlarged or otherwise affected; for many such affections may be very serious, and yet the sensibility of the diseased part not much increased. I have known rupture of an enlarged and softened spleen occasioned by the rudeness of the examination; and writers have mentioned similar accidents to have occurred to the liver.

14. 4th, The *tension and firmness* of the abdomen require attention, and due estimation of their actual amount; and in connection with the other diagnostic indications furnished by the examination. Thus, when the tension is associated with increased temperature and sensibility, inflammation of one or more organs underneath, particularly of the peritoneum, may be predicated. The tumefaction, degree of sensibility, position of the patient, &c. will further prove the accuracy of the diagnosis. Tension and firmness are always present in the different forms of peritonitis and inflammations of the subjacent viscera, but not uniformly throughout all their stages. Even in the worst or most malignant forms of peritonitis, as those met with in puerperal females, these symptoms are often either almost altogether wanting, or they exist for a short time only. When effusion of a serous or sero-purulent matter occurs in peritonitis, or when suppuration has followed inflammation of the enveloped viscera, tension as well as firmness disappear. They are generally, however, both present, even when the sensibility of the parietes is not much greater than natural, in chronic peritonitis with the formation of false membranes, or the agglutination of the opposing surfaces of the viscera.

15. 5th, The *presence of tumours* or other morbid growths, or the fact of their absence, has also to be ascertained by a manual examination. This information can be obtained only by this mode of investigation, carefully conducted. If we detect any degree of unusual tumefaction or hardness, we should endeavour to ascertain its exact site; its form, size, connections; its consistence, degree of sensibility; and whether it is fixed or moveable, soft and yielding, or hard; pulsatile or not. The situation of the tumour; its size, form, and degree of fixedness, will enable us to form an idea of the part affected: whilst the absence or presence of morbid sensibility in it, of fluctuation and pulsation, and the manner in which the nearest parts of the abdominal parietes are affected by it, will furnish important indications of its nature. When tumours or unusual circumscribed indurations are detected in any part of the abdomen, we should bear in mind that their sources and kinds are numerous: that they may be formed in the liver, pancreas, spleen, stomach, pylorus, mesentery, omentum, cæcum, kidneys, uterine organs, &c.; that their nature may be extremely various; and that they may consist either of accumulations of some fluid contained in a cyst, or infiltrated in the substance of an organ, or enclosed in its natural cavity, the outlet of which has been obstructed; or of a deposition of some morbid structure, the nature of which can only be known by a comparison of numerous symptoms, and the history of the disease. Care should be also taken that the accumulations of fæcal matters occasionally formed in the cæcum, and in various parts of the colon, or that an unusual anterior protuberance or curvature of the inferior dorsal or lumbar vertebræ, be not mistaken, as have sometimes happened, for morbid growths; and that unusually large collections of the natural secretions in their cysts, as of the bile and urine, owing to temporary obstruction to their discharge, be not treated as morbid formations of a very different kind. I have known cases in which distension of the gall-bladder, from great accumulation of the cystic bile, was mistaken for abscess of the liver; and an enormously distended urinary bladder was viewed as dropsy.

16. 6th, The *presence of fluids effused into the peritoneal sac* is best ascertained by placing the patient in the erect posture. If this cannot be done, and if he cannot even sit up, the shoulders and limbs should be placed low; and, whether in the erect or recumbent posture, the palm of one hand laid with a gentle pressure upon one side of the abdomen, whilst we tap, somewhat smartly with the other hand, on the opposite side. The impulse occasioned by the stroke will occasion, if fluid be effused, a vibratory undulation or shock which will be felt by the other hand, and which constitutes the diagnostic

symptom in diseases of the abdomen attended with effusion.

17. 7th, *Accumulation of fæcal matters* in the bowels are not unfrequently mistaken for tumours. These matters usually collect and harden in the cæcum, or in some part of the colon. They seldom accumulate in the small intestines, unless they consist of certain kinds of *intestinal concretions* (see the art.); which are with difficulty distinguished from tumours seated in some one of the abdominal viscera. It is indispensably requisite to examine the abdomen carefully in all cases of habitual or occasional constipation, particularly in the region of the cæcum and course of the colon; as, when conducted with an experienced tact and discrimination, these collections will generally be ascertained: and when the history of the case, and numerous contingent rational symptoms, are taken into account, little risk will be run of confounding them with morbid growths. The accumulation of secretions in the gall-bladder, and in the urinary bladder, are chiefly, particularly the latter, ascertained by manual examination. The diagnosis of those disorders is fully pointed out in another place.

18. 8th, *Protrusion* of some part of the abdominal contents, giving rise to any either of the more common kinds of *Herniæ*, or of those which are unusual, should never be overlooked. Inguinal, femoral, and umbilical herniæ are so frequent, and, when either incarcerated or strangulated, occasion so serious effects, that in all cases where severe symptoms are referred to any of the viscera contained in the abdominal cavity, or in its vicinity, or when the functions of the bowels are obstructed, this source of mischief should be particularly enquired into.

19. I may observe generally, in respect of manual examination of the abdomen, that it furnishes valuable means of diagnosis in very many diseases, particularly when estimated in due connection with those derived from other sources; but I should add, — what I shall often have to prove hereafter, — that it does not always give us exactly the same kind of information that is stated in several, and even in some very recent, works. Thus it is said to be the most certain means of ascertaining the presence of enlarged mesenteric glands, and by actually feeling these glands enlarged. Now this is not the case, and I state it from an experience of many hundred cases: for there are comparatively but few instances in which these enlarged glands can be satisfactorily detected, by the most careful manual examination. But this mode of investigation furnishes certain indications of their presence of a different kind from that which writers have laid down. It may also be remarked, that a manual examination of the abdomen is generally much more successfully made in lean subjects, in females than in males, and in children than in adults; whilst in muscular men, and in fat persons, it furnishes much less information, owing to the muscularity and thickness of the abdominal parietes.

20. III. PERCUSSION has been employed as a means of diagnosis in diseases of the abdomen from a very early period of medical knowledge, but chiefly with a view of recognising tympanitic affections, or unusual accumulations of air, and dropsical effusions; and it was not until very lately that attention was directed to it as a means of investigation in a very large proportion of other diseases of the abdominal viscera. Percussion of the abdomen as well as of the thorax is either *direct* or *mediate:* the former is that which was first ably insisted on by AUENBRUGGER, and brought into notice by CORVISART, chiefly in the investigation of thoracic diseases; the latter, both in its application to abdominal and thoracic affections, is the invention of M. PIORRY, who has paid great attention to its perfection, and has written ably on it as a means of diagnosis.

21. *Direct* percussion consists of simply striking the parts, somewhat smartly, with the points of two or more fingers united and brought to the same plane, and attending to the sounds elicited. *Mediate* percussion is performing the same with a thin plate of ivory, box wood, or any other hard elastic body, placed over the part to be thus examined, and striking upon it. The advantages derived from having such a body interposed between the surface and the fingers are, 1st, The part is protected in a great measure from the stroke, which, although slight, yet is frequently unpleasant to delicate and sensitive persons; 2d, It assists in the production of the sound for the obtaining which percussion is employed. (See art. PERCUSSION.) The body on which the percussion is thus made usually consists of a small ivory plate of about 2½ or 3 inches in diameter: M. PIORRY calls it the *pleximeter*, or measure of percussion. In all cases in which we wish to examine the abdomen by percussion, it will be necessary to use the pleximeter. The information it conveys varies according to the state of the parts underneath. If we place it over the liver, percussion gives out a dull sound; from the circumstance of a dense body lying beneath that part of the abdominal parietes: if it be moved in the course of the stomach and colon, a sound will be elicited clear in proportion to the quantity of air contained in these viscera.

22. During our investigation of the abdominal contents with the aid of mediate percussion, it will be necessary to attend to certain facts: — 1st, That the pleximeter will furnish, in the same person, a sound varying from dull to tympanitic as the parts over which it may be placed differ in density and the quantity of air they may enclose; 2d, That in situations of the abdomen where, owing to the quantity of air usually contained in the bowels, mediate percussion generally gives a tympanitic sound when the plate is placed lightly on the surface, it will give a much duller, or even a dead sound, when pressed inwards so as to displace the air from underneath it, and to approach nearer to some solid body, or to bring the parts nearer to that condition by the pressure; 3d, That the stomach and whole tract of the intestinal canal always contain a certain quantity of air or gaseous fluid, particularly the large bowels; and that they approach more nearly to the abdominal parietes in proportion to their distension, whether with air, or with fluid or more or less solid contents; and, 4th, The quantity of air contained in the digestive tube, especially the stomach and large bowels, is great in proportion to the deficiency of its vital energy, and the degree of inflammatory action affecting it.

23. These facts being attended to in our investigations of abdominal diseases by means of percussion, mediate or direct, the extent of the

liver may be distinctly traced by its means; and the degree of inflation of the bowels, or stomach, may be ascertained with tolerable certainty. When the stomach is nearly empty (for it always contains some air secreted from its internal surface), it retracts backwards, and recedes from the abdominal parietes towards the centre of the trunk; having then the colon, more or less distended with gas, placed before it. As it becomes filled with air or the ordinary ingesta it extends to the left hypochondrium, and approaches the left and anterior parietes of the upper zone of the abdomen. In proportion to the quantity of air it contains, percussion gives out a clear sound, which is dull or dead as it is filled with fluid or solid ingesta, and as the air is displaced. When we know that the stomach must be empty of food, and yet find that a dull sound is emitted on percussion, we should always suspect organic disease. In these cases air is often secreted with great rapidity from its internal surface, but is immediately expelled, owing to the irritable state of its muscular coats, without being retained, and before any very material distension of the viscus is occasioned by it.

24. The small intestines generally contain air; although, I believe, much less than is usually found in the large bowels. In a state of health, particularly a few hours after a meal, when the chymous matter is passing along them, percussion over them, — that is, over the umbilical region, and the immediately adjoining parts of the surrounding regions, — generally yields a dull sound; which becomes clear in proportion to the quantity of air they contain, excepting in very fat persons. In a great majority of abdominal diseases, the quantity of air contained in the small intestines is increased much beyond what exists in health: this is particularly the case in several diseases of debility, as chlorosis, indigestions, colicky affections, torpid states of the liver, constipation, certain states of fever, hysteria, &c.; and still more so in inflammatory states of portions of the digestive tube, in peritonitis, in puerperal fevers, &c.

25. When the mucous surface of the bowels or of the stomach is irritated or inflamed, the quantity of air secreted is often very great; but, excepting in the slighter states of such diseases, it is seldom retained within the sphere of the inflammation so as to occasion that degree of distension which may be detected by percussion, although it is often retained in adjoining parts of the tube, occasioning distension, great pain, tormina, &c. This disposition to expel the morbid collection of air arises from the irritability of the muscular fibres of that part of the intestines, the mucous surface of which is in a state of irritation; the morbid action of these fibres propelling it either upwards or downwards, where it may accumulate or be evacuated, but most commonly into the large bowels, or into the duodenum and stomach, where it may be detected by percussion. In diseases which paralyse the contractile actions of the muscular coats of the bowels, as the malignant puerperal peritonitis, the last stages of enteritis, rabies canina, and the advanced states of adynamic fevers, the quantity of air which is secreted and accumulated in the whole digestive tube, and the consequent distension, are often enormous. The sound on percussion, in these cases, generally becomes quite tympanitic long before death, indicating the cause, as well as the lost tone of the muscular coat of the canal.

26. The phenomena now noticed to occur in respect of the small intestines affect, in a still more marked manner, the large bowels; flatulent distension of these being readily traced by mediate, or even direct percussion, particularly in the course of the colon, even when the small intestines are comparatively free from it.

27. It is not merely the presence of accumulated air in the different parts of the digestive tube, and the important pathological and therapeutic indications to which the knowledge of this fact naturally leads, that render percussion of the abdomen a valuable means of investigation, but it is also the information it conveys of the existence of more solid formations — of fluid collections, and morbid productions. Unusual distension of the bladder; all the forms of abdominal dropsy; ovarian diseases; purulent collections in, or enlargements of, the liver; tumours of every kind, particularly when they reach a considerable size; enlargements of the spleen or kidneys, &c.; are more readily and earlier detected by means of mediate percussion than without this aid: and, in all these, the sound emitted is dead over the diseased part, and becomes clear as the boundary of disease is passed, and when the plate is placed over the hollow viscera.

28. IV. Auscultation, mediate or direct, particularly the former, is often necessary in abdominal diseases, particularly in ascertaining whether or not the large vessels are affected; and even in tracing disease of the right side of the heart and of the pericardium. It may also be useful in those diseases of the liver which extend to the lungs through the diaphragm, particularly abscess, or hydatidic cysts of the liver breaking into the lungs. Auscultation of the abdomen has been resorted to by M. Kergaradec to ascertain the existence of pregnancy; and by M. Lisfranc, to determine the presence of stone in the bladder, when the sound is imperfectly heard to strike against it.

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ABORTION.

Syn. *Abortus, aborsus, affluxio.* *Διαφθορα, ἐκτρωμα, ἐκτρωσμος*, Arist. *Αμβλωμα, εξαμβλωσις*, Hip. *Avortement*, Fr. *Aborto*, Ital. *Falche Geburt, Fehlgeburt*, Ger. *Miscarriage*, Eng.

Classif. 5. *Class*, Diseases of the Sexual Function; 3. *Order*, Affecting Impregnation (*Good*). I. Class; V. Order (*Author*, see *Preface*).

1. Defin. *The expulsion of an embryo or fœtus which is either already dead, or is at a too early period of fœtal existence to live.*

2. This definition will distinguish *abortion* from *premature labour*, which latter is applicable to delivery after the sixth month, when the fœtus may live; and from *false delivery*, which signifies the expulsion of a mole, or false germ instead of an embryo. Under this term I also include expulsion of the ovum before the sixth week, commonly called *miscarriage*.

3. Causes. These may be divided into such as act primarily upon the mother, or depend

upon her; and into those which are connected with the product of conception, and are owing to diseases of the fœtus and its appendages. (Duges.) Or they may be divided into the predisposing, exciting, and efficient causes. It will be necessary to consider the causes with some relation to these distinctions.

4. I. *Predisposing causes.* The disposition to abortion is, in some females, so strong that the slightest exciting cause will produce it; in other females the most serious injuries, and the most violent mental and moral impressions, are insufficient to occasion it. Some of the predisposing causes are referable to the mother, others to the fœtus and its appendages.

5. *A.* The predisposing *causes referable to the mother* are numerous, and consist of certain states of the uterus, and particular conditions of the habit and constitution, influencing either the uterus or the embryo itself.

6. The *conditions of the uterus* favouring abortion are great rigidity of its fibres, and an unyielding state of its parietes, opposing too great a resistance to the dilatation which the organ must necessarily experience; too great sensibility and contractility of the uterus, in the former of which states the other organs of generation often also participate; too great a flow of blood to the uterus and ovaria, either proceeding constitutionally, or from causes which excite the nerves of these organs or parts adjoining; feebleness and relaxation of the neck of the uterus, — a condition of the parts which M. Desormeaux states he has frequently ascertained to exist in females subject to abortion; and atony of the uterus itself, either from original constitution or long-continued leucorrhœa, or from a severe or protracted labour, a cause which may be conjoined with the one preceding it. The foregoing causes are chiefly productive of those abortions which occur at the same period of pregnancy, and which have been called periodic by some authors.

7. To the above may be added, as strictly referable, a condition of the organ called by Peu immoderate heat of the uterus, which is attributable to an excited condition of the nerves of the organ, and a chronic inflammatory or irritative state of its vessels; also scirrhus, fibrous, fleshy, steatomatous tumours of the uterus; polypus, dropsy, the presence of several children, and the too rapid or too great dilation of the organ thereby occasioned; tumours of, and fluid effusions into, the substance of the ovaria; and inflammation of the ovaria and parts adjoining.

8. The causes chiefly referable to the *constitution and habit of the mother* are certain states of the atmosphere, to which only can be attributed those frequent abortions sometimes observed, which have even assumed an epidemic form, and of which Hippocrates, Fischer, Tessier, Desormeaux, and others have made mention; the sanguine and irritable temperament; plethoric habit; a constitutional disposition to hæmorrhage independently of, or connected with, the foregoing states; habitual menorrhagia; irregular menstruation; great debility of body; excessive sensibility, susceptibility, and mobility of the nervous and muscular systems; hysterical states of the nervous system; the syphilitic and the mercurial poisons; a cachectic condition of the frame; painful and chronic diseases; addiction to masturbation in early life; curvatures of the spine; malformations of the spine and pelvis; hereditary disposition; an acquired disposition arising from previous abortions caused by accidental circumstances; marriage or impregnation late in life; deficient or improper nourishment; too close cinctures of the body; worms in the intestinal canal; conception at a too early period after delivery, or after a previous abortion; the atonic state of plethora generated by luxurious indulgences, by sleeping in soft and too warm beds, by indolence, a too full diet, &c.; local plethora, or excitement of the uterine organs, occasioned and kept up by sensual gratifications; and the constitutional and local commotion occasioned by infectious, exanthematous, pestilential, and febrile diseases.

10. *B. The causes which depend upon the fœtus* are referable either to the fœtus itself or to its appendages. They operate either by favouring the death of the fœtus, which acts then as a foreign body in the uterus, exciting the organ to expel it; or by impeding its growth, so that it does not consume, or does not afford a ready circulation to, the blood sent to the uterus; thus occasioning an accumulation of this fluid in the uterine vessels, and consequently congestion, terminating in hæmorrhage and the expulsion of the embryo. Owing to these circumstances, abortion is favoured by debility, or imperfect developement of the fœtus; by monstrous conformation, and disease affecting it at some period of its early growth; by the imperfect adhesion of the placenta to the surface of the womb, or its implantation over the neck of the organ; by disease of the placenta, as inflammation, apoplectic hæmorrhage into its substance, calcareous deposits, fatty degeneration, scirrhous or cartilaginous induration; the formation of serous cysts, of hydatids, aneurism, or varices of this organ; by atrophy, hypertrophy, or disproportionate size of the placenta; by a too short or a too long umbilical cord; by twisting of the chord around the neck or one of the limbs of the fœtus; by diseased structure of the chord itself, as extreme tensity or softness, the formation of tumours or hydatids in it, by knots or adhesions preventing or impeding the circulation through it; great tenderness of the membranes of the ovum; inflammation, thickening, opacity, and irregularity of the membranes; the presence of too much or too little amniotic fluid, and collections of serum, or of a sanguineous fluid, between the chorion and amnios; adhesions formed between the placenta and parts of the surface of the fœtus; and, in the more advanced periods of gestation, constitutional diseases, particularly eruptive and infectious diseases, or continued fevers, extending from the mother to the embryo.

10. II. *The occasional exciting causes* are extremely numerous. It may be even said, that there is scarcely an occurrence in life which may not be occasionally concerned in producing abortion. (Desormeaux.) The chief causes of this class are acute diseases; such as fevers, scarlatina, measles, small-pox, and inflammations, particularly of the uterus, ovaria, pelvic peritoneum, colon, &c.; the irritation of adjoining viscera; diarrhœa, dysentery, tenesmus, colic, constipation, hæmorrhoids; hysterical and epilectic convulsions; syphilis; violent pain; disappointment and anxiety of mind; anger, fright, excessive joy;

the impression of various odours; threatened asphyxia, particularly from the vapour of carbon; violent exertions and fatigue; dancing; riding on horseback, or in an uneasy carriage, or on a roughly paved road; excessive venereal indulgence; severe coughs; hiccup; immoderate laughter; vomitings; sea-sickness; injuries on the loins or abdomen; any sudden shock, even the extraction of a tooth; the use of irritating or drastic purgatives, or of emmenagogues; pediluvia; hot-baths; large blood-lettings, particularly from the feet; convulsive movements of the fœtus; rupture of the umbilical cord or of the membranes; adhesions formed between the serous surface of the fundus of the uterus and the adjoining viscera, preventing the dilatation or the ascent of the womb, and occasioning its reaction on its contents.

11. The foregoing causes act variously in producing abortion. Some of them may produce directly a separation of the placenta from the surface of the uterus, particularly when the placental mass is very considerable; but this is a rare occurrence, and can only be inferred to exist when uterine hæmorrhage follows immediately upon the application of the exciting cause. A violent shock, injury, fall, compression of the uterine region, riding, dancing, coition, &c. may have the immediate effect, or they may occasion rupture of the cord or of the membranes; but more frequently these, and, in a still more particular manner, the other exciting causes, produce certain intermediate effects, as congestion of the vessels of the womb, which is soon followed by hæmorrhage and by separation of the placenta; or they occasion contractions of the uterus, owing to the excitement and irritation of its nerves, or of the nerves of adjoining or sympathising parts, the separation of the placenta, and expulsion of the fœtus.

12. KLEIN and many other authors have remarked that the causes of abortion generally have a more marked effect at the period at which the menses would have returned in the unimpregnated state. The *molimen*, or tendency to congestion in, and hæmorrhage from, the uterus, which then may be supposed to exist, renders it more susceptible of being injuriously impressed by the occasional causes of the disease; and, where other predisposing causes are already in existence, has a direct influence in separating the placenta, and inducing uterine contraction and abortion: several of the causes produce spasmodic or convulsive actions, which are sympathetically transmitted to the uterus, whilst others seem to act primarily on the fœtus. The direct action of certain of the exciting causes on the fœtus may be doubted; but every experienced and observing practitioner must have remarked the very frequent and immediate effect of strong passions of the mind of the mother upon the motions of the fœtus, inducing convulsive actions, painfully and distinctly felt, and sometimes followed by its death. Amongst the most common exciting causes of abortion are those means which, from their occasional action in this way, have been called *abortives*, and which the practitioner should be acquainted with, so as to enable him the better to counteract their effects.

13. The production of abortion is a felonious act, and one which the practitioner never will resort to, except in the case of irreducible retroversion of the uterus. The means usually resorted to by females themselves, or by persons who criminally usurp the medical character, and employ feloniously the little empirical knowledge they may have acquired, either surreptitiously or otherwise, are, large bleeding from the feet; pediluvia; violent emetics; drastic purgatives, particularly those which act upon the colon and rectum; active emmenagogues, as savine, ergot of rye, juniper, hellebore, &c.; and stimulating injections into the vagina: also various mechanical means employed to break the membranes, or to procure the discharge of the amniotic fluid. Many of the foregoing, or all of them excepting the last, will often fail of producing the desired effect. They frequently also succeed, and sometimes they occasion the death of both mother and fœtus. MAURICEAU, DE LA MOTTE, BOER, DESORMEAUX, DUGES, BURNS, HAMILTON, RYAN, &c. have satisfactorily shown the uncertainty of those means, and have met with numerous instances in which they had been carried to the utmost extent without acting in the way desired; but had occasioned enteritis, dysentery, peritonitis, metritis, and other dangerous diseases. Many cases are also on record where attempts had been made to produce abortion by puncturing the membranes; and the uterus itself had been penetrated, and the death of the mother thereby occasioned. It is a matter of the utmost difficulty, even to the most expert surgeon, to puncture the membranes at that period of pregnancy when it is usually attempted by ignorant persons; the only persons, indeed, who would make the attempt.

14. THE SYMPTOMS of abortion vary remarkably with the period of pregnancy at which it takes place: also with the cause producing it. They do not, therefore, admit of being divided into precursory and essential symptoms: the former being frequently wanting. In the two first months of pregnancy the ovum, which is then small, is sometimes expelled without any remarkable pain or hæmorrhage; but more frequently there are pains, accompanied with coagula, in which the ovum is generally enveloped, and where it often escapes observation. This is particularly the case when, the membranes being broken, the embryo escapes without the placenta. At this early period females often suppose that they have been the subject merely of an interruption of the menses, followed by a more abundant and painful return of them than usual, instead of a true abortion, or miscarriage.

15. As the period of utero-gestation advances, and the size of the fœtus increases, the pains and hæmorrhage accompanying abortion are augmented; the hæmorrhage being generally more considerable than that attending delivery at the regular period.

The abortions which proceed from chronic diseases, or from causes acting slowly, and particularly those which are occasioned by morbid states of the embryo, or of its membranes, are generally preceded by horripilations or rigors, followed by febrile movements, by heat, want of appetite, nausea, thirst, pain in the loins, lassitude, leipothymia, syncope, coldness of the extremities, palpitations, lowness of the spirits, paleness of countenance, tumefaction or lividity of the eyelids, deficient brightness of the eyes, fœtor of the breath; a feeling of weakness in the abdomen, or of cold about the pubis; of weight about the anus and vagina; flaccidity and diminished size of the breasts, sometimes with a slight discharge of serum; a flow of a sanious, then of a sanguineous fluid, and afterwards of blood, either in a fluid or grumous state, from the vulva; diminished motion of the child, soon afterwards followed by perfect cessation of motion; lessened bulk of the abdomen or of the hypogastrium; uterine pains, which become more and more frequent and severe; progressive dilation of the uterine orifice, and prominence of the membranes; and, lastly, expulsion of the amniotic fluid and fœtus, followed, at an indefinite time, by the placenta. Most frequently the discharge of blood does not cease until the placenta is expelled. (DESORMEAUX.)

16. Abortion proceeding from the more energetic exciting causes is sometimes preceded by pains, and an unusual sense of weight in the loins; and at the lower part of the vagina by horripilations or rigors, by general uneasiness, and cardialgia or nausea. From the first there is often an appearance of blood, followed by the discharge of a sanguineous serum, which soon passes into serious hæmorrhage. In other cases the action of the cause is instantly followed by a large effusion of blood, which continues until after the expulsion of the fœtus and its appendages. Frequent lancinating pains dart through the abdomen, chiefly in the direction of the umbilicus and vulva: the uterus makes efforts at expulsion, and the fœtus is expelled. The more advanced the term of pregnancy, the nearer do the symptoms approach to those of delivery at the full time; and the nearer also do its consequences assimilate to those following upon a natural confinement, as the lochial discharge, after pains, milk-fever, &c.

17. It is sometimes observed, even up to the middle period of utero-gestation, that the fœtus is expelled enveloped in its membranes. But it sometimes also occurs in the first months, that, after the rupture of the membranes, the fœtus and placenta are retained, decomposed, and discharged in the form of a brown fœtid sanies. In other cases the placenta is not expelled until several weeks after the fœtus, either in the state now described, or in that of a putrid mass. It occasionally is observed that the placenta continues attached to the uterus, and is nourished, increasing in size, and assuming the appearance of a fleshy mass, in which are sometimes found simple cysts, or cysts containing hydatids. This latter occurrence takes place either when the fœtus had been expelled, or had died at an early period of its formation; and, whilst it was yet small and nearly gelatinous, being dissolved during the process of decay in the amniotic fluid, or preserved in it.

18. This change in the placenta forms what has been called by DESORMEAUX and others the *mole of generation*; the chief character of which is that it possesses a cavity lined with a smooth membrane, the remains of the amnion. Frequently, at the more advanced periods at which abortion takes place, the fœtus is expelled alive; but the duration of its life subsequently depends upon its age, and the circumstances attending its abortion. It sometimes also is dead before it is expelled, occasionally for a considerable time; although it may have reached the age of several months. Its death does not necessarily lead, although it does generally, to its expulsion. In some cases it is retained even up to the full period of utero-gestation, and is then thrown out in a state of peculiar softening and maceration, but without putrefaction: this only occurs when the membranes have remained entire, and air been excluded from the interior of the uterus. In other instances it is converted into a substance resembling adipocire, or the fatty substance generated during the decomposition of animal matter. In rarer cases the fœtus and envelopes become hardened, and even converted into a bony or petrous state, and retained till the natural death of the mother; or, in the course of some months, or even years, occasion inflammation of the uterus, and suppuration. Sometimes, in cases of this latter description, a portion of the uterus forms adhesions to the parts opposite; the abscess which is formed extending in that direction, and opening on the surface of the abdomen, or in the interior of the intestinal canal, or into the vagina, and giving issue to purulent matter, mixed with a fœtid sanies, and portions of bones arising from the decomposition of the textures of the embryo. But these latter consequences of abortion are rarely met with unless in cases of rupture of the womb, or extra-uterine impregnation.

19. In some cases of abortion the hæmorrhage from the uterus continues to a serious extent for several days. This may be the case at various epochs of pregnancy; and may result from the detachment, partial or general, of the placenta, and its retention along with the fœtus in the uterine cavity, owing to imperfect action of the uterus to eject it. It may also proceed from the expulsion of the fœtus, and the retention of the placenta, either altogether or partly separated from the uterus. In some cases the presence of the placenta, or of a portion of the membranes in the womb, or in the os uteri and upper part of the vagina, by the irritation thereby occasioned, may have the effect of keeping up a constant and exhausting hæmorrhage. In a case of abortion to which I was recently called, the practitioner in attendance stated the fœtus to have come away two or three days previously. Upon enquiring as to the discharge of the appendages, I was led to recommend an examination *per vaginam*; when they were found lodged partly in the vagina and os uteri. After their removal the patient rapidly recovered.

20. DIAGNOSIS. The diagnosis of abortion should be directed to three objects: 1st, its cause; 2dly, to the possibility of preventing its occurrence; and 3dly, to ascertaining the stage or developement of the process. The causes of abortion are generally readily recognised, and admit of an easy explanation. There are two, however, to which Professor DESORMEAUX has particularly directed attention; namely, rigidity of the fibres of the fundus and body of the uterus, and laxity of its neck. The former of those is generally connected with a similar state of the whole system, and accompanied with scanty or painful menstruation. In the first impregnations abortion takes place at an early period; but in subsequent impregnations the period of gestation approaches more nearly the natural epoch, the female at last bearing children to the full time.

When the abortion is referable chiefly to laxity of the neck of the uterus, a result contrary to the foregoing takes place; the period of abortion approaching nearer, in successive conceptions, to the time of impregnation. Examination per vaginam discloses this state of the cervix uteri, which sometimes permits the escape of the ovum without much pain. The presumed existence of either of the foregoing states, particularly if any of the symptoms enumerated as characterising abortion be present, should lead us to suspect its approaching occurrence. And it may be considered as commenced if pains occur at regular intervals, which become of shorter duration, and are directed from the umbilicus to the os coccygis; if the os uteri dilates, if the membranes become prominent during the pains, and if the amniotic fluid escape. M. DESORMEAUX, however, has detailed instances where, notwithstanding the above phenomena, the patient was not delivered for several weeks afterwards; but these are extremely rare.

21. In cases where more than one child is contained in the uterus, or where this organ is double, one of the fœtuses may be expelled in the course of gestation, and the other may still remain and arrive at the full period of fœtal life. The eminent author whom I have now quoted mentions the case of a female, pregnant for the first time at the age of forty years, who experienced abortion at two months and a half: the symptoms of pregnancy, however, continued, and the motions of the fœtus were felt at the usual time. At the seventh month, a severe fright was immediately followed by symptoms indicating the death of the child; however, the motions of the child were still felt in the uterus: at last, after two months, and at the usual period of gestation, this female was delivered of a dead child, and of another which had arrived at the full period, and was living and healthy. M. ROUSSET has also related a similar case (*Traité de l'Hystérotokie*). When abortion occurs during the first two months, we can often only distinguish it from excessive menstruation by the coagulating of the blood. Cases, however, sometimes are met with where coagula form during menstruation, but seldom or never during healthy menstruation. Abortion is most frequent during the three first months of pregnancy.

22. PROGNOSIS. Abortion has been considered of more serious import than delivery at the full time, by HIPPOCRATES, ÆTIUS, MAURICEAU, and others. The prognosis will, however, entirely depend upon the nature of the causes producing abortion; the period of gestation at which it takes place; and the symptoms accompanying it. It may be stated generally, that the danger increases in proportion as it approaches the full period of gestation; inasmuch as the hæmorrhage is greater, the expulsion of the fœtus and appendages more difficult, and the milk-fever more violent, the longer the period of utero-gestation. The abortion which occurs from accidental, or active exciting causes, is generally more dangerous than that which follows the predisposing causes; this is more particularly the case, the more violent the cause, the more prompt its effects, and when it acts upon females not predisposed to abortion. The most dangerous abortions are those which are procured by substances of an irritating nature taking internally, and by attempts to excite the uterus, or to puncture the membranes per vaginam.

23. On the other hand, when abortion takes place spontaneously, and without any very manifest or sufficient cause, it is often unattended by pain or difficulty, leaving behind it scarcely any unpleasant consequences: but this form of abortion is most liable to recur; and its repeated occurrence often gives origin to a number of ailments, some of them of serious moment, such as irregular menstruation, chronic metritis, organic lesions of the uterus and ovaria, irritable uterus, hysteria, and a debilitated and cachectic habit of body.

24. Abortion is chiefly dangerous from the *hæmorrhage* attending it; and hence the risk is proportionate to the extent of this effusion. Abortion, accompanied by convulsions, diarrhœa, dysentery, or supervening in the course of fevers, inflammations, or of eruptive diseases, are seldom devoid of danger, which, under certain circumstances, is even great. Inflammation of the womb of great severity, endangering the life of the patient, or causing adhesions of the Fallopian tubes or of the ovaria to the serous surface of the uterus, and consequent sterility, is not an unfrequent consequence of abortion.

25. On the other hand, it may be productive of certain advantages, according to MAURICEAU, DESORMEAUX, and some others, who have, in rare cases, observed abortion occurring before the third month to be followed by a more regular state of the catamenia, in those who had been irregular previously, and by an improved state of health; even fecundity taking the place of former sterility.

26. TREATMENT. The treatment of abortion is divided into, 1st, the preservative; 2d, the palliative; and, 3d, the remedial. On each of these I shall offer a few remarks.

I. The *Preservative* treatment comprises the following objects; viz. to remove the predisposing causes as far as this may be accomplished; to repress all undue action whenever it may appear; and to prevent, as well as to counteract, the effects of the exciting causes. These ends are to be kept in view, and applied to individual cases, appropriately to the causes and circumstances by which they are characterised. Where plethora, general or local, exists, it should be reduced by general or local depletion, in very moderate quantity, and repeated at short intervals; but more preferably by a low and antiphlogistic diet and regimen, acidulous and cooling beverages, the recumbent posture, and tranquillity of mind. In cases characterised by relaxation of the system, and of the reproductive organs, an opposite, or a tonic and invigorating, regimen is required. In every instance the preservative treatment must be based upon our views respecting the pathological state of the uterus, and of the whole frame at the time of prescribing it.

27. When the horizontal posture is considered necessary, the patient will be more benefited by reclining on a mattress, than on a soft, hot bed. Her apartment should be cheerful, large, and airy; the bed-clothes light; and all anxiety of mind respecting the issue, and depression of spirits, prevented; a confiding and cheerful state of feeling will materially conduce to a favourable result.

The *diet*, under ordinary circumstances, ought to be light and digestible, and varied according to the particular circumstances of the case. The *beverage* should be mild, and, in cases of local or general plethora or excitement, rather cooling than otherwise, and such as may promote, rather than retard, the natural actions of the bowels. Lemonade, imperial, barley-water, toast-water, &c., are amongst the best in this class of cases.

28. Much will depend upon the perseverance with which this plan may be followed, particularly in cases of habitual or precedent abortions; where it ought to be rigorously enforced and continued for months, or, at least, for a long time after the period of gestation at which the former abortion occurred. If the threatened abortion be accompanied with pains, or by any degree of discharge, an opiate should be given at bed-time; and, in every case where we have conceived it requisite to abstract blood, either generally or locally, even as a preventive measure, the operation should be followed by a dose of opium.

29. Attention to the bowels is indispensable; but great discrimination is necessary in the choice of laxatives when the bowels are constipated. These should be of the most cooling and gentle description. The soluble tartar, and cream of tartar in the form of electuary, or with confection of senna, particularly in cases of plethora, are very eligible. Castor oil, with a very few drops of laudanum, which will not retard its operation; or small doses of the super-sulphate of potash, are also suitable laxatives.

30. When, from our knowledge of the state of the ovum, in previous abortion, we suspect a repetition of it, we may endeavour to prevent it, by using those means which are most successful in imparting energy to the constitution, and, through it, to the generative functions; so that the process of fœtation may proceed to a successful issue. This is, perhaps, best accomplished by change of air; the use of the tonic mineral waters, both internally and in the form of baths; by the mineral acids given in the infusions of bitter tonics, or with the solutions of the salts of iron: as the tinct. ferri muriatis; the tinctura ferri ætherea (see *Appendix*); by the sulphate of zinc, with the compound infusion of roses; by the exhibition of the various balsamic and terebinthinate medicines, combined with the pulvis cinchonæ, or the pulvis rhei, and the subcarbonate of the alkalies, or magnesia; and by attention to the state of the bowels, to diet, and gentle but regular exercise. The balsams most serviceable in cases of this description, as well as in all those characterised by weak and imperfect uterine function, are the balsams of Peru, of Canada, of Chio, and of Copaiba; the terebinthina vulgaris, and T. Veneta. SIEBOLD recommends the balsamum vitæ Hoffmanni (F. 317.), a medicine which enjoys great reputation on the Continent in many diseases of debility. The loins may be rubbed night and morning, for some time, with the linimentum saponis et camphoræ comp. (F. 306.), the linimentum terebinthinæ compositum (F. 311.), or the liniment. anodynum (F. 298.). The application of the emplastrum cumini, the emplastrum picis compositum, or the emplastrum roborans (F. 118.), to the loins will also prove of service.

31. When diarrhœa occurs during the period of utero-gestation, and more especially if it be accompanied with tenesmus, in delicate females, or in those who have experienced previous abortions, it should be immediately checked or lessened. In these cases disorder is chiefly confined to the colon and rectum, which should be soothed by small emollient and anodyne enemata, or by the use of suppositories of lead plaster, and opium. Whilst, however, we thus prevent the irritation from being extended from the large bowels to the uterus, we should take care to prevent the retention of hardened fæces in the cells of the colon, by which irritation will be perpetuated; and to remove them, when we suspect their presence, by the use of gentle laxatives, and emollient and aperient injections, avoiding the use of saline purgatives and cathartics.

32. In cases of threatened abortion in debilitated constitutions, the mineral acids, particularly the sulphuric, either with or without small doses of laudanum, or combined with small doses of colchicum, or of digitalis, are extremely useful. Where the circumstances of the case permit the horizontal posture to be dispensed with, the patient may be allowed very gentle exercise, for short periods, in the open air, avoiding all exertion and local excitement. She should live abstemiously, yet not too low. In many cases of this description a glass or two of light wine may be allowed daily, and in several a still more tonic treatment is required. When this is the case, the infusion of calumba, or of quassia, with the carbonate of soda and tincture of hyoscyamus, has seemed to me very serviceable; and the patient has been allowed the occasional use of the swing, or a gentle ride in a carriage. The tepid and cold hip-bath, particularly with sea-water, are often of use in cases of this description, as well as the treatment recommended in a preceding paragraph. The necessity of abstaining from sexual intercourse, in all cases of threatened abortion, is most evident.

33. In cases accompanied with incipient discharge, either the cold hip-bath, or sponging the hips, thighs, and lower parts of the trunk with cold water and vinegar; or by squeezing a large sponge filled with cold water, so that its contents may fall in a scattered stream from some height upon the hips and pelvis; will sometimes be serviceable. Injections of cold or iced water, or cold astringent solutions per vaginam, or a lavement of cold water, will sometimes arrest the accession of hæmorrhage.

34. It will occasionally be observed that weak, nervous, and delicate females are often irritable and dispirited from a tedious confinement, during gestation, and even abort owing to this cause; obviously, in many cases, from the effect produced upon the uterus, and upon the nutrition and health of the embryo. This should be anticipated, and prevented by a timely relaxation of the plan, and by allowing the patient as much exercise, amusement, &c., and by adopting as much of the treatment recommended above (§ 32.), as may be consistent with the accomplishment of our end. When, in these cases, the nervous symptoms predominate, the use of antispasmodics, with anodynes, and their combination with vegetable bitters, chalybeates, &c., are often required. The diet should also be nutritious, but easy of digestion, and not too heating and stimulating.

35. The foregoing plan will often succeed in

preserving the infant, unless the discharge continues or becomes more copious; the uterine pains, with the other symptoms of commencing abortion, still persist or increase; and the woman be advanced in pregnancy; when little advantage will be obtained, particularly if the orifice of the womb dilate. When this is the case, attempts at preservation will entirely fail, and we must adopt the second intention.

36. II. The *palliative* measures now required consist, in addition to those recommended (§ 33.), of cold applications to the genital fissure and insides of the thighs, and the *tampon*, or plug, as recommended by a number of authors, and sanctioned by Denman, Hamilton, Burns, Merriman, Dewees, Ryan, &c. These are especially requisite where the hæmorrhage is great, particularly when the abortion takes place between the third and sixth month. Opium, with the superacetate of lead, given in a very large dose at the first, and repeated according to circumstances, should also be exhibited. Opium, as well as plugging the vagina, are chiefly serviceable where the hæmorrhage continues after the expulsion of the embryo. The plug recommended by Dr. Dewees is a sponge squeezed out of vinegar. Dr. Ryan advises either old linen or a sponge to be wetted with a saturated solution of alum, and smeared with some oleaginous matter, to be passed up the vagina, so as completely to fill it. Dr. Blundell directs a scruple of alum, dissolved in a pint of water, to be injected into the uterine cavity.

37. The practitioner should in every instance be satisfied as to the expulsion of the embryo and the whole of its appendages, for he may be deceived in this matter (§ 19.); a small remnant of the placenta or of the membranes, when still left in the cavity of the uterus, or even lodged in its orifice, being often sufficient to keep up an exhausting, or even dangerous discharge. When the embryo only is expelled, the appendages being still retained, or when the hæmorrhage is great, the entire ovum still remaining in the uterus, the ergot of rye will often prove of inestimable service: and when given in the form of decoction, with as much borax as it will dissolve, will seldom disappoint our expectations. When a portion of the appendages remain at the orifice of the womb, it may be drawn down by the finger, or by a curved dressing forceps. In cases of great hæmorrhage in the early months of pregnancy, the ovum being retained, Dr. Burns advises the use of smart clysters, and plugging the vagina. In every case of hæmorrhage from abortion, as well as after delivery at the full period, but particularly when the hæmorrhage proceeds from inefficient contraction of the uterus and retention of the ovum, or some portion of the appendages of the embryo, I have prescribed, with complete success, an enema, with from one to two ounces of the oleum terebinthinæ in a pint of water-gruel.

38. The injection of water into the rectum, or a solution of acetate of lead and opium, has been advised by Dr. Dewees and Dr. Conquest. When the hæmorrhage occurs in robust and plethoric females, and the discharge has not produced much exhaustion, venæsection may be tried. In cases of this description, digitalis, in half-drachm doses, has been recommended: but, owing to the loss of blood, the effect, although not produced with the necessary celerity, will often be too violent and unmanageable, and will so endanger the patient as not to justify its use unless under very peculiar circumstances. I once prescribed colchicum in large doses in a case of hæmoptysis, with violent paroxysms of cough and threatened abortion, occurring in a plethoric lady at the fourth month of pregnancy. Full venæsection was performed, chiefly on account of the severity of the pulmonary disease; the colchicum was directed with an anodyne; and the patient left under the care of the family practitioner. Abortion took place, and was attributed chiefly to the sickness, retching, and depression occasioned by the colchicum; it having been unremittingly administered until my next visit, on the third day from that on which it had been prescribed, notwithstanding the discretionary power with which the practitioner had been invested. (See also, on this subject, the *Treatment* of Hæmorrhage from the Uterus.)

39. III. The *remedial treatment* of abortions is next to be considered. It occasionally happens that the retention of the ovum, or of a portion of the appendages of the embryo, produces much constitutional disturbance, particularly nervous symptoms and irritative fever, which sometimes assume serious features, with disorder of the bowels, typhoid or ataxic signs, and an offensive vaginal discharge. The decoction of cinchona and muriatic acid, or this decoction with the liquor of the acetate of ammonia, or the following, will prove extremely serviceable:—

No. 1. ℞ Mist. Camphoræ ℥j.; Liq. Ammon. Acet. ʒijss.; Acidi Acetici Pyrolignei ♏xxv.; Syrup. Zingiberis. ʒss. M. Fiat haustus ter quaterve in die sumendus.

No. 2. ℞ Camphoræ rasæ, gr. ij.—iij.; Extr. Cinchon. Resin. gr. iij.—v.; Conserv. Ros. q. s. ut fiant Pilulæ ij., ter die capiendæ.

In cases of this description a turpentine enema, administered every second or third day, is extremely beneficial: and advantage will be derived from injections of a solution of the chloruret of lime, or of Labarraque's liquor, *per vaginam*.

No. 3. ℞ Liq. Labarraquii Chloro-Sod. ℥jss.; Mist. Camphoræ, ℥vijss. M. Fiat injectio.

40. When troublesome diarrhœa is present, in cases of this description, the chloruret of lime, either in the form of pill or solution, is extremely efficacious. I have prescribed it as follows:—

No. 4. ℞ Chlorureti Calcis gr. viij.—xvij.; Pulv. Tragacanth. Comp. ʒjss.; Syrup. q. s. M. Fiant Pilulæ xxiv., quarum capiat binas ter quaterve in die.

No. 5. ℞ Chlorureti Calcis gr. vj.—xij.; Tinct. Calumbæ ʒiij.; Aq. Menth. Virid., vel Aq. Carui, vel Aq. Anethi, ℥vj.—℥vijss. Fiat Mist., cujus sumat coch. j. vel ij. larga ter quaterve quotidiè.

The chloruret of lime may also be administered in water gruel, as an enema, in doses of viij. to xij. grains, once or twice daily.

41. The debility occasioned by abortions require the use of tonics, with mineral acids, nourishing but light diet, a wholesome air, gentle exercise, and the tepid or cold salt-water bath:— the mineral waters of Bath, Barèges, or Tunbridge; those of Ems, Spa, Pyrmont, and Geilnau; or the artificial mineral waters of the last-named places, are also beneficial. When nervous or hysterical symptoms supervene, the exhibition of antispasmodics, with gentle tonics, and the occasional use of cooling aperients, are required. The treatment of the effects of abortion is, in every respect, the same as that recommended in

the articles on *Hæmorrhage* from the *Uterus*, in the unimpregnated and puerperal states.

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ABSCESS. SYN. *Abscessus* (from *abscedere*, to depart, to separate), *Apostema*, *Abscessio*, *Vomica*, *Imposthuma*, Auct. Lat. *Αποστημα*, Gr. *Abcès*, Fr. *Die Eiterbeule*, Ger. *Edderbyld*, Dan. *Bulning*, Swed. *Ettergezwel*, Dut. *Ascesso*, Ital. *Abscesso*, Span. *Abscesso*, Port. *Abscess*, *Imposthume*, Eng.

CLASSIF. — See INFLAMMATION.

1. DEFIN. *A collection of purulent matter formed or deposited in the structure of an organ or part.*

2. An abscess is never an original disease, but is constantly the effect or termination of inflammatory action, in some form or grade, or of irritation of the part in which it is seated. This may not seem to be in accordance with certain phenomena connected with the formation of purulent collections, in parts at a distance from those in which inflammatory action originates, and where pus is originally formed: but I shall have occasion to show that it is not opposed to sound views as to this topic, or, at least, that the exceptions to it are few.

3. Without noticing further than to enumerate them, the older distinctions of abscesses into the warm, phlegmonous, or inflammatory, the cold or congestive, and the acute and the chronic, I shall have to show that, instead of proceeding from different sources, they are equally the result of a certain state of inflammatory action, modified into a variety of forms according to the degrees of vital energy and action of the part, and of the system generally, the organisation of the part affected, and the peculiarity of constitution and diathesis. In the present article, a general view will be taken of the *pathology* and *medical treatment* of abscess, the consideration of the different kinds of abscess; their various seats, and relations to other diseases, fall under different heads, where they are more advantageously discussed.

4. I. OF THE PATHOLOGICAL CHARACTERS OF ABSCESS. 1st, *Of abscess proceeding from acute inflammation, with integrity of the constitutional energy.* When a part becomes inflamed, the vitality of which has not been previously injured, as respects either its individual state or constitutional relations, its temperature becomes increased, and its vessels are injected with a greater quantity of the circulating fluid than in health, and generally in proportion to the violence of the irritation upon which this afflux of fluid depends. At first the fluid does not extend beyond the vessels in which it has passed: but, in proportion as it distends them so as to exhaust their tone and power of reaction, and as the vital cohesion of their extremities, and of the tissues which they supply, is weakened, a portion of the more fluid constituents of their contents escapes into the texture of the part affected; infiltrates, and combines with, its constituent elements; and renders it, at first, more compact and dense. But, at the same time that the inflamed part undergoes this change, it loses its vital elasticity, is more friable or lacerable, so as to break down more readily from foreign pressure, or upon the application of a firm ligature.

5. If the inflammatory action stops not here, the tissues affected by it undergo further changes. They pass, more or less rapidly, from a dense but friable state to that of softening; and this quickly but insensibly assumes a pulpy condition, owing to its continued and increasing infiltration with the more fluid parts of the blood, and even with more or less of its colouring particles; the molecules composing the tissues of the part being so combined with, and separated by, the infiltrated fluid, that all distinct traces of proper organisation are lost. From this pulpy state, to which the central portion of the inflamed structure is reduced, the transition to pus proceeds rapidly. But it is not to be understood that the tissues themselves are converted into this fluid. The fluid poured out from the extreme capillaries gradually distends the surrounding parts, and partially dissolves the softened and disorganised tissues in which it is effused. The coagulable lymph, which the tonic or unexhaused vital energy of the adjoining vessels form in the surrounding texture, confines the effused fluid, and prevents it from extending beyond the barrier it opposes; whilst the impaction of the cellular tissue, occasioned by the increasing quantity of purulent effusion, and the pressure it produces in all directions, with the thickening, and the continued deposition of lymph in the parietes of the abscess, tend still further to fulfil this end, and thus to limit the mischief, and to prevent the contamination and disorganisation of the adjoining structures; consequences which not unfrequently supervene, when the vital energies of the frame and the state of local action are insufficient to admit of the formation of coagulable lymph, and to throw up this barrier against the extension of disease.

6. The first step of the suppurative process is the dissemination, particularly in the softest, in the first and most intensely inflamed part, of minute collections of a sero-albuminous or sero-sanguineous matter. By degrees, this fluid becomes more abundant. These minute collections enlarge, approach each other, and, at last, the partitions of softened tissue between them are altogether disorganised and disappear; the whole, at last, forming only one cavity of variable extent. As this process advances, the effused fluid changes from a thin albuminous lymph into pus; which becomes more thoroughly elaborated, losing its colouring matter which it had derived from the blood, and dissolving the shreds or *débris* of the disorganised tissues in which it had formed: and when the suppurative process is matured, the pus forms an homogeneous fluid, presenting certain characters distinguishing it from all other animal fluids.

7. *Pus*, taken from a matured abscess of the description now exhibited, is generally a whitish or cream-like fluid; friable, homogeneous, soft, and smooth to the touch; somewhat heavier than water, in which it is only partially soluble; without any disagreeable smell, and producing of itself no irritating effects upon the tissues enclosing it as long as it is excluded from the action of the atmosphere. Upon a closer examination, it is found to consist of minute colourless globules, resembling the colourless globules found in the blood, floating in a thin albuminous fluid.

8. It is often a matter of importance to distinguish *pus* from the *mucus* secreted by a mucous membrane in a state of irritation; and, accordingly, various attempts have been made to establish some specific character. The circumstance of pus sinking in and partially mixing with water, whilst mucus remains at its surface, has been taken as a common test; and in many cases will be sufficient, with the history of the disease, and various concomitant phenomena, to enable us to decide: but it should be recollected that the mucus, which is frequently secreted in great abundance by the internal surface of the bladder, and which is very remote from pus in its characters, always sinks in water. Besides, mucous surfaces, when in a state of inflammation, secrete a fluid varying from a thin watery or frothy matter; and in some cases, from a thick albuminous and viscous mucus to a friable cream-like pus: but most commonly, a muco-purulent liquid, which presents more or less of the characters of both pus and mucus. The appearance exhibited by pus, when pressed between two plates of glass, which are afterwards separated, is often distinctive: this fluid attaching itself to their surfaces, without the viscous adhesion of mucus, and partly consisting of small globules. The viscous elasticity of mucus, of which character pus is entirely deprived, distinguishes the one from the other more completely, and in a more intelligible manner, to the practised eye, than any other feature they present. In addition, however, to this, it may be added that, when water is added to a solution of pus in dilute sulphuric acid, a more or less abundant precipitate is formed; whilst, with a solution of mucus in the same acid, whitish filaments form on the surface upon the addition of water.

9. As the partitions of softened tissue placed between the incipient purulent collections, in a part undergoing the early process of suppuration, lose their vitality, and become broken down in the effused fluid, the vessels and nerves, as well as the more solid tissues passing through the part, continue to resist the disorganising process for a longer period, so as to form isolated bridles, and communications between the separated parietes of the abscess.

10. The interior of the *parietes* of the cavity is generally more or less reddened, tomentous, and very close in its texture, owing to the impaction or distending power exercised by the accumulated fluid and the effusion of lymph; so that the fluid contained by them is completely isolated from the surrounding structures. The *membrane* thus formed presents all the characters of a mucous surface, particularly when the greyish pellicle which usually covers it is removed. Its interior surface is in contact with the purulent collection; whilst, externally, it adheres intimately to the surrounding tissues, and is confounded insensibly with them. It approaches more nearly to the circumference of the inflamed part, the more complete the softening of the tissues, and the more the abscess has advanced to maturity. Its density and thickness are generally in proportion to the slowness of its formation and the length of time it has existed.

11. In parts abundantly supplied with cellular tissue, the membrane proper to abscesses acquires a great degree of resistance and density, forming thick *cysts*; whilst in very soft organs, or in those but scantily provided with cellular tissue, as in the brain, it remains long in the state of a vascular pellicle, scarcely distinct from the healthy structure with which it is connected. It is in general rare that we find a thick or firm cyst in the acute abscess now under consideration; for it forms too rapidly to admit of the thickening and condensation usually occasioned by inflammatory action of some duration. In some very acute abscesses, as in those which sometimes form in the liver of Europeans residing in India, after intense inflammation of the internal structure of the organ, no cyst, membrane, or even pellicle can be detected on the internal parietes of the abscess; the whole surrounding structure being inflamed, softened, and sometimes portions of it hanging or floating in shreds in the midst of the purulent collection. In these cases the purulent collection, although existing as a circumscribed abscess, more nearly approaches the diffused abscess next to be noticed.

12. The functions of the membrane lining abscesses are not confined to the containing and isolating the purulent matter, so as to prevent the contamination of the adjoining structures. Owing to the absorption and exhalation proceeding in its surface, the contained fluid is continually renewed, its qualities are modified, and its decomposition prevented. It is not altogether removed from the influence of life, but participates in the vitality of the surrounding textures, as all fluids accumulated in organised parts do, though in a feeble and obscure degree. M. Dupuytren remarks, that it is through the medium of this living envelope that the matter contained in abscesses is augmented and diminished in quantity; is thickened, or rendered more fluid; or is occasionally changed by substances absorbed or injected into the circulation. It is because the cysts of abscesses are connected by an intimate sympathy with the chief centres of vitality that the excitation of the more important viscera affects them in so marked a manner; and that remedies, judiciously applied to these viscera, often tend to promote the absorption of the matter they contain.

13. 2d. *Of Abscesses proceeding from acute inflammation in a cachectic habit of body, deficient vital resistance, and with a tendency to spread; or Diffuse Abscess.* In debilitated and vitiated habits of body; in persons of exhausted vital energy, whose assimilating and secreting organs are torpid; and owing to the operation of certain noxious and intense causes, particularly those which contaminate the structure to which they are applied, as various animal poisons, animal and vegetable matter in a state of decomposition, or whatever produces, from its local or constitutional action, a septic effect upon the living textures: from these circumstances especially, inflammatory action is

not limited to a particular part, or within distinct bounds; and the fluid which is poured out from the inflamed vessels is not circumscribed, or confined to the centre of the inflamed part. The inflammation which produces this unhealthy and imperfect form of abscess is always characterised by that state of asthenic or ataxic action, local and general, which is incapable of producing coagulable lymph from the blood, that may limit both the morbid action and the effused fluid. (See art. INFLAMMATION.)

14. The present kind of abscess not unfrequently forms in erysipelas; or after wounds, injuries, and punctures; and from the inoculation of an animal poison. The character of the succession of morbid actions it presents is want of vital power and resistance, and a speedy solution of the vital cohesion of the affected tissues. It would seem that the influence of the ganglial nerves supplying the capillaries of the part is rapidly, or almost instantly, destroyed by the cause of the disease; and that the vessels, thus deprived of a great proportion or the whole of their vitality, allow the escape of the more fluid parts of the blood, and the infiltration of the tissues. The vessels pass rapidly, and without the previous grades of healthy inflammation, into that state which admits of the effusion of a watery or puriform sanies. The state of vital energy, and the deficient crasis, or unhealthy condition of the blood itself, probably contributes to this result; and, with the effect of this effusion on the diseased part, promotes the rapid exhaustion of the remaining action of the capillaries.

15. Diffusive abscesses generally commence in, and spread rapidly in the direction of, the cellular tissue. They affect also, in a very marked manner, the other structures placed in their way. They seldom commence in the internal viscera, as the liver, lungs, &c.; but when they do thus originate, as is occasionally observed in the latter stages of malignant or ataxic fevers, in exhausted states of the frame, &c., they nearly approach the characters they assume in the cellular structure. In almost every case of this disease, the constitutional disturbance is very remarkable; and the powers of the nervous system, particularly that presiding over the organic and assimilating functions, uncommonly depressed. Locally, the effusion of a watery, or sero-albuminous, or a sero-sanguineous fluid is nearly coeval with the affection of the cellular tissue and congestion of its capillaries. The vital cohesion of the inflamed texture is rapidly dissolved; and the fluid, abundantly poured out in its areolæ or cellules, distends the part, diminishes its vital functions to the lowest grade, and, at points, lacerates its tissue, thereby partially cutting off its connection with the adjoining structures. Thus the fluid is effused from the congested capillaries of the affected part in numerous places: in some, forming considerable collections; in others, mere infiltrations. Parts of the cellular tissue itself, and, in rare instances, as the mischief proceeds, portions of adjoining or intermediate textures, are deprived of all vitality, sphacelate, and mix with the fluid effused.

16. In many cases the integuments participate but imperfectly, and often not at all, in the morbid actions, whilst the process, as now described, is going forward; and the great effusion into, and partial destruction of, the cellular tissue, have enormously distended the limb or part in a diffused manner and to a great extent, and given it a boggy or imperfectly fluctuating character. At a later period, parts of the more attenuated or discoloured integuments vesicate, ultimately burst, and give issue at first to a discoloured puriform secretion, which afterwards becomes offensive and otherwise modified. When the skin is affected, it generally presents a dark or livid hue: its temperature is seldom above (excepting, sometimes, at the very commencement of the antecedent inflammation), and frequently sinks below, the natural standard.

17. With respect to the appearance of the secretion in this form of abscess, I may state, that it not only varies remarkably in different cases, but also at different stages of the same case. At first, the fluid effused and infiltrating the cellular structure consists chiefly of a limpid, reddened serum, which readily flows from the divided structures; in a more advanced stage, the effused matter is less fluid, often high-coloured, but without the whiteness and opacity of purulent matter. Afterwards, the cellular membrane is engorged with a white semi-fluid matter, which separates the particles of fat and cellular tissue at an unusual distance from each other. In subsequent stages it continues opaque; but often becomes reddish, greenish, and more fluid. At a still more advanced period, the infiltrated cellular and adipose tissue are entirely broken down, and the sphacelated portions hanging into, or mixed with, the puriform matter; which sometimes now presents the appearance of a brownish, purulent sanies, sometimes a greenish pus, and at other times a sero-purulent matter of various shades of colour and degrees of consistence. At no period of the disease is the matter contained in any circumscribed cavity, but is gradually and irregularly lost in the surrounding cellular tissue; without any demarcation, or appearance of coagulable lymph about the circumference of the diseased part. In general, the purulent secretion speedily assumes an offensive odour, and its sensible qualities are otherwise altered, and often variously, upon the admission of air to the diseased surface.

18. The muscular structure, and other parts in contact with the puriform matter, and in the way of the spreading disease, is generally much discoloured, softened, easily torn, and sometimes partially destroyed. In some cases the muscles are paler; in others, darker, and more livid than natural. In rarer instances, the adjoining bones and more resistant structures are also affected. (See INFLAMMATION, *Diffusive*.)

19. 3d. *Abscesses consequent upon inflammation of lower grades of intensity.* — The more slow and obscure the progress of inflammation, the less marked are the signs of irritation preceding and accompanying abscesses. It is not uncommon to observe, in lymphatic and phlegmatic temperaments, fluctuating tumours of various sizes, both superficial and deep-seated; without any considerable pain or increase of animal heat, either antecedent or subsequent to their formation. Purulent collections, of a chronic and indolent character, generally proceed from a low but continued state of irritation, or from reiterated excitation of so low a grade as scarcely to influence the sensibility of the part; and occur in constitutions of weak vital

resistance and defective restorative energy. On the other hand, the abscesses described in the preceding sections result from inflammation of a more or less acute character, occasioned by active stimulation or deleterious agents, and generally affect the system in a more or less active manner.

20. Owing to the low grade of irritation in the affected part, the vessels are but little, and often scarcely perceptibly, injected. The abscess, in place of commencing with a number of distinct centres or foci, appears at first as a single isolated collection in one or more of the cellular areolæ, and presenting, from the commencement, a manifest fluctuation. In some cases, this appearance of the affected part is less that of true phlogosis than of a deviation from its nutritive actions. The tissues, instead of attracting, in virtue of their vital endowment, the nutritive particles; and the vessels, instead of imparting them in an appropriate condition, and exhaling a fluid suitable to the healthy state of parts, are so far changed as to fail in the performance of these actions; the vessels furnishing a fluid of a certain kind, apparently composed of the particles or globules which, under the influence of healthy vital endowment, would have been separated from the circulating fluid for the nourishment or growth of the tissues, and of the watery exhalation destined to lubricate them, and render them fitted for their functions.

21. In the chronic varieties of abscess, the *pus*, being secreted under the influence of a lower grade of excitation, differs from that previously described (§ 7, 8.). It is frequently yellowish, serous, transparent; containing flocculi of an albuminous or fibrinous nature, and whitish, opaque appearance: sometimes it is mixed with minute shreds of cellular-like substances. In other cases it is nearly analogous to mucus, from its thickness and viscosity. In some subjects, when very slow in its formation, it assumes a greater consistence and opacity, resembling half-congealed lard or liquid honey; and the tumours which it forms seem to constitute a connecting chain between pure abscesses and melicerous or steatomatous cysts. These latter differ in no respects from abscesses devoid of active inflammation, but in the greater consistence of the matter they contain: and in some cases, as M. DUPUYTREN remarks, it is difficult, if not impossible, to distinguish between them.

22. Owing to the extreme slowness of their formation, and the absence of acute inflammatory action, the *parietes* of the present kind of abscess have a more distinct organisation than those of the first species. Vascular injection and redness are here seldom observed exteriorly to the *cyst* enclosing the purulent collection. The skin covering the tumour, and through which the fluctuation is readily felt, is generally free, moveable, and unaltered. All the morbid action seems concentrated in the diseased membrane enclosing the matter. This membrane or cyst is, internally, of a reddish grey tint, and more or less intimately connected with the surrounding structure. It is in some cases soft, thin, and cellular; in others, thick, strong, and of a cellulo-fibrous, or even fibrous structure. The slower the tumour is in enlarging, the more liable is the cyst to undergo change, and to modify the state of the matter it contains: and, hence, abscesses of a very slow or chronic kind often approach slowly but nearly to the characters of several other encysted tumours.

23. The purulent collections which form around foreign bodies, that occasion but little irritation, generally belong to the present kind of abscesses. They are always lined with a firm cellular cyst, analogous to that enclosing the foreign body itself. The abscesses which proceed from bodies occasioning great irritation are preceded by great pain and inflammation, and belong to the preceding kind of abscess.

24. 4th. *Of symptomatic abscesses, or collections of matter at a distance from the places where the pus is first formed.* In the foregoing sections I have considered the formation of abscesses in, and their limitation to, the primary seat of irritation: but if the parts affected are surrounded by a loose areolar cellular tissue, readily permeable by the matter as it is formed; and especially if the state of vascular action and vital energy of the frame are insufficient tot he production of coagulable lymph around the inflamed centre; the matter gradually finds its way in the course of the cellular structure to adjoining parts, particularly to those which are more dependent, infiltrates them, and forms, more or less distinct and fluctuating, tumours at a distance from the primary seat of inflammation. Instances of this kind of abscess are furnished us in diseases of the hip-joint, and in cases of inflammation commencing in some or one of the vertebræ, or their fibro-cartilages. In this latter case, if the disease commences in one of the dorsal vertebræ, the purulent fluid may accumulate under the pleura, infiltrate the adjoining cellular tissue, and, following the direction of the ribs, appear at some part of the side or back, or even near the sternum, far from its origin. When the inflammation attacks one of the dorsal or lumbar vertebræ, or intervertebral structures, it may travel in a similar manner behind the pillars of the diaphragm, proceed in the course of the psoæ and iliac muscles, following the cellular tissue behind the peritoneum, and appear exteriorly, most frequently under the crural arch, but sometimes through the inguinal ring. In other cases it proceeds to a shorter distance, and points at the sacro-iliac symphysis, or in the angle between it and the spine: or it may extend down the pelvis in various directions, following the cellular substance surrounding the vessels and nerves. Thus it may pass through the ischiatic notch, forming an abscess at the internal part of the gluteal muscles; or along with the great sciatic nerve, and point on the superior and posterior part of the thigh; and, lastly, it may find an issue in the perineum, at the margin of the anus, or into the rectum, or even into the vagina. In some rare instances a double tumour and opening are formed. In the case of a female by whom I was consulted, the matter had found its way to the integuments of the sacro-spinal angle of the loins, where it was punctured by a surgeon, and yet had also burst its way into the vagina. In the case of a groom whom I attended, a tumour formed at the sacro-iliac symphysis, below the crural arch, producing the most violent and painful tumefaction of the limb, owing to the pressure of the matter on the nerves and veins; and the matter afterwards burst into the lower part of the sigmoid flexure of the colon.

25. The matter proceeding from abscesses symp-

tomatic of inflammation and ulceration of bones or cartilages is generally greyish, thin, mixed with albuminous flocculi, minute clots of blood, and portions of phosphate of lime. It exhales a nauseous odour: but this characteristic is present only after the opening of the tumour, and when the air has access to the cavity.

26. If we examine the cavities of symptomatic abscesses, and trace them from their origin to their outlet, we shall find, in the former situation, the cartilages and bones profoundly changed: the bones are softened, friable, changed to a greyish black, partially absorbed and carious, and their periosteum destroyed. From this origin of the disease is formed a channel or sinus, traversing the cellular structure frequently in the course of the large vessels or muscles, and terminating with the external outlet of the tumour. The whole of this canal or sinus is usually surrounded by a softened, friable, or lardaceous state of the textures; and lined with a smooth, thick, firm, cellular, or fibro-cellular membrane, which in some cases is of a fibro-cartilaginous structure. At the lower part, the canal generally dilates into a considerable cavity, sometimes irregular or sinuous in its form, and lined with the membrane usually found in the more chronic kinds of abscesses.

27. 4th. *Of consecutive abscesses; or collections of matter found in situations consecutively to its formation in distant parts, between which there exists no communication.* It has been not infrequently remarked, that inflammation of a part has taken place, and has gone on to suppuration; that the matter thus formed has been absorbed; and that it has subsequently formed in some other viscus, generally in an internal organ. The nature and procession of the morbid phenomena now enounced have led to some enquiry, particularly in recent times. The circumstances in which consecutive abscesses occur in practice are the following: —

Inflammation of the internal surface of the uterus, or of its veins, or of both the substance of the uterus and veins, occasionally takes place after child-birth, and terminates the life of the patient. On dissection, purulent infiltrations or distinct collections of pus are found, in one case, in the lungs; in another, in the liver; in a third, in the substance of the brain; in a fourth, in the capsules of the joints; and, in a fifth, in both the lungs, liver, and perhaps, also, in the joints. A man, from injury of the head, has inflammation of the sinuses of the brain, followed by all the symptoms of a vitiated state of the circulating fluid, terminating in death: after which, abscesses, or purulent infiltrations, are found in the liver or lungs. A similar procession of phenomena occasionally results from phlebitis consequent on blood-letting, or other causes; also during the suppurations following amputations, particularly when the matter is confined on the face of the stump, by the adhesion of the integuments which had been drawn over it. A child is seized with severe or confluent small-pox; and during, or subsequently to, the secondary fever, fluctuating tumours form in the joints from matter accumulated in their capsules. Upon dissection, the cartilages are found eroded; and, in other rare cases of this kind, purulent collections are found in the internal viscera. In other instances, abscess disappears from external parts; the patient sinks with low fever; and, upon dissection, collections of pus are found in internal organs. In cases of this description, the following require notice: — 1st, The state of the vital energies preceding or during the occurrence; 2d, The symptoms characterising the progress of the phenomena; and, 3d, The nature of the results.

28. 1st, The energies and vital resistance of the system are generally greatly impaired, either from pre-existing or concurring causes, in cases where consecutive abscesses form. (See article on *Inflammation of* VEINS.) 2d, The depression of the powers of life increases as the disease advances. The nervous system is seriously affected; the circulating fluid betrays change in its appearances after its emission, or after death; the soft solids lose their vital elasticity and cohesion; the surface of the body and countenance become dusky and livid; and low delirium, rapid and weak circulation, &c. take place. 3d, The purulent matter is generally either infiltrated into the parenchymatous structure of some organ, or collected into one or more distinct abscesses, or it is effused into the cavity of one or more joints. When the matter is infiltrated into the texture of an organ, the infiltrated structure is very frequently also softened. The purulent collections that are found in other cases generally have no distinct cyst, and the surrounding substance of the organ seldom presents any marked redness or injection of its vessels, or indeed any remarkable change, excepting in some instances a slight softening. The matter is usually found in several distinct abscesses or collections, varying from the size of a small seed to that of an egg, or even larger. Sometimes the immediately surrounding structure seems impacted around the abscess, but not otherwise changed. The purulent matter itself varies but little from that which is observed in the abscesses described in the first section. (§§ 6, 7, 8.) It is occasionally of a darker or greenish hue, particularly when found in the liver.

29. As to the *Origin* of these purulent collections, some doubts may be entertained. That they are very intimately connected with the primary inflammation and formation of matter in other parts of the system, cannot be doubted, but in what way cannot be so readily stated. It seems to me extremely probable, from the attentive observation of the progress of a number of such cases which have come before me in practice, that, owing to depressed vital energy, and deficient resistance of the frame, purulent matter passes into and vitiates the blood; that the morbid condition of the circulating fluid, thus induced, depresses still lower the already weakened nervous powers; and that the irritating matters carried into the circulating current change the state of the capillaries of parenchymatous and some other organs, so that they secrete purulent matter without any evident sign of previous or accompanying inflammation. Several French pathologists suppose that the purulent matter conveyed into the blood circulates without combining with it, and is merely deposited by the capillaries, or separated by them, from this fluid in parts; the vessels and texture of which are most disposed to permit its elimination, or the best constituted to admit of its deposition. It is difficult to determine in which of those ways the consecutive abscess is formed. Indeed, both may approximate

the truth, the consecutive formation of pus arising, in one case, from the irritation occasioned by the presence of morbid matters in the blood; and, in another, chiefly from the separation or secretion of it in the parenchyma of an organ, without any previous or attendant irritation.

30. II. **OF THE PROGRESS AND TERMINATIONS OF ABSCESSES.**—At any period of its existence, the inflammatory action in an abscess may cease, and the matter which has been formed be *absorbed*. In these cases the purulent matter is carried into the circulation; and, whether the inflammation is primarily and gradually extinguished in the abscess, or whether intense pain and inflammation, developed in some other organ, exercises on the first centre of mischief a true revulsion, the absorption of the pus is only consequent upon the subsidence of the local signs of inflammation and congestion. The part loses its turgescence, redness, increased heat, and tumefaction, and is restored to its healthy state without any deformity or cicatrix. In these cases the absorbed matter is eliminated from the circulating mass, without accumulating in it to a hurtful extent, by the active or unimpaired functions of the various eliminating organs, particularly by the kidneys, and mucuous surface of the intestinal canal, — the matter, in some cases, being apparent in the urine, and in the others exciting a temporary diarrhœa.

31. In other instances, the inflammation productive of suppuration being but slight, or being less completely dissipated, and the solid tissues, and particularly the firm and thickened cyst, opposing the extension of the abscess, it occasionally rests long stationary. In this case the pus remains inactive and inoffensive in the part, like a smooth and inert body lodged in a cyst. Abscesses will sometimes continue for a very long time unchanged, and without occasioning much disturbance to the economy, particularly when deeply seated. In such cases the cyst becomes more and more firmly constituted, thickened, and changed from the state of the surrounding parts; so that the pus is in some measure isolated from the adjoining structures: in this state it may remain, as in the brain and liver, for a considerable time, without any very marked symptoms, until some accident or exciting cause occurs to affect it and the adjoining parts, when the usual course of the disease will be resumed.

32. The foregoing changes are comparatively rare. In the great majority of cases, pus distends, compresses, and obscurely excites, the parts in which it is lodged. Instead of being diminished, the abscess is increased in size, and tends to find an external outlet, uniformly in the direction of either the cutaneous or one of the mucous surfaces. Purulent matter is thus submitted to the general law of the economy; the vital resistance, opposed to all substances calculated to excite or otherwise injure the textures, detruding it by a regular procession of phenomena, as long as the energies of the system are not entirely overwhelmed, to the nearest or most unresisting part of the surface, and at last expelling it altogether from the body.

33. The succession of morbid phenomena occasioning the deliverance of the system from collections of matter, is of great importance to the practitioner, particularly as respects deep-seated or internal abscesses. Generally the quantity of matter is continually increasing, owing either to the extension of suppuration in the inflamed part, or to a continued secretion from the internal surface of the abscess, or to the concurrent operation of both causes. In consequence of this increase of quantity, the parietes of the abscess are distended and applied more closely to the surrounding parts, which are pressed outwards by the accumulated matter. This distending power is equally exercised from the centre to the circumference. But, as all the adjoining parts do not exercise the same degree of resistance, the abscess extends in the direction of the external or free surfaces; its more deeply seated parietes being sustained by all those parts which are placed beneath them; whilst the tissues which are exterior to it, being deprived of aid, are readily elevated and distended by the increased effusion.

34. As to the nature of this effusion, and the changes it undergoes, certain questions have been urged. It has been supposed that the matter found in abscesses is not secreted in the state in which it exists at the period of maturation: but that the fluid effused is in a state which may be called albuminous serum; which, owing to the continued exhalation and absorption taking place in the internal surface of the abscess, is changed into what is called well-digested pus. Others suppose that the purulent fluid is secreted in the state of pus, or nearly approaching to it, by the membrane forming the cyst, and which, as it presents many of the characters of mucous membrane, may, like this membrane, when highly inflamed, secrete a purulent fluid. It is extremely probable that both views may be in a great measure correct: for attention to the maturative process in recent abscesses shows that the fluid first effused is not pure pus; and it is undeniably proved that the matter contained in the different kinds of abscesses is variously modified according to their duration, their situation, and the circumstances attendant on their progress. Whilst, on the other hand, it must be conceded that the internal surface of an abscess, particularly in a high state of inflammation, or when irritated by the contact of the air, will secrete a purulent fluid, or a matter which very rapidly assumes the puriform character; the vessels terminating in it giving issue not only to the watery part of the blood, but also to many of its smaller globules, so as readily to form a pure pus, which quickly becomes thick, upon the evaporation or absorption of a portion of its more fluid constituents.

35. Another important matter, relative to the progress and external pointing of abscesses, is the fact, that inflammation generally seizes upon the adjoining structures as the internal membrane is more closely applied to them. The parts most distended and stretched by the contained fluid have the inflammatory action extended to them from the parietes or membrane of the abscess. To the inflammatory irritation thus induced in the surrounding textures succeed their adhesion to the parietes of the abscess; absorption of their solid elements, with attenuation; and, lastly, ulceration, — the integuments merely often resisting for a considerable period the discharge of the fluid.

36. If we take as an example the not unfrequent occurrence of abscess in the substance of the liver, and trace its progress in one of those

directions which it sometimes follows, namely, through the diaphragm and lungs, until it empties itself into the bronchi, we shall find the following to be the course of the morbid phenomena: — As the inflammatory action and the secretion of purulent matter proceed, the abscess which has been formed, generally in cases of this kind in the convex part of the organ, advances towards the surface; the inflammatory action extends to this part; and lymph is thrown out, which, with the pressure of the swelling and pointing of the abscess, irritates the peritoneal surface of the diaphragm, inflames it at the part opposite, and occasions its agglutination at this situation to the parietes of the hepatic abscess. As the tumour points upwards, the inflammatory action advances in the same direction; extends to the muscular structure of the diaphragm, which is softened and attenuated, assuming at the same time a dark or bluish tint; and invades the diaphragmatic pleura, where it throws out coagulable lymph. This secretion occasions irritation and inflammation in the opposite part of the pulmonary pleura, and the cohesion of the lung to the diaphragm at the part where the collected matter is advancing prominently upwards. As the parts thus successively involved undergo the softening process consequent on inflammation, and yield before the pressure of the accumulated fluid, owing to their diminished vital cohesion, absorption commences and proceeds in the central or prominent part of the tumour; and the matter thus finds its way in the direction which is most yielding, where the inflammatory action most readily advances, and where the resistance to it is thereby still further diminished. I have had frequent occasion to trace the above phases of the progress of large and deep-seated abscesses; and to satisfy myself that they proceed in a similar manner, whether they advance to the external surface of the body, or open upon a mucous surface, or into a shut cavity; which last is a rare occurrence.

37. It is of importance to observe the procession of phenomena now stated; inasmuch as the successive reddening, inflammation, adhesion, softening, and absorption of the various structures, as the tumour advances exteriorly, are the guides to a very important part of the treatment of these formations. Thus, when we observe marks of inflammatory irritation of the skin take place in the situation of an internal abscess, we may infer that the ulterior phenomena now enumerated, particularly adhesion, have taken place in the parts beneath, and we may safely decide upon carrying an incision from the centre of the inflamed integuments to the seat of abscess.

38. It must not be overlooked, that various aberrations of purulent collections take place, in their progress to the surface, and that they often proceed in a direction opposite to that of gravitation, owing to the resistance of bones, fasciæ, and aponeuroses; which last oppose them in a most remarkable manner, and cause their extension in various directions, giving rise to the most severe local and constitutional sufferings.

39. Abscesses, besides, cause the inflammation of parts placed between them and the centre of the system, as respects the direction of the circulating vessels, as well as of those parts situated exteriorly to them, although in a much less degree, and followed by very different results; for, instead of the thinning, erosion, and ulceration of the exterior parts, tending to advance them to the surface, the inflammation of the parts behind, or more deeply seated than they, is frequently accompanied with thickening, and increased density of structure; whereby the system is, in a great measure, protected from their extension to more internal and vital parts. Numerous instances occur, where the periosteum or the peritoneum, the pleura, the fibrous and synovial capsules, undergo a marked thickening, opposing thereby an increased obstacle to their extension in that direction, when abscesses form in the vicinity of those membranes. When, however, the energy of the system and its vital resistance are deficient, exceptions sometimes occur to this rule, and abscesses find their way, when situated favourably to this mode of termination, into important cavities and organs. Thus, an abscess seated deep in the parietes of the chest or abdomen, may open into these cavities, as in the case of the son of the eminent M. Petit; or an abscess in the liver may find its way into the pericardium. But any disposition to its opening internally, is opposed not only by the thickening of the serous and other membranes, &c., as here instanced, but also by the support of the viscera underneath, which resist the pressure and extension of the tumour in this direction.

40. The progress and *spontaneous opening* of abscesses, advancing in the manner now explained, terminate with the erosion of the integuments, which, having been reduced to a pellicle, have their epidermis elevated in the form of a phlyctena, which soon breaks, and gives issue to a portion of the contents of the abscess; and the discharge is renewed at intervals, by the gradual retraction of the parietes of the cavity upon the re-accumulated secretion. The successive evacuations occasioned by the reaction of the parietes of the abscess, are particularly favourable in cases of large abscess, by preventing any vacuity. In cases of empyema, for instance, where the artificial opening is often fatal, a favourable result not unfrequently follows a spontaneous and successive evacuation of the purulous collection: for it is chiefly by imitating the natural process in those cases, that we secure the greatest advantages to the patient, where we find it requisite to open symptomatic abscesses, as those usually called lumbar; and not by making large incisions, and producing a large evacuation, whereby the air has access to their cavities, but by successive punctures, the margins of which are immediately closed, upon the evacuation of that part of the contents which are first expelled by the reaction of their parietes.

41. The passage of air into the cavities of abscesses is always followed by an increased state of irritation of their lining membrane. The hurtful effects of this communication have been demonstrated by M. Dupuytren, and other eminent men, although denied by others, but without either the satisfactory proofs of experience or of reasoning. In some cases the accession of inflammatory action in the part, upon the access of air, is very remarkable. In cases of small chronic abscesses this effect is often beneficial; but in large and acute abscesses the irritation thus induced may be too great for the powers of the system to withstand.

42. Under the most favourable circumstances, the effects of the admission of air into the cavity of an abscess are counteracted by the accompanying treatment; and the discharge soon assumes a different appearance from that of the matter first evacuated: it becomes less white and consistent; and, subsequently, when the parietes commence forming the adhesions which precede cicatrisation, it is merely a more or less copious citron-coloured serosity.

After the opening of slow and indolent abscesses, the serous, thin, and flocculent pus with which they are filled, is replaced by the discharge of a more digested, homogeneous, and cream-like fluid, indicating a more intense state of action in their parietes.

43. Upon examining the interior of abscesses which have been opened, it will be seen that their parietes gradually discharge themselves; that they cast off the grayish and flocculent pellicle which covers them; and that they become covered with cellular and vascular granulations, of a lively red and solid appearance, formed from coagulable lymph thrown on the inflamed surface, into which new capillary vessels shoot, and resembling the granulations on the surface of wounds, from which is exhaled the matter which succeeds to that first discharged from them. The parietes thus cleansed contract towards their centres, and in the direction of their most deeply seated parts. They afterwards unite; so that the cavity, which has been thus circumscribed, at last disappears. In the situation of the abscess nothing is found but its cicatrix; at first consisting of a cellular lamina, or plate, of various thickness and density, penetrated by coagulable lymph, and subsequently converted into a scarcely apparent cellular line, which sometimes, at last, entirely disappears.

44. But the progress of abscesses after they have been opened, is not always so favourable. It may be premised, that the irritation proceeding from the contact of air with the internal surface of an abscess is, in general, in proportion to its volume, and the unyielding state of its parietes. When the abscess is small, the resulting irritation is but faintly marked: but if the parietes be of a large extent, and if the abscess is deeply seated, particularly if it be in any of the viscera, the inflammatory excitement occasioned by the air not only increases all the local phenomena, but also gives rise to serious constitutional disturbance, often terminating the life of the patient. The yielding state of the parietes, and their apposition, are sometimes calculated to counterbalance the bad effects occasioned by their extent. When the diseased surfaces have been freed by the complete discharge of matter, and admit of being closely applied to each other, the admission of air is in a great measure prevented, and adhesions frequently proceed rapidly. Where, however, the parietes cannot be brought closely together, and the cavity can be obliterated only by means of granulations formed to an extent that may fill it, the duration of the suppuration is prolonged, and the effects produced on the constitution by the extent of the discharge are often serious.

45. But this is not all the mischief resulting from the access of air to the cavity of an abscess: the pus which still remains, particularly in deep-seated abscesses, is more or less changed by it, and exhales an infected or putrid odour, proceeding from decomposition occasioned by the temperature to which it is subjected, and its contact with atmospheric air. It is also often observed, that when large abscesses are opened, and air gains access to them, the morbid excitement thereby occasioned in their parietes, re-acts upon the principal vital centres; the nervous systems, the digestive organs, and the circulation suffering from and participating in it, and the suppurative process is thereby greatly increased; at the same time the constitutional powers are much depressed, the matter is rendered much more offensive, and otherwise changed, according to the seat of the abscess. As the powers of life sink under the disease, the fluid secreted is more offensive and disposed to decomposition, until it is often doubtful whether the change proceeds more from the access of air, than from the low state of vital energy. Indeed, in many cases, the latter cause seems much more influential towards producing this state of the discharge than the presence of air; for we not infrequently observe, that as long as the constitutional powers remain but little depressed, the access of air has but little effect, the discharge exhaling no offensive odour; but as soon as, owing either to the increase of inflammation in the cyst, or to other concurrent causes, the febrile commotion is increased, and the nervous system and digestive organs evince serious disturbance and loss of energy, the discharge becomes rapidly offensive and increased in quantity; the matter often changing from a more or less pure pus to a state approaching to putrid sanies.

46. III. Of the Diagnostic Signs of Abscess. When inflammation has attacked a cellular structure, or viscus, in which this tissue is a prominent constituent part, and particularly if it be intense in degree, rapid in its progress, and accompanied with a pulsative pain, we may with confidence decide upon suppuration being about to take place. This result is announced by a diminution of the pain, which changes to a pulsatory sensation isochronous with the pulse; by a feeling of weight and tension in the part; by a diminution of the febrile action, succeeded by a large, broad, open, soft, or undulating pulse; and by irregular chills or rigors, which extend, after various intervals, along the back, loins, and sometimes the lower extremities. If the matter is not soon afterwards evacuated, the symptoms of chronic irritation succeed; especially small and frequent pulse, heat or burning of the palms of the hands and soles of the feet; irregular fits of perspiration, and night sweats; loss of strength; and all the characteristics of hectic fever, which makes more or less rapid progress, and is sooner or later followed by colliquative diarrhœa, according to the seat and extent of the abscess, the constitutional powers of the patient, and the treatment employed. The above symptoms indicate that a permanent cause of irritation, and of constitutional contamination, has succeeded to the state of active inflammation.

47. The tumefied state which characterises sthenic or phlegmonous inflammation, is greatly modified after suppuration has advanced. It becomes less diffused, is much lessened in the circumference of the periphery of the tumour, and seems more and more concentrated. Hence it

becomes more elevated, prominent, and softened at the centre of the surface. The redness and tension undergo a similar change. The circumference of the inflamed surface is restored in some degree to the natural state; but the more prominent part acquires a dark red tint, afterwards a bluish hue, and yields more and more to the pressure of the subjacent pus. For some time previous to this stage the tumour evinces a more or less distinct fluctuation when suitably examined, and this sign becomes more manifest as the abscess advances to the surface.

48. When an abscess forms in deep-seated parts or viscera, particularly those protected by solid envelopes, or by thick and unyielding structures, the diagnosis rests entirely upon the nature of the constitutional disturbance, and the disorder in the functions of the affected organ or part, and here the physician should seize and appreciate the slightest difference taking place in the pulse, the animal heat, and the state of all the natural and organic functions. In these cases he requires the most exquisite tact for examination, in order to arrive at an accurate opinion. The symptoms which should guide him in cases of this description will be stated when I treat of the diagnosis of the different kinds of visceral abscess. I may, however, remark at this place, that, even in parts much less deeply seated, when the cyst of an abscess is greatly distended and very tense, fluctuation of its contents are generally extremely obscure, or even not to be felt, although its contents may be very fluid. Also, when the purulent matter is contained in no distinct cyst, but is disseminated through the textures, or infiltrated bebetween fasciæ or muscles, or is confined beneath aponeuroses, great incertitude may exist as to its formation. The parts in such cases present more of a diffused œdema than of a fluctuating tumour; and if fluctuation can be at all felt, it is only obscurely.

49. It must be evident that the more feeble and latent the phenomena of the precursory inflammatory irritation, the more difficult is it to determine the period at which the elaboration of pus commences. We frequently observe in practice, particularly after phlebitis, injuries of the head, fractures, and capital surgical operations, abscesses form in the liver, mediastinum, lungs, kidneys, or ovaries, preceded merely by obscure and occasional pain, and furnishing no certain symptoms of a local kind, by which we can decide as to their formation, until the time that they appear externally, or are detected upon *post mortem* examination. In cases of this description, the constitutional symptons are our chief guides; but even these are often so uncertain and so imperfectly developed as to leave us in doubt. The accession in this obscure manner of internal abscess is particularly remarkable as respects those which supervene to inflammatory disease existing in other parts, particularly to phlebitis, and which I have denominated *consecutive* abscesses. (See Veins — *inflammation of*.)

50. Symptomatic abscesses generally escape detection until they advance externally. Previous to this, pain, uneasiness, tumefaction, &c. are only felt chiefly in the part originally affected. But the symptoms already noticed (§ 46—48.), especially the unhealthy aspect of the surface, the state of the febrile action and of the pulse, the night perspirations, the disorder of the respiratory and alvine functions, will generally serve, in conjunction with the changes in the part to which symptomatic abscesses extend, to indicate the nature of the mischief.

51. It is important, as M. Dupuytren has very justly remarked, to take into account, when determining the existence of abscess, the greater disposition inherent in some constitutions to form purulent matter. In some persons, the least irritation is followed by the suppurative process. This is particularly the case in persons of a pale visage, of a soft flaccid state of the different structures, and of the lymphatic temperament. It is also remarkable in those whose vital energies have been lowered by previous disease; by chronic affections of the digestive mucous surfaces; and by those diseases which require the performance of amputation, or other important surgical operations. When the suppurative process has continued for some time, and has afterwards been suddenly stopped by an operation, or any other active treatment, the disposition to form abscesses is generally remarkable. A similar remark may be extended to the sudden suppression of any accustomed secretion or discharge. The most familiar instance of this kind is noticed in the breasts of nurses, which are extremely liable to suppuration upon interruption to the secretion of milk. These considerations should have their due weight with us when estimating the signs of the existence of internal abscess. Those symptoms which are peculiar to collections of matter formed in each of the internal viscera are pointed out in their respective articles.

52. IV. Of the Prognosis of Abscess. The danger from abscess is in proportion, 1st, to the extent of their internal surface; 2d, to the depth at which they are seated; 3d, to the indolence of their action, or the deficiency of vital action accompanying them; 4th, to the severity and danger of the disease by which they have been occasioned; 5th, to the sinking or deficiency of the constitutional powers under them; and, 6th, to the severity of the symptoms accompanying them, or produced by them. These positions are so obvious, that no remarks need be offered in support of them. I may, however, observe, that abscesses seated in internal viscera are always attended with danger; but the degree of danger will depend upon numerous circumstances connected with their seat, the direction which they take, the state of the vital energies of the frame during their progress, the chances of their evacuation, and the means of reparation and renovation the constitution may still possess.

53. The prognosis of chronic, symptomatic, and consecutive abscesses depends as much upon the nature of the preceding disease, as upon the state of the abscess itself. In chronic abscess, the danger is in proportion to the extent of the surface of its parietes, and to the grade of constitutional vice. In symptomatic abscess, the danger depends almost wholly upon the nature and extent of the original disease, of which it is the consequence, and upon the largeness of surface extending thence to the ultimate limits of suppuration. In consecutive abscess, the danger is extreme; owing, in many cases, to the nature of the primary disease, the depressed state of the constitutional powers, and to the vitiation of the circulating

fluid and soft solids of the body, with which it is connected.

54. V. OF THE MEDICAL TREATMENT OF ABSCESS.—The indications of cure which we propose in abscess is, 1st, to remove the purulent collection from the part containing it; and, 2d, to procure the obliteration of the cavity in which it was lodged. The *first* intention is accomplished either by procuring the absorption of the purulent matter, and its elimination from the body; or by opening the parietes of the abscess, and thus giving a direct outlet to the contained matter. When the means used to accomplish the absorption of the purulent matter fail, or when the character of the abscess and state of the frame forbid the employment of these means, opening the abscess must be resorted to when the proper period for having recourse to the measure arrives.

55. 1st, *Means which may be resorted to, in order to procure the absorption of the purulent matter, and its elimination from the frame.*—Numerous instances have occurred of the rapid absorption of the matter contained in an abscess, and of its discharge from the circulation, 1st, by the urinary organs, the urine becoming abundant, and containing either a puriform secretion, or being otherwise altered; 2d, by the mucous surface of the bowels, attended with diarrhœa; and, 3d, by the cutaneous surface, in the form of a copious, thick, or viscid, and offensive perspiration. These are the most common channels of elimination of the purulent secretion, when absorbed into the circulation from the cavity of an abscess. The purulent collection may, also, disappear in consequence of other critical or accidental evacuations; but this result is of rare occurrence, and is a much more remote contingency than those enumerated. Experience having shown the possibility, and the great advantages, of removing the matter contained in an abscess by exciting absorption, the means most effectual in attaining this end should be first put in practice.

56. With this view drastic purgatives may be prescribed, when the state of the patient admits of them; and next to them, such diuretics and diaphoretics, as may be appropriate to the circumstances of the case. Contemporaneously with the use of those internal derivatives, external applications should be employed, particularly those which possess discutient, resolvent, and styptic properties. Frictions with stimulating substances, as ammoniacum, iodine, hydriodate of potash, &c.; cold, warm, or tepid affusions on the part, either of simple or mineral waters, of sulphureous or saline, natural or artificial, may likewise be tried conjointly with the internal means. But this energetic plan of treatment,—this combination of the revulsive and discutient practice,—this *methodus perturbatrix*, is not applicable to all cases. There are many circumstances connected with the seat and condition of an abscess, and with the state of the different functions, that either altogether forbid its employment, or require important modifications and adaptations of it.

57. Thus, abscesses preceded by acute or active inflammation, are rarely susceptible of being absorbed; the opening of them, therefore, is almost inevitable. Chronic abscesses, which are generally provided with thick cysts, also admit not of removal by this practice; it being generally requisite to excite a new action in their parietes, which may modify their texture, and render them susceptible of contracting the adhesions requisite to their obliteration. The majority of purulent collections which are removed by absorption, is such as form rapidly, without much previous inflammation, and in debilitated habits, or in those weakened by pre-existing disease. In persons of this description, the excitement or irritation of the kidneys, or of the mucous surfaces, will often overcome the irritation existing in the seat of abscess, and consequently promote the absorption of the pus it contains; at the same time that the fluid abundantly secreted by the parts artificially excited will assume, in consequence of the state of the patient, a puriform character. (DUPUYTREN.) But, in the majority of instances of this kind, it is necessary that the artificial irritation or excitement shall be greater than that previously existing in the seat of abscess, and that the organs or parts in which it is induced be in a sound state; otherwise the revulsion cannot be either successfully or safely practised. However we may explain the mode of action of revulsants on abscesses of this kind, there can be no doubt that it is almost entirely in them, and particularly when they are seated in lymphatic glands, that we can hope successfully to employ this plan of cure.

58. When the evacuations procured from the first passages, and from the kidneys and skin, have no effect upon the tumours, and particularly if the stomach and bowels seemed to support their action with difficulty, they must be abandoned, and recourse be had chiefly to the more direct means of cure. The local excitants, as iodine, the sulphureous *douches*, frictions with mercurial, camphorated, and terebinthinated liniments, and the repeated application of blisters for a short time, are only suited to the chronic kinds of abscess, where little or no inflammatory action exists. But these remedies should be watched, lest they increase the heat and inflammatory action of the external or superficial part of the tumour, and thus occasion their external opening.

59. In the majority of abscesses, it is requisite to keep three facts in recollection: 1st, that the inflammatory action in their parietes does not cease on the formation of the purulent collection; 2d, that an abscess is generally a complication of this inflammation, and of the retention of purulent matter in the inflamed parts which formed it, the inflammatory action being still present, although in a somewhat modified state and grade, and still continuing to form this matter; and, 3d, that the existence of pus does not necessarily or materially change the nature of the action which produced it. The therapeutical indications to which these facts necessarily lead are important, particularly as they show, what, indeed, has been proved by experience, that antiphlogistic remedies, especially those of local application, should not be laid aside with the supervention of suppuration. In the majority of cases, and particularly when increased heat of the part still continues, this class of local remedies should be employed with an energy in proportion to the activity of the local symptoms. As long as pain, redness, heat, and tension remain around the abscess, so long should leeches, or other modes of capillary depletion, directed to its vicinity, be had recourse to, particularly if the state of the patient offers no urgent indications against the practice.

Emollient and astringent applications should also be constantly employed. These will generally reduce the inflammation of the surrounding tissue, favour the resolution of the parts not yet suppurated, limit the quantity of the morbid secretion, and favour the maturation of the abscess, so that it may be opened with the best hopes of success. In some cases, the use of these antiphlogistic measures will give rise to the absorption of the purulent matter, even after this had been attempted to no purpose by means of revulsants.

60. It should be recollected that the surfaces of abscesses are the constant seat of two kinds of action; one of exhalation or secretion, the other of absorption; and that whatever excites or irritates them increases the former, and whatever soothes or diminishes this irritation lessens it, and favours the latter action. This consideration should lead us strenuously to adopt a continued antiphlogistic and soothing treatment of the affected part, until the thinning of the skin at the most prominent part of the tumour indicates the necessity of opening it.

61. In symptomatic abscesses, the treatment should chiefly be directed to the primary seat of disease; for as long as the mischief continues or advances there, the purulent collection increases, and diminishes as it subsides. Thus, the abscesses that point near the anus or crural arch, in consequence of disease of the vertebræ, will sometimes disappear after the use of active means directed to the original malady, and judiciously adapted to the state of the patient.

62. Consecutive and spreading abscesses require a very different management from that now pointed out. These generally occur in persons of an unhealthy habit of body, or who have been weakened by acute disease; or they are the result of an adynamic or ataxic and spreading inflammation occasioned by a specific or poisonous agent; and they are not infrequently the consequence of the inflammation of veins, or of the presence of morbid secretions or purulent matter absorbed into the circulation, (§§ 25—28.), or of the transfer of irritation from a distant part. But from whatever cause they may proceed,—and they may, and occasionally do, proceed from either of those sources,—deficient constitutional energy, and vital resistance to the influence of the exciting cause, with a marked disposition of the structures to be invaded by it, and to participate in the morbid action it excites, are their constant concomitants; requiring the energetic use of those means which are the best calculated to rouse the powers of the frame, to restore the deficient tone of the capillary vessels, and to thus enable them to form coagulable lymph, by which the spread of the local mischief may be limited. Instead, therefore, of having recourse to antiphlogistic remedies, the state of local action, and of constitutional power, requires a tonic, stimulating, and restorative treatment; conjoined with the means best calculated to promote the functions of all the abdominal viscera, so that morbid matters may be eliminated from the circulating current, and healthy nutritious elements conveyed into it; and with a pure air to perfect the changes which it undergoes during respiration, and which are requisite to the continuance of the functions of life. The treatment necessary in such cases is fully detailed in the articles on Inflammation of Veins, on Spreading Inflammation of the Cellular Tissue, and on the treatment of Animal Poisons.

63. 2d. *Of opening abscesses.* — When we fail in procuring the absorption of the puriform matter, its artificial discharge will, sooner or later, be required, when this can be accomplished. Certain abscesses require a more immediate performance of this operation than others, and more particularly the following: — 1st, Abscesses proceeding from the escape, into the substance of any organ or part, of irritating secretions or excrementorial matters, as the urine, or fæcal substances. 2d, Abscesses preceded by very acute inflammatory action, and occurring in cellular or adipose structures, as the margin of the anus, the sides of the neck, or the groins. 3d, Purulent collections deeply seated, or confined under fasciæ or aponeuroses. 4th, Abscesses formed in the parietes of the splanchnic cavities, in order to prevent the chance of their breaking internally. 5th, Abscesses formed in parts through which large nerves and blood vessels pass, and on which the purulent matter occasions a painful and injurious pressure; as abscesses in the neck, and underneath the sterno-mastoid muscle, at the top and inside of the thighs and arms, &c. 6th, Abscesses which embarrass the respiratory organs, and which press upon the larynx, pharynx, or trachea, or which endanger the integrity of those parts.

64. In all these the strict antiphlogistic treatment will be requisite, unless they are of the diffusive or consecutive kinds, with emollient applications, in order to limit the extent of the inflamed parts, to diminish their size, and to hasten their maturation; and in many cases this mode of treatment must be continued for a considerable time after the discharge of the matter, in order to limit or prevent its re-accumulation, and to promote the collapse and diminution of the parietes of the abscess. The cases where it will be frequently necessary to retard the period of discharging the purulent collection, are chiefly those in which it is formed in the internal viscera, as the liver, spleen, kidneys, lungs, &c.; respecting which I have treated fully under their appropriate heads.

65. Chronic abscesses should be opened as soon as it is shown that their absorption cannot be accomplished; or when they augment in bulk under the discutient and derivative treatment. Symptomatic abscesses also require to be opened, when we find that the means which we have directed to the original seat of disease fail of limiting their extension, or lessening their bulk. Consecutive abscesses require to have their contents immediately discharged, when their situation admits of this being done; for the morbid state of the matter they sometimes contain, and the weak vital resistance opposed by the surrounding parts, and by the constitution, favours the contamination of the adjoining structures, and, indeed, of the whole frame. But this intention can seldom be fulfilled, owing to the seat of the purulent collection; and, when it is put in practice, it should be followed by as complete an exclusion of the atmospheric air as possible.

66. It does not come within the scope of this work to notice, at this place, the different modes of opening abscesses, and the treatment with which the operation should be accompanied and

followed. This necessarily differs in every case; but that part of it which belongs to my province is stated at the place where abscesses in the different viscera are discussed, and the means which may be employed to procure the obliteration of their cavities, the *second* intention of cure, are noticed, with reference to abscess of each of the important viscera and structures in which it is liable to form.

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ABSORPTION.

SYN. *Absorptio*, Lat. *Absorption*, Fr. *Die Einsaugung*, Ger. *Assorbimento*, Ital.

CLASSIF. GENERAL PATHOLOGY and THERAPEUTICS.

This is one of the most important functions in the system, and one of the most frequent channels through which disease is caused, perpetuated, or removed. As to each of these relations it requires a brief notice.

1. OF ABSORPTION IN RELATION TO THE CAUSATION, PERPETUATION, AND THE REMOVAL OF DISEASE. — The importance of entertaining accurate ideas as to the channels through which noxious agents affect the system, must be manifest. Without them, many of our pathological doctrines must be erroneous, and the therapeutical indications founded on them worse than useless: on the other hand, just views as to the nature and extent of the causes which operate through this medium, give rise to the most important inductions, — the chain of morbid causation is traced without interruption, the nature of pathological conditions is more accurately observed, and ultimate effects are recognised in due connection with remote causes. The practical advantages which accrue are great: prophylactic measures are based on sound principles; remedial agents are directed with precision; and the physician prescribes in a spirit of rational induction, instead of blind empiricism.

2. The agents which affect the system injuriously through the medium of absorption consist, *first*, of those which are external and foreign to the body, and act upon it only occasionally, or under certain circumstances; and, *secondly*, of those which are generated in the body itself, and, when carried by means of absorption into the current of circulation, produce very important effects. The *former* rank among the primary causes of disease; the *latter* are themselves the result of disease, but become important *secondary* causes, perpetuating and generally increasing its severity. The *first* class invade the system on the mucous and cutaneous surfaces, — the skin, the lungs, the alimentary canal, &c.: the *second* class form in the parenchyma or texture of organs and parts, or are generated on secreting surfaces, whence they are absorbed into the circulation. On each of these I shall offer a few remarks.

3. 1st. *Of absorption on the skin in relation to the production and removal of disease.* — *a.* That disease frequently proceeds in this way is evinced by certain contagious and chronic affections of the skin itself: that it is possible to produce various derangements, by applying to it several active agents, which affect this surface no further than in being absorbed from it, may be proved by direct experiment. But it is chiefly when the skin is deprived of a portion of its cuticle, however minute, that we perceive affections produced through the medium of cutaneous absorption. Several eruptive and contagious diseases are familiar examples of this; and the majority of deleterious agents produce a most decided effect when applied to the skin thus exposed.

4. *b.* The same channels through which disease invades the system, are often the most suitable through which to counteract or remove it. This is shown by the treatment of syphilis; by the use of baths, lotions, fumigations, and inunctions in cutaneous and visceral affections; and by the employment of various remedies to the skin, which are partially absorbed from it into the system. When the skin is deprived of a portion of its cuticle, it absorbs rapidly many of the most active agents employed in medicine; and it is thus rendered one of the most eligible situations to which we can direct our plan of cure. Thus, when the stomach will not retain the sulphate of quinine, it may be efficaciously administered to the denuded cuticle; or when we wish to produce an anodyne effect upon the system, or to assuage violent pain, the preparations of morphine, as the acetate, may be applied in this way. And in various diseases, when the function of deglutition is lost, or the mouth cannot be opened, certain active remedies may be thus administered; more especially those which operate their effects after having been absorbed into the circulation. Even purgatives, as the croton oil, and elaterium, some preparations of iodine, strichnine, prussic acid, tartar emetic, &c., if judiciously employed in this way, will be often productive of advantage, and are not infrequently required to be thus prescribed.

5. 2d. *Of absorption from the lungs in relation to the causation and removal of disease.* — *a.* There are very few, if indeed any, of the numerous maladies which are usually denominated infectious, that are not caused through the medium of the lungs. And, though the greater proportion of them are most probably induced from the morbid impression which their exciting causes make upon the nerves supplying this organ, yet several of them are also, more or less, occasioned by the absorption of the cause itself into the circulation, and by its influence upon the blood, and the nervous and vascular systems. Probably, also, certain other causes of disease, of no mean importance, particularly marsh miasmata, and noxious animal exhalations, act directly upon the organic nerves of the lungs, and on the blood itself, through the medium of absorption. We

have reason, moreover, not only to infer that the more material causes of disease are absorbed from the surface of the lungs, when inhaled into them with the atmosphere, in the moisture of which they are dissolved, or otherwise combined; but also that the foreign gases, which sometimes mix with the air, act in some measure through the same channel.

6. The organisation of the respiratory surfaces, the nature of the circulating functions on these surfaces, and the more immediate relation subsisting between the air in contact with, and the blood circulating in, them, will readily explain the rapidity with which foreign matters floating in the atmosphere are frequently conveyed into the circulation. Besides, we have strong reasons to infer that several of the gases, and of the soluble substances which float in the air, are carried directly into the blood from the surface of the lungs, without passing along absorbent vessels. The experiments of Professor Mayer, and of Drs. Lawrence and Coates, as well as those of MM. Segalas, Fodera, &c., fully confirm this inference; whilst those performed by MM. Magendie, Seiler, Ficinus, Tiedemann, Gmelin, and several others, show, that even in the alimentary canal, and especially when capillary vessels are divided in any of our tissues, the function of absorption is not confined to lacteal or lymphatic vessels, but is frequently extended to the venous capillaries, which, in respect of certain substances particularly, chiefly perform this function. Hence I may conclude that foreign substances dissolved in, or combined with, the moisture of the air, or mixed with this fluid, may, when inspired, be carried from the surface of the lungs into the blood, independently of the absorbent vessels; although, doubtless, these vessels perform their appropriate functions in this as in other parts of the body.

7. *b*. The rapidity of absorption in the lungs, and the ready access to the blood which foreign matters find through them, are sufficient to vindicate their importance as channels through which to convey our means of cure, not only in those maladies to which they are liable, but also in a number of diseases affecting the whole frame, or particular parts of it. General suggestions on this subject are all that can be advanced in this place: the particular recommendations for its use are given in their appropriate places. Those gaseous bodies which possess active medicinal powers; all those remedies which are more or less volatile, or are soluble in aqueous vapour; and many medical substances which may be rendered volatile or soluble in water, when combined with other bodies that do not destroy altogether their remedial powers, may be prescribed advantageously through the medium of the lungs. Chlorine, the nitrous oxide, dilute oxygen gas; the vapour of iodine, or the sulphuret of iodine; the vapour of turpentine, camphor, of the common, the aromatic, or the pyroligneous vinegars; tar vapour; the chlorides or chlorurets of lime or of soda; aqueous vapour holding the active principles of opium, henbane, hemlook, belladonna, digitalis, colchicum, &c. in solution; the volatile principles of various salts, the aroma of a number of vegetable bodies, — all exert powerful effects upon the system when administered in this way.

8. *c*. Through this channel a number of fevers, especially those which are characterised by great depression of the powers of life, or which rapidly pass into this state; various chronic affections of the lungs themselves, which are unattended by acute inflammation, but consist chiefly of a morbid state of the respiratory nerves, and are accompanied with spasm, and a morbidly increased secretion; the different kinds and forms of asphyxy; the diseases which threaten life by interrupting the respiratory functions; and various maladies in which the blood is vitiated, and where it becomes important to act in a direct and decided manner on this fluid, and on the circulating organs generally, may be successfully combated.

9. *d*. The knowledge that we thus acquire respecting the channels, through which the causes of many diseases invade the system, and the remedies for removing them may be efficaciously administered, furnishes us with important indications as to the employment of *prophylactic measures*, and rational plans of regimen and hygiene. Miasmal or contagious fevers furnish us with numerous opportunities of proving the justness of these views. Observation shows us that the causes of this class of disease act upon the system chiefly from their presence in the air we breathe: it further enables us to decide that these causes invade the system chiefly through one of two, or perhaps by both, routes; viz. by the nerves supplying the respiratory organs, or by the partial absorption of the causes themselves, from the pulmonary mucous surface, into the circulation. From the same source, or from the collateral evidence of experiment, we know that foreign substances do not so readily enter the circulation, when its functions proceed with energy, and the vital resistance is perfect, as when they act feebly and imperfectly; and that the depressing causes of disease have less power over the nervous influence of the respiratory organs, and of the system in general, when the vital actions which take place in the lungs are performed with due activity. The same sources of observation make us acquainted with the important facts, that the dilution of the atmosphere, which contains the causes of febrile diseases floating in it, by free ventilation; that the destruction, or neutralisation, or counteraction, of these causes, by the evaporation of certain disinfectant and stimulating agents; and that a due energy of all the vital and secreting functions, with an equable state of the mental powers and manifestations, and with a steady confidence; are the most successful means of preventing the attack and diffusion of those maladies.

10. By combining these facts as to the source, mode of operation, and methods of counteraction, of the chief causes of a most important class of maladies, and by directing the measures they suggest as far as may be according to the peculiarities of individual cases and diseases, we are thereby enabled to furnish persons, and even whole communities, with instructions and means calculated either to counteract or to lessen the dangers to which they are exposed.

11. 3d. *Of absorption from the alimentary canal, in connection with the causation of disease.*—*a*. It may be received as a pathological axiom, that the rapidity and extent with which deleterious matters are absorbed from the digestive mucous surface, as well, indeed, as from the respiratory, and other organs of the body, are nearly in pro-

portion to the depression of the nervous energies and vital resistance of the system. The truth of this is evinced in respect not only of the actions proceeding on the mucous surfaces, but also of those taking place in the different organs and structures. It is necessary to allude here to the numerous agents which cause, counteract, or remove disease, by their being absorbed from the alimentary canal. Whilst many agents produce their effects chiefly by modifying the states of the nerves and mucous tissue of this canal, others act principally from being absorbed, either by the lacteals, or by the venous radicles, and carried into the circulation; and a still more numerous class seem to operate through both channels, impressing immediately the nerves and tissues to which they are applied, and subsequently being absorbed into the blood, where they produce important effects not only upon this fluid, and on the vascular system, but also upon the functions of various secreting organs, especially those by which they are eliminated from the body.

12. A very large proportion, therefore, of the ingesta, whethether alimentary, medicinal, or poisonous, thus acting upon the system chiefly through the medium of absorption, the importance of directing a considerable portion of attention to this function in our pathological investigations, as well as in the appropriation of medicinal means, must be apparent. Besides these more obvious relations of the subject, there are others which have been either imperfectly investigated or entirely overlooked. To these I can merely allude: but amongst the most interesting are the absorption of unwholesome and imperfectly digested chyle from the intestinal surface; the absorption of a portion of the vitiated secretions which occasionally accumulate in the alimentary tube, particularly in the cœcum and cells of the colon; the absorption of some part of the fæcal matters, when they are long retained in the above situation, as evinced by the sensible qualities of the perspiration, foul state of the skin, &c., or of the obstructed and accumulated urinary secretion, as proved by similar phenomena; the passage of bile into the circulation, when it has been retained in the liver, the biliary ducts, or gall-bladder, from torpor or obstruction of these parts, or when it is secreted in large quantity, and does not readily pass off with the egesta. All these are very fruitful sources of disease; and, although generally connected with some degree of pre-existing disorder, or of torpid function, they are often the chief aggravating causes of many of the maladies we are called upon to treat, from the constitutional and visceral disturbance they occasion and perpetuate.

13. There are few disorders which implicate the digestive and chylopoietic organs, and very few febrile diseases, which do not, at some period of their course, evince signs of the absorption into the circulation of a portion of the morbid secretions or fæcal fluids retained in the alimentary canal, when due evacuations are not practised. Therefore, besides the other effects produced by medicines of this class, the due evacuation of these secretions and fæcal matters from the prima via is one of the best offices they perform.

14. *b*. It is unnecessary to do more than to allude to the advantages that accrue to the scientific practitioner from some knowledge, — although, in the present state of medicine, necessarily imperfect, — of the remedies which act by being absorbed, either altogether or in part, from the alimentary canal. Most of those substances which are found by experience the most efficacious in promoting the actions of the different secreting viscera, and in producing a marked and permanent change of the general state and functions of the economy, operate after having been absorbed into the circulating current, and conveyed through this channel to vital and secreting organs; and, although, during the healthy performance of the secreting functions, or whilst the vital energies are not far reduced, these substances seldom accumulate in the blood so as to be detected in it by chemical analysis, owing to the balance which is preserved between the rapidity of absorption and the activity of elimination, yet their passage through it is proved by the fact, frequently observed in regard of all of them, of their being found in the secretions of the eliminating or depuratory organs. This fact was established by experiments performed by myself, — some of them as far back as 1819, — and published in several periodicals in 1821 and 1822.

15. 4th. *Of absorption from diseased organs and structures.* — *a*. When morbid secretions are generated, or accumulated in any organ or texture, or when any part is changed in such a manner as to secrete a matter different from the healthy constituents and fluids of the body, the matter formed is generally, after a while, absorbed into the circulation, and contaminates, in a more or less marked manner, according to its nature, the other fluids, and the soft solids, and thereby at last destroys life. Illustrations of this procedure are furnished us in the pathological history of internal and deep-seated abscesses; in some morbid states of the uterus; in scirrho-cancer, fungous hæmatodes, and other malignant diseases. The celerity with which the absorption of the morbid matter and the contamination of the frame proceed, is generally according to the principle already recognised (§ 9.), — in proportion to the diminution of the vital energy and resistance of the constitutional powers.

16. *b*. The commencement of the contamination can scarcely be determined by an appreciation of symptoms: but the experienced observer will readily recognise, in the colour of the surface of the body; in the state of the heart's action, and of all the circulating functions, as well as in the blood itself; in the failure of the energies of life; in the morbid condition of the nervous functions and of the powers of the stomach, and indeed of the whole digestive canal, sufficient proofs of the early, as well as of the advanced progress of disease, arising from the absorption of morbid matters from the primary seat of morbid action, and the consequent vitiation of the circulating fluids, of the soft solids, and of the secretions and excretions of the body. (See *Art.* BLOOD.)

17. In many of the more chronic diseases which either commence with or terminate in the malignant state, this contamination is frequently first evinced by the tumefaction and pain of adjoining lymphatic glands, owing to the irritation produced by the morbid fluid conveyed into them: the inflammation or obstruction thus produced in them becoming an obstacle to the rapid transit of the morbid matters from the original seat of disease into the circulation. But in many cases this is an

insufficient barrier; and in others, these matters seem to pass onwards, either without circulating through lymphatic glands, or without occasioning irritation, obstruction, or inflammation in them; or are almost directly conveyed into the venous circulation. Whatever may be the channel of conveyance, there can be no doubt of the fact — the practical importance of which is very great — that the rapidity of the absorption of morbid matters, and extent of their hurtful effects on the constitution, are in proportion to the depression of the vital energies of the frame, — this depression being frequently the cause of their absorption, particularly in respect of puriform fluids; or at least the circumstance which more especially favours its occurrence, and the rapidity of its progress.

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ABSTINENCE. *Its Morbid Effects.* Syn. *Abstinentia*, Lat. *Astinensa*, Ital. *Die Enthaltung*, Ger. *Abstinence*, Fr. *Starvation from Hunger*.

Classif. I. Class, V. Order (*Author*, see *Classification in the Preface*).

1. It does not come within the scope of this work to enter upon the consideration of the therapeutical relations of abstinence; but that the practitioner should be acquainted with the states of disease which it occasions, and with the best means of treating it, is extremely important; more especially as, when it is too rigidly enforced during the treatment of several diseases, it not unfrequently gives rise to effects of a serious nature, which not infrequently have been mistaken for the spontaneous course of the malady.

2. Of the Morbid Effects of Abstinence. — Abstinence has been long employed as a means of cure, and generally as a part of the antiphlogistic regimen, in a very great number of diseases, particularly in fevers and inflammatory affections. Very great difference, however, exists both among writers and practitioners as to the extent to which it should be carried, and the maladies in which it ought to be prescribed. As to its applicability to the class of diseases now noticed, there is no doubt: but in disorders of debility, or of irritation merely, particularly those which occasionally simulate chronic inflammation, and in various nervous affections, it is extremely injurious; and I believe that it has been carried to a hurtful extent in many of these affections, particularly by Broussais and his followers, as indeed has been recently well shown by MM. Piorry and Barras. A case of this description, which had been long under the care of M. Broussais, very lately came before me, with many of the morbid effects of this practice, which had been carried to a hurtful extent. There can be no doubt, however, that it is extremely beneficial, when carefully watched and regulated, in many of the diseases of the stomach and its associated viscera; but the fact is equally incontrovertible, that it will often produce effects very nearly resembling those for which it has been prescribed. The importance, therefore, of keeping these effects in recollection, when treating several diseases, particularly those of irritation and debility, must be apparent.

3. In appreciating the usual effects of abstinence it is extremely requisite to be aware of two things: 1st, That the effects vary with the state of the patient at the time that abstinence is endured; 2d, that they differ materially according to the suddenness with which it is entered upon, the extent to which it is carried, and the circumstances with which it is associated. By very corpulent and plethoric persons, abstinence is generally borne well for a long period, and by those labouring under febrile or inflammatory excitement; and it is, in them, one of the most necessary means to diminish the one and lower the other. In these, particularly the latter, total abstinence may be endured for many days; whilst, if carried to the same extent in healthy persons, its effects would be fatal, or nearly so. Abstinence, also, is longer endured by persons of the middle or matured epochs of life, than by those of an early age.

4. That the absolute or sudden deprivation of food should be productive of more rapidly serious effects is very obvious; but it is not so well known that there are circumstances, which modify the effects of the less absolute states of abstinence, and which, when thus combined, give rise to very important and dangerous diseases. In order to place the subject more clearly before the reader, I will *first* notice the effects of abstinence simply, and unassociated with other causes of disease; and *next*, the morbid conditions, which its association with certain influential agents usually occasion.

5. 1st. *The morbid effects of simple abstinence.* — Keeping in recollection the modifications depending upon the extent to which deprivation of nourishment is carried, and the age and state of the person at the time of its adoption, I may briefly describe the morbid effects of abstinence as follow: — Paleness and languor of the countenance; muscular debility and emaciation; a weak and small pulse; thirst; at first quickness of intellects, constipation, and flaccidity of the muscles. To these succeed increased frequency of pulse, palpitations, alternating with leipothymia, or even full syncope; headach or delirium; flashes of light before the eyes; tinnitus aurium; slight amaurosis; parched state of the throat, and thirst; pains in the stomach; great wakefulness, followed by delirium, sometimes mild, but in other cases furious, or at first mild or muttering, and afterwards strong or furious; sinking of the animal heat, or alternate coldness and burning in parts of the body; and lastly, morbid sensibility of the organs of sense and surface of the body, and greatly depressed temperature, followed by insensibility, stupor, or coma, terminating in death.

6. It is obvious that the severity and duration of these symptoms will vary in different cases, according to circumstances peculiar to each. But it is not so well known that they will be actually produced by pursuing a too rigid abstinence in the treatment of various diseases, and particularly when the nature of the disease is mistaken: as when the irritative symptoms frequently attendant upon diseases of debility, or on nervous affections, are viewed as resulting from inflammation. Many cases have occurred to me in the course of practice, where the antiphlogistic regimen, which had been too rigidly pursued, was itself the cause of the very symptoms which it was employed to remove. Of these symptoms, the affection of the head and delirium are the most

remarkable, and the most readily mistaken for an actual disease requiring abstinence for its removal. A case of this description lately occurred to me. A professional man was seized with fever, for which a too rigid abstinence was enforced, not only during its continuance, but also during convalescence. Delirium had been present at the height of the fever, and recurred when convalescent. A physician of eminence in maniacal cases was called to him, and recommended him to be removed to a private asylum. Before this was carried into effect, I was requested to see him. A different treatment and regimen, with a gradual increase of nourishment, were adopted, and he was well in a few days, and within a fortnight returned to his professional avocations.

7. *The morbid appearances* observed after fatal cases of deprivation of food possess some interest. The most remarkable are the emaciation and absorption of every particle of fatty matter: the paleness, flabbiness, softening, and emaciation of the voluntary muscles, and of the substance of the heart; an exsanguined and pale state of the viscera; slight atrophy of the liver and spleen; diminished size of the stomach and colon; and particularly the increased vascularity of the brain, and sometimes of the membranes also, compared with the other viscera. It would seem that a very large proportion of the blood continues, as in many cases of great vascular depletion, to be sent to the brain to the very last. This is obviously owing to the pressure of the air on all parts of the body, from which the encephalon is guarded by its unyielding case. In addition, also, to the vascularity of this part, a limpid serous effusion between the membranes, or in the ventricles, is sometimes met with.

8. 2d. *Of the morbid effects of abstinence when it is associated with other hurtful agents.* — These effects are occasionally presented to medical men under a variety of circumstances, and from a varied combination of causes; but in the great majority of instances they result from deficiency of food merely, rather than from a rigid abstinence, conjoined with the depressing influence of cold or insufficient clothing, great or continued exertion, or with a moist and unwholesome atmosphere. Thus we find the association of these causes, particularly insufficient or unwholesome food, laborious exertion, mental depression, a moist, cold, or unwholesome atmosphere or locality, not unfrequently give rise to purpura hæmorrhagica, scurvy, scorbutic dysentery or diarrhœa, low or typhoid fevers, affections of the brain and nervous system, emaciation, with chronic ulcerations, &c. —effects which have received a particular notice in their respective articles.

9. The best illustration of the effects of this association of other agents with a continued deficiency of food is furnished by the diseases which appeared a few years ago in the Milbank Penitentiary. The prisoners confined in this prison were suddenly put upon a diet from which animal food was nearly altogether excluded, excepting in as far as it entered into the composition of a weak soup. They were at the same time subjected to a low grade of temperature, to considerable exertion, and confined within the walls of a prison situate in the midst of a marsh which is below the level of the adjoining river. The consequences were, first, loss of colour, of flesh and strength; subsequently, diarrhœa, dysentery, scorbutic dysentery, scurvy; and, lastly, low ataxic or adynamic fevers, or headach, vertigo, convulsions, delirium or mania, apoplexy, &c. The smallest loss of blood produced syncope or leipothymia, and fatal results. Yet, in the great majority of the fatal cases, independently of the lesions observed in the mucous surface of the digestive tube, or in other situations, increased vascularity of the brain and its meninges, frequently with effusion of fluid in the ventricles or between the membranes, was found upon examination after death.

10. The Treatment of the morbid effects of abstinence is very obvious, yet considerable care is necessary to its successful issue in very urgent cases. Nourishment should be administered cautiously, in a very small quantity at a time at first, but frequently. It ought to be bland and farinaceous: animal food may be entered upon subsequently, and the quantity gradually increased. The animal warmth should be promoted, at the same time, by the usual external means — by frictions and warm applications; and the bowels assisted by the occasional use of bland enemata. Soups may be allowed early in the treatment, but in a small quantity at a time. Milk is often prejudicial, unless diluted and made into gruel with some of the farinaceous articles of food. Internal stimulants are seldom required, unless when symptoms of cerebral or nervous irritation exist, when they may be given; particularly the preparations of ammonia, the æthers, camphor, vegetable bitters and tonics, at first in very moderate doses, in conjunction with small quantities of an anodyne, as the extract of hop, the extract of hyosciamus or of opium, the paregoric elixir; and by warmth, frictions, and stimulating applications to the cutaneous surface and lower extremities. These means will generally succeed in removing the effects of simple abstinence whilst they admit of removal. The treatment of the effects resulting from the conjunction of other causes with the one now discussed, is considered under their respective heads.

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ACNE. ’Ακνη. Derived, according to Cassius (*Nat. et Med. Quest.*, &c., Prob. 33.), from ’ακμη. Syn. ‘Ιονθος, Gr. *Varus*, Lat. *Psydracia Acne*, Sauv. *Gutta Rosea*, Darwin. *Ionthus*, Good. *Bouton*, *Couperose*, Fr. *Die Finnen*, Ger. *Carbuncle*, *Stone-pock*, *Whelk*.

Classif. 3. *Class*, Diseases of the Sanguineous Function; 2. *Order*, Inflammation (*Good*); 7. *Order*, Tubercles (*Willan* and *Bateman*). IV. Class, IV. Order (*Author*, see *the Classification*).

1. Defin. *Hard, inflamed, tubercular tumours, suppurating very slowly, occurring chiefly in the face; sometimes, also, on the neck and shoulders.*

2. One or more, sometimes a number, of these tubercles appear, generally in succession, in the face, and sometimes on the neck, shoulders, and

breast, but never lower; remain permanent for a considerable time; and suppurate slowly and imperfectly, leaving a dark or livid mark, which gradually disappears. They occur chiefly in persons of the sanguine temperament; commencing at the period of puberty, and generally disappearing after thirty or thirty-five. They are common to both sexes, but are most frequent and numerous in the male sex.

3. This is one of the most constant and unvarying in its characters of any of the affections of the skin; but writers upon this class of diseases differ widely in respect both of its particular character and seat. WILLAN, PLENCK, BATEMAN, and THOMSON consider it a tubercular affection; whilst ALIBERT, BIETT, and RAYER view it as pustular. I believe, however, that both opinions are in some respects correct; and that in certain forms or states of acne the tubercular change is predominant, little or no suppuration taking place, but a state of slow inflammation giving rise to a continued exfoliation of the cuticle, or formation of thin scales on their apices; and thus they slowly disappear; whilst in others the pustular character is very distinct, but always preceded by the characteristic tubercular hardness. This affection may be viewed, therefore, as forming an intermediate link between the tubercular and pustular eruptions.

4. In respect of the particular tissue in which this disease is seated, some difference of opinion also exists. The greater number of writers on the pathology have considered this disease to be seated in the proper structure of the cutis vera; many of them admitting, at the same time, an affection of the sebaceous follicles very nearly resembling it. Mr. PLUMBE, however, attributes it entirely to obstruction and chronic inflammation of these follicles. I believe that this opinion is too restricted; and that, whilst one form of acne evidently depends upon this cause, others are essentially disease of the cutis vera.

5. Spec. I. ACNE SIMPLEX, *Simple Acne*. Syn. *Gutta Rosea Hereditaria*, Darwin. *Dartre Pustuleuse Miliare*, Alibert. *Ionthus varus simplex*, Good.

Simple acne affects most frequently young subjects, at the period of puberty, and particularly females. They generally appear on the forehead, shoulders, and upper part of the thorax, and are liable to recur at the menstrual periods, especially in cases of dysmenorrhœa. Many of these vari do not proceed to suppuration, but slowly subside. They are very commonly developed in succession; commencing with small, hard, and inflamed tubercles, of the size of a pin's head. These continue to enlarge for three or four days, and the inflammation becomes more apparent. In seven or eight days they have reached their greatest size. They are then dark red, smooth, prominent, shining, hard, and slightly painful to the touch. After two or three days a small speck of matter appears on the apices of some of them; and when these break, a thin humour exudes from the tubercular induration, and dries on its surface, forming a thin scab, which adheres firmly; but, after a few days, is loosened at the edges, and falls off; the tubercular hardness and livid redness gradually subsiding, and disappearing after three or four weeks.

6. In some persons this eruption recurs frequently at short intervals, the vari being more or less numerous; in others it is more extensive, and never altogether disappears, although it is more troublesome at one time than another. When the vari are numerous, many of them undergo no suppuration; but the sebaceous glands are often excited, giving the skin a greasy appearance. In many of these cases, several of the vari assume the characters of the next species.

7. Spec. II. ACNE INDURATA, *Stone-pock*.

The tubercles are larger, more indurated and permanent than the foregoing; and are apparently the consequence of a slower and more deep-seated inflammation. They often appear in considerable number, of a conical or oblong-conoidal form; some of them assuming a roseate hue, and tending to suppuration at their apices; others remaining in a hard, elevated state for a very long time, without any appearance of the suppurative process, or disposition towards it. In some cases, two or even more of them coalesce, and occasionally suppurate at their respective apices; but one only may undergo this change. As they continue they become more purple or livid, particularly when they have no tendency to suppurate. When they experience this process, the same process of scabbing and exfoliation, already described (§ 5.), is gone through; but it sometimes happens that when they experience any irritation they may suppurate a second time. As they very slowly subside, they leave a purple or livid discoloration, and, occasionally, a slight depression, which is long in wearing off, and which sometimes never altogether disappears.

8. This species of acne generally is most frequent and numerous along the rami of the lower jaw, on the temples, the nose, and cheeks; also on the back and neck. They are frequently accompanied by a greasy state of the skin, from an excited state of the cutaneous follicles; are commonly sore and tender to the touch; and, when numerous, are in every stage of progress, giving the surface a spotted and variegated appearance,—owing to the prominence and redness of some at their commencement, to the yellow points in those that are suppurating, to the scaly crusts covering those which have undergone this process, to the lividity of those that have exfoliated or are subsiding, and to the discoloured depressions which others have left after them.

9. The general health seldom suffers materially from either the simple or the indurated acne, excepting as far as regards some pre-existing and concomitant disorder of the digestive functions. If fever, or acute disease, attack persons affected with these eruptions, the vari generally disappear; but they frequently also re-appear upon its subsidence, becoming in some respects a critical eruption.

10. Spec. III. ACNE ROSACEA, *Rosy-drop*. Syn. *Gutta Rosea*, Auct. var. *Gutta Rosea Hepatica*, Darwin. *Ionthus Corymbifer*, Good. *Dartre Pustuleuse Couperose*, Alibert. *Goutte Rose, Couperose Rougeurs*, Fr. *Kupferbandel, Roth-nase*, Ger. *Carbuncled Face*, Eng.

The *first* and *second* species, described above, might have been, with propriety, viewed as varieties of the same species; but this is a very distinct species from the preceding. It consists of small, slowly suppurating tubercles, accompanied with a shining redness, and an irregular granulated appearance of the skin of the part affected. This species commonly appears first at the end of the nose, and afterwards spreads from both its sides to the cheeks, which it never altogether covers. At first it is not uniformly red; but is pale in the morning, and intensely red whenever the patient is excited or heated, and particularly after dinner, or drinking wine or spirits. After some time the texture of the cuticle is gradually thickened, and its surface granulated and variegated by the ramifications of cutaneous veins, and the suppuration of small, prominent vari, which successively arise in different parts of the nose and face.

11. This species of acne seldom appears before the age of forty, excepting in those addicted to the immoderate use of vinous or spirituous liquors, or who possess great hereditary predisposition to it. In advanced life, or in the worst of these cases, it sometimes spreads to the greater part of the face, even to the forehead and chin. The nose usually becomes very tumid, and of a fiery red colour, and sometimes is enlarged to an enormous size. The nostrils, in these cases, are generally distended, and their alæ often fissured and divided into lobes. In advanced age, this species of acne becomes more livid; and if any of the tubercles suppurate, they often ulcerate, and are indisposed to heal. In younger persons, who are attacked chiefly from hereditary disposition, it is often accompanied with irregular red patches on the face, which are often smooth, devoid of tubercles, and accompanied with occasional slight exfoliations of the cuticle. These patches are extended, or aggravated, by intemperance in food or drink.

12. Spec. IV. ACNE PUNCTATA, *Maggot Pimple.* Syn. *Crimones*, Auct. var. *Punctæ Mucosæ*, Darwin. *Ionthus Varus punctutus*, Good. *Der Gries*, Ger. *Tannes*, Fr. *Grubs*, Eng.

This is, in my opinion, the only species of acne which is seated in the follicular glands; and, although often observed as the only form of eruption, it also is frequently found intermingled with the species already described, particularly the first and second. It consists of a number of black points, surrounded by a very slightly elevated border of cuticle, proceeding from concreted sebaceous matter accumulated in the glands and their ducts, whence it may be squeezed out in a vermicular form, the external extremity being dark from its exposure. In consequence of the accumulation and distension, these glands sometimes become inflamed, and give rise to small tubercles, with minute black points in the centre of their external surface. These tubercles suppurate partially, as the preceding, whilst others remain stationary for a considerable time, and several are distended without even being inflamed. They are not infrequently mixed with tubercles without the black punctæ, which are evidently owing to a similar obstruction, and to a more complete closure of the outlet of the ducts. In this species of acne the accumulated secretion may be squeezed out.

13. Spec. V. ACNE SYPHILITICA, *Venereal Acne.* Syn. *Gutta Rosea Syphilitica*, Plenck. *Syphilide Pustuleuse Miliaire*, Alibert.

Amongst the very numerous forms of cutaneous affection in which secondary syphilis may manifest itself, this may be enumerated as one, although not a common one. PLENCK has given a very correct description of it. This species nearly resembles, in the size and form of the pustules, the acne rosea. It chiefly affects the forehead, face, neck, and upper part of the trunk. The vari are round and conical, with an inflamed, copper-coloured, tubercular base and areola. They suppurate slowly at their apices, where a yellowish brown scab is formed; and leave a dirty, dark, and slightly depressed mark. They present a darker colour, and more permanent tubercles, on the nose, the adjoining parts of the cheeks, and forehead, than elsewhere; and are there observed in discoloured patches, in every stage of their growth. They are frequently found complicated with other eruptions, chiefly of a scaly character, on different parts of the body; are always a secondary venereal affection; and, although sometimes unaccompanied with other syphilitic symptoms, are most commonly attended with ulcerations in the throat, with nodes, inflammation of the periosteum, and nocturnal pains.

14. DIAGNOSIS. — *Acne* can be confounded only with *ecthyma*. The tubercular pustules of the former, however, are small, slowly developed, with an indolent and hardened base; whilst the pustules of *ecthyma* are large, superficial, unaccompanied with chronic induration, and forming thick scabs, more or less prominent, much less adherent, and such as never are formed in acne. The characters of *syphilitic acne*, the antecedent and accompanying symptoms (§ 13.), the colour and predominance of the eruption about the nose and commissures of the lips, the tendency of the vari to ulcerate, and the associated affection of the throat, and sometimes of the periosteum, sufficiently mark the nature of this species of the disease.

15. The PROGNOSIS of acne regards merely the persistence of the eruption, and the inconvenience attendant on it. Acne *simplex* and *punctata* are often of comparatively short duration. The acne *indurata* is much more tedious; and in some constitutions will resist, even for many years, every mode of treatment, particularly if the causes in which it not infrequently originates be overlooked. *Acne rosacea* is seldom or ever cured, excepting by a strict attention to regimen.

16. The CAUSES of acne are extremely various. The species *simplex*, *indurata*, and *punctata* usually occur during youth, in the sanguine and bilious temperaments, and disappear about middle age. They are very generally connected with chronic affections of the stomach, bowels, and liver; with hæmorrhoids; in some, with a tendency to phthisis; and in females, with painful and scanty menstruation. These species, as well as the acne *rosacea*, evidently arise, in many cases, from hereditary predisposition; and are most common in cold and moist climates, — probably owing to the use of ardent spirits. Excesses at table, cold indigestible articles of food, sedentary habits, fits of passion, anxieties of mind, and the depressing passions, cold drinks — particularly if taken when the body is overheated — the use of irritating cosmetics, and disorder of the digestive functions, are very common causes of these eruptions. I believe, however, that the simple, indurated, and punctated species of acne are most frequently occasioned by uterine irritation,

and excitement, or an imperfect performance of the uterine functions; by constipation; by torpid conditions of the liver; and by the injurious addiction to onanism.

17. TREATMENT.—In the treatment of these affections, our chief attention ought to be directed to their pathological relations and causes. These latter must be removed as far as may be done; and the former should both guide our indications, and direct our means of cure. The apprehensions entertained by the older writers, of producing internal disease by the sudden repulsion of the eruption, were founded on the results of observation, although explained by partially inaccurate or unsound pathological views. Affections of the stomach, bowels, chest, and head, have been thus induced, and been relieved upon a re-appearance of the eruption: but such consecutive diseases are more common after the repulsion of other eruptions. We should, however, as being both the safest and the most permanent method of cure, direct our remedies to the constitutional or internal relations, as well as to the external manifestations of disorder.

In the treatment of this, as well as many other diseases, the causes, the state of the habit and constitution of the patient, its morbid relations, and its duration, are severally to be kept in recollection.

18. 1st. *Treatment of acne simplex.*—In delicate constitutions, the chief attention should be directed to the state of the digestive functions. These should be promoted by gentle *aperients*, combined with *tonics*, and the functions of the skin promoted, by preserving a free transpiration on its surface. With this view, *sulphur* may be combined with magnesia, or with cream of tartar, and confection of senna, and taken in a sufficient dose, at bedtime, to procure a full evacuation in the morning, or any one of the formulæ (AP. Nos. 82. 89. 98.) may be had recourse to. These may be occasionally changed for a powder with rhubarb, sulphur, and magnesia, or for the extract or decoction of taraxacum, with subcarbonate of soda or sulphate of potash. If the functions of the liver are torpid, the following may be taken for a few nights:—

No. 6. ℞ Pilul. Hydrarg. Submur. Comp. ℈j.; Fellis Tauri Inspiss. gr. xv.; Saponis Castil. gr. x.; Extr. Taraxaci ʒj. M. Fiant Pilulæ xviii., quarum capiat binas vel tres horâ somni.

After the bowels have been evacuated, and the secretions brought to a healthier state, the dilute *mineral acids*, either alone or with *bitter infusions*, may be taken through the day.

19. When the eruption occurs in young plethoric persons, and when it is in females attended with scanty and difficult menstruation, small *blood-lettings* may be practised; in the latter, by the application of *leeches* to the superior and internal parts of the thighs. In more delicate females the functions of the lower bowels are to be promoted by the pilula aloës cum myrrha, combined either with pilula ferri composita, or with the extractum gentianæ. When the eruption is obviously connected with imperfect and painful menstruation, the use of the warm salt water *hip-bath*, or of the hip vapour bath, or warm salt water *pediluvia*, after the application of a few leeches to the insides of the thighs, will be extremely serviceable. In such cases, the internal exhibition of the *sub-borate of soda*, either in the form of pill or draught, combined with camphor, the extractum taraxaci, or the extr. rutæ, or, as directed in Form. Nos. 93. 184. 209. 254. will be found of great advantage.

20. In addition to these internal remedies, which require to be varied according to different pathological relations of the eruption, external applications will be necessary; and when conjoined with the above treatment, or employed subsequently to it, no dread may be entertained of any injurious consequences from them. The ancients, particularly CELSUS, PLINY, AETIUS, PAULUS, ACTUARIUS, &c. recommended lotions and liniments with vinegar and honey; and these sometimes combined with turpentine, emulsion of bitter almonds, myrrh, alum, soap, Cimolian earth, the bruised roots of the lily, the cyclamen, narcissus, and the fruit of the wild vine; the most of them calculated to be advantageous in many states of the common forms of acne.

21. If the tubercles are much inflamed, and inclined to be pustular, mildly stimulating applications are most serviceable, as *dilute spirit*, or the *pyroligneous acetous acid*, or *liquor ammoniæ acetatis*, with rose or elder-flower water. In the more indolent cases, or when the skin can bear an augmented stimulus, WILLAN and BATEMAN recommend from half a grain to a grain, or more, of the *muriate of mercury*, in each ounce of the vehicle; or a drachm or more of the *liquor potassæ*, or of the *muriatic acid*, in six ounces: and THOMSON advises that the emulsion of bitter almonds, containing ten minims of *hydrocyanic acid* to each fluid ounce of the emulsion, should be the vehicle adopted. The solution of the *sulphuret of potass*, in the proportion of a drachm to twelve or sixteen ounces of water, may also be employed; and, in the more obstinate cases, the *baths* directed in Form. No. 14—17. may be had recourse to. The solution of the *muriate of ammonia*, either alone or with the chloride of mercury, is often serviceable.

22. The lotion from which I have derived the greatest advantage in practice, and which I have found the most generally applicable, is a solution of the *sub-borate of soda* in rose or elder-flower water, or in water which had been poured in the boiling state over sulphur, and allowed to infuse for ten or twelve hours. The borax may also be dissolved in equal quantities of elder-flower water and honey, and used as a lotion in the more chronic cases.

23. 2d. *Treatment of acne indurata.*—In young and plethoric subjects, or in females, when the eruption is accompanied with a scanty and painful menstruation, the treatment already pointed out (§ 19.), should be put in practice. When we suspect that sexual irritation or masturbation is connected with the causation of the eruption, early rising, mental occupation, the use of gentle cooling aperients, of soda combined with small doses of camphor, soda water, sulphur with soda or antimony, are the most serviceable internal remedies. After these, the mineral acids, the sulphureous mineral waters, and gentle vegetable tonics, will be useful. Where the eruption is dependent upon torpid function of the stomach, or liver, or bowels, mild alteratives, exhibited at bedtime, as the pills already prescribed (§ 18.), and gentle tonics through the day, will be required. In a most obstinate case, which some time ago came before me in a lady, whom all the prac-

titioners who had acquired a reputation in the treatment of cutaneous affections had attended, strict attention to the state of the digestive and uterine functions removed the eruption. The following electuary has sometimes been used by me in this and other obstinate cases.

No. 7. ℞ Potassæ Supertart. in pulv. ʒj.; Sub-boratis Sodæ ʒijss.; Sulphuris Præcip. ʒss.; Confectionis Sennæ et Syrup. Zingiberis āā ʒjss. M. Fiat Electuarium, cujus capiat Coch. unum minimum omni nocte.

At the same time a solution of two grains of the chloride of mercury in four ounces of the compound tincture of cinchona was prescribed, and a teaspoonful of it directed to be taken twice daily, in half a glass of infusion of camomile flowers. The lotion already recommended (§ 22.) was also employed. In cases similar to this, and, indeed, in all those accompanied with disorder of the digestive functions, cold or drastic purgatives ought to be avoided; and the bowels should be regulated with the pilula aloës cum myrrha, combined with a little blue pill, or with the pill prescribed above (§ 18.); or the ext. aloës purif. conjoined with the extr. gentianæ; or the electuary now directed. Advantage will also be obtained from a draught of infusion of cascarilla, or of calumba, with subcarbonate of soda or potass, or the liquor potassæ, taken twice a day.

24. As to *external applications* in this form of acne, little need be added to what has been already stated. The lotions with the chloride of mercury, or with the borax, are most to be depended upon, particularly when dissolved in an emulsion of bitter almonds, or in camphor mixture, with the addition about twelve minims of the hydrocyanic acid to each ounce of the vehicle. In cases where the tubercles have at all suppurated, it will be advisable to open them with the point of a lancet before the lotion is used.

25. At the commencement of the eruption, mild emollient poultices and fomentations are useful; and afterwards, particularly in the more obstinate cases, M. Biett, and after him MM. Cazenave and Schedel, recommend the following ointments to be used, in order to promote the resolution of the tubercles: —

No. 8. ℞ Protochlor. Hydrarg. et Ammoniæ* (Submur. Hydrarg. et Ammon.) ℈j.—ʒj.; Axungiæ ʒj. Misce.

Of this ointment I have had no experience; but the following I have employed with advantage in several chronic eruptions, and in two cases of this species of acne:—

No. 9. ℞ Sulphureti Iodinæ gr. xii.—xxiv.; Axungiæ ʒj. M.

Ambrose Paré and Darwin considered that blistering successively small portions of the face was the most successful means of ridding it altogether of this very obstinate eruption. This practice has been employed at the hospital St. Louis, by M. Biett, with great benefit. When the disease has disappeared, this scientific physician has derived great advantage from a douche of cold sulphureous water in preventing a return of the eruption.

26. 3d. In *treating* the *punctated species* of acne, it will be frequently necessary to press out the accumulated and hardened matter from the follicles. The vapour bath, the warm sulphur bath, followed by frictions either with a coarse towel or a flesh-brush; and lotions such as have been already recommended, or a weak solution of pure potash, or of ox-gall, or of sulphuret of potash, also followed by frictions, are particularly indicated in this species of acne.

27. *Internally*, the solution of the carbonate of potash, or the oxymuriatic acid, advised by Underwood and Willan, may likewise be employed. Sulphur, magnesia, soda, rhubarb, and the subborate of soda, are also of much benefit. Dr. Thomson states, that he has seen the skin completely cleared by the use of the following alkaline tonic for six weeks; at the same time regulating the bowels: —

No. 10. ℞ Zinci Sulphatis gr. xxiv.; Liquoris Potassæ f. ʒxij. Solve. Sumantur guttæ xxx. ex cyatho aquæ bis quotidiè.

It ought always to be observed, as a general principle, in this as well as in the other forms of acne, that attention to the secretions of the abdominal viscera, and to the general health, by promoting the digestive functions, will of itself, independently of external means, go far in promoting a cure; and that, without such attention, no cure will be permanent.

28. 4th. *The treatment of acne rosacea* is generally unpromising. It should always have a strict reference to the particular nature of the affection of the liver, or digestive canal, or both, with which this eruption is associated, and in many respects symptomatic. A. rosacea often precedes serious disease of the liver, more frequently co-exists with it, and most commonly indicates a congested and obstructed state of the viscus. To this organ, therefore, ought our remedies to be particularly directed. A moderate *blood-letting;* the application of *leeches* on the region of the liver; and, if the eruption occurs in females, and is attended with obstructed or scanty menstruation, leeches also to the upper part of the insides of the thighs, or bleeding from the feet, and stimulating pediluvia, or the hip-bath; the use of *mild mercurials*, or alterative and deobstruent medicines, such as the pills previously prescribed (§ 18.); the blue pill, or the hydrargyrum cum creta with soda and taraxacum; Harrogate, Barège, and other sulphureous mineral waters; the decoction of dulcamara, liquor potassæ, and chlorine or sulphureous fumigating baths; are severally of advantage in some cases. But from none of these will any permanent benefit be derived, unless the regimen presently to be noticed is rigidly observed, and the pathological relations of the eruption appropriately treated.

29. Blood-letting in this, as well as the foregoing species of the eruption, was strongly insisted on by Ambrose Paré; and certainly in the cases pointed out as requiring this practice should never be omitted; more particularly when accustomed discharges have disappeared, as the hæmorrhoidal flux and the menstrual evacuation. In this form of the disease, much advantage will sometimes be procured from the *nitro-muriatic acid* foot-bath; and from a lotion with these acids applied to the affected parts twice or thrice a day (see F. 4, 5.). This practice has received the sanction of MM. Biett, Cazenave, and Schedel. The advantages to be derived from the use of these acids as a lotion will be more certainly secured by applying a few leeches to the vicinity of the eruption, and afterwards a fomentation, which may be followed either by a spirit and alum or zinc lotion, or by

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* Prepared by subliming equal quantities of the corrosive sublimate and murias ammoniæ.

the lotion with the sub-borate of soda (F. 334.). If these fail, the nitro-muriatic acid lotion may be employed. Stimulating and irritating applications ought to be avoided; and whilst the tone of the digestive organs and the secretions of the liver should receive the closest attention, drastic and cold purgatives are to be avoided.

30. 5th. The *treatment of the syphilitic* or specific form of acne must be directed as in other states of secondary venereal disease. At the same time, however, that the mercurial preparations are being exhibited, the external means which have been recommended may be employed, according to the particular form the acne may assume. The mercurial preparations should be combined with sarsaparilla or taraxacum, or both, and with small doses of antimony. The decoction of Feltz, which chiefly consists of a combination of these remedies (see F. 588.), is much employed in these eruptions on the Continent, and may be taken to the extent of a pint and a half daily. When the tubercles remain long, the ointments formed with the iodurets of mercury or sulphur (F. 774, 775.) may be employed twice daily, and assisted by douches of vapour.

31. The *diet and regimen* of persons affected with acne, particularly the A. rosacea, ought to be carefully restricted. In the A. simplex, indurata, and punctata, the diet should be light, nutritious, and easy of digestion. Cold, raw, and indigestible vegetables, particularly cucumbers and melons, and very cold fluids, should be avoided. Moderate and regular exercise in the open air, and early rising, as tending both to promote digestion and invigorate the frame, are always of service. In the *acne rosacea*, more will often depend upon regimen, than upon the medical treatment of the patient. The careful avoidance of all its exciting and concurrent causes, and of excesses of every description, both in eating and drinking; the adoption of a mild farinaceous diet, with a small portion only of light and nutritious animal food, and of toast-water or barley-water for drink; shunning mental excitement and depression, as well as heating and fatiguing exertions; gentle and regular exercise, and attention to the promotion of the secretions and functions of the abdominal viscera; are essentially requisite to the removal of this very obstinate and often unconquerable eruption.

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ADHESIONS. Syn. *Adhésions*, *Adhérences*, Fr. *Die Anhänglichkeit*, Ger. *Congiunzioni*, *unioni*, *aderenzæ*, Ital.

Classif. Morbid Structure. — Therapeutics. Chiefly a result of some one of the *Inflammatory States*. — See Inflammation.

1. *Adhesions* of opposite surfaces of tissues are amongst the most common organic lesions presented to our view in post mortem examinations. They may be congenital, arising either from an original disposition of parts, or from intra-uterine disease. As they are commonly brought before us in practice, they are generally one of the consequences of inflammatory action, affecting the adhering surfaces, or which had affected them previously; and occur in those parts which are in contact, or so nearly in contact, that the effusion of a common product of the inflammatory act becomes the medium of union.

2. It is requisite to all adhesions, that a fluid be thrown out from the inflamed surface, previously to the adhesion being commenced. This fluid varies somewhat in its characters with the state of inflammatory action; but it soon passes into a much more consistent condition, and thus becomes the medium of adhesion. In some places it is scarcely perceptible between those parts of opposite surfaces which are naturally very nearly or altogether in contact with each other, the agglutinating medium being there so remarkably thin; whilst those parts that are further separated in their natural state, have the interstices filled up by a copious exudation. The fluid exuded in thus variable quantities, has been denominated, in its first stages, or inorganised states, coagulable and coagulated lymph, albuminous exudation, coagulated albumen, &c. When first poured out from the inflamed surface, particularly of serous membranes, it consists of a lymph-like fluid, which soon becomes somewhat opaque, more solid, and assumes the appearance of a softly coagulated albumen, — its chemical properties very nearly approaching to those of pure albumen, containing a small proportion of the usual saline ingredients of the blood.

3. The longer this matter has been effused, and the longer adhesions, which it has occasioned, have endured, the more firm and more closely resembling cellular or cellulo-fibrous tissue do they become. This change in the state of the adhesions, according to their duration, is fully stated in the article on the morbid states of *serous membranes*. It may, however, be here premised, that the medium of adhesion, which is first fluid, and afterwards albuminous and nearly solid, soon becomes partially organized; blood-vessels shoot into it, and thus opposing surfaces become more or less firmly united, according to the degree of motion occurring between them, that may either prevent their firm adhesion, or disturb it after it has been already formed, and to the state of the fluid which becomes the medium of union. In some cases this fluid is secreted so copiously, and is so deficient in the albuminous constituent, the watery part being so predominant, that adhesions are formed only in different, or in numerous and irregular points, between which serum in various states is effused, separating the opposite and partially united surfaces, stretching the adhesions, breaking down some, and reducing others to cellular bands running between these surfaces through the effused fluid, which is in such cases usually very turbid, and abounds in flakes of albuminous matter. This appearance is not unusually observed in cases of adhesion of the pleura, pericardium, and occasionally of the peritoneum.

4. The concrescible fluid, as will appear in the sequel, which is formed between the surfaces of divided structures, originates in two distinct modes, generally assumes a firmer and more fibrous character in its advanced stages, and undergoes a more marked diminution of volume than is ob-

served in those adhesions which form on serous surfaces. From this it will be apparent that adhesions are formed by the medium, 1st, of a concrete inorganic albuminous matter; and 2d, of this matter, at a later period, in a more or less organised state, and presenting various appearances, according to the length of their duration, and the nature of the inflammatory disease which produced them. It will be also apparent, from the foregoing, that the adhesion of opposite surfaces is not in itself a specific disease, but the result of disease, — generally of inflammation in some one of its grades.

5. Adhesions, in respect of their ultimate tendencies, are either *reparative* or *morbid*. M. Cruveilhier, who has divided them in two classes, according to this view, comprises under the former the adhesions between divided tissues and surfaces brought about by surgical aid; to which I may add those that take place around purulent formations, and prevent the extension or effusion of the collected matter into adjoining parts. Whilst the reparative class of adhesions are stated to form generally between divided structures and diseased surfaces, it should be kept in recollection that all the tissues do not admit of adhesion taking place immediately between their divided surfaces. Blood-vessels, nerves, muscular fibres, and tendons do not unite after division. It is the minute vessels of the cellular tissue which surrounds them, and their individual fibres, that chiefly furnish the means of their adhesion. From these vessels, if protected from the atmospheric air, a coagulable lymph is thrown out; which gradually becomes vascular, organised, and in a few days cellulo fibrous, and as firm as the parts which formed it. This newly produced substance is the medium by which the muscular fibres, or other structures which had been divided, are united; and this gradually becomes thinner and less apparent, and admits of the nearer approximation of the separated parts, until they at last seem continuous, although the existence of the medium of union may still be detected. This constitutes *primary* adhesion, the union by the "*first intention*" of surgeons.

6. When the division takes place between bones, this exudation forms the callus, into which ossific matter is deposited. Some pathologists believe that the concrescible lymph, thus furnished by the capillary vessels of the divided surfaces, particularly those of the cellular tissue, is the matrix, in which the peculiar structure, of which nerves or muscular fibres consist, is afterwards formed or deposited. But, if this were the case, the firm, and even fibrous, matter into which the medium of union is ultimately changed would at last disappear, and these structures be actually continuous. This, however, never unequivocally occurs; for, although the uniting medium is reduced to a very thin, and scarcely perceptible, substance, yet it may be made apparent by maceration and careful dissection.

7. When air is admitted between the divided structures, or when primary adhesion fails of taking place, a different process obtains; minute granulæ or carunculæ form upon their surfaces, whence proceeds at first a fluid pus, subsequently a more concrescible fluid, which forms a sort of false membrane, and which, when the opposite surfaces are kept in a state of near approximation, becomes the medium of adhesion, unless the state of the system is such as not to admit of the formation of this concrescible fluid, and of the other steps of this restorative process. When divided parts come in contact with the air, the adhesion is always formed in this manner, — by the suppurative process, whatever may be the nature of the structure which is thus circumstanced; and the false membrane, which is the medium of union, becomes more thin, firm, and fibrous, and, at the same time, less apparent with the lapse of time. This may be called *consecutive* adhesion. When the divided surfaces are protected from the air, and primary adhesion takes place, the process is more rapid; but its quickness will depend upon the quantity of blood effused between the divided surfaces. If this be considerable, one of two things will result, — either the effused blood will be absorbed, and a cyst, or cellulo-fibrous medium of union, be slowly formed, which will be gradually diminished in thickness; or the coagulum may act as a foreign substance, keep up irritation of the vessels in the divided surfaces, cause suppuration, and consecutive adhesion, with the cicatrix formed by the medium of union. (See art. Abscess.)

8. There is one important point connected with adhesions in their various states and seats, — whether *reparative* or *morbid*, whether *primarily* reparative or *consecutively* reparative, and whether taking place between cellular, serous, or other structures, — which has not received the attention from modern pathologists that its practical importance requires for it, and to which John Hunter first directed notice. I allude to the important truth, that adhesions of either of the above descriptions, but particularly the primary reparative, whether taking place between divided surfaces or around purulent formations, either will not form, or, if in the process of formation, will be dissolved, in certain states of the vital energies of the frame, and of the circulating fluid. Great depression of the vital influence will have this effect, whether it be produced by the exhaustion proceeding from profuse discharges, by contagious and other noxious miasms, by the close air of hospitals, and other places loaded with animal effluvia, by the inoculation of certain animal poisons, by the absorption of puriform or sanious secretions, or other morbid matters, into the current of the circulation, by the mercurial affection of the frame, or by the gouty diathesis. When the vital energies of the frame are greatly depressed, and the tonic action of the capillaries much relaxed, by causes acting either extrinsically or intrinsically as respects the blood-vessels, the ability of throwing out a concrescible or coagulable lymph from the divided or inflamed vessels is destroyed, and in its place is produced an ichorous serum, or sanious fluid, which may either pass out, or, if no ready outlet is afforded, will infiltrate itself through the tissues adjoining, or be partially absorbed and vitiate the perhaps already morbid blood. (See art. Blood.)

9. In order to prevent this very dangerous state from supervening in all cases where the reparative process of adhesion is required, the utmost attention ought to be devoted to the state of the vital energies, particularly as indicated by the tone and frequency of the pulse, and the states of the digestive organs. When the former becomes

very quick, and the powers of the latter fail, that much dreaded state of the frame, which is insufficient for the formation of coagulable lymph, may be considered as approaching, if it be not actually present. In all cases where blood-vessels are liable to be inflamed, this state of the constitutional powers, owing to the risk of the blood being vitiated, is particularly to be guarded against. Having advanced as much as belongs to my province respecting the reparative states of adhesion, I proceed to state briefly the doctrine of *Morbid* adhesions. The particular morbid adhesions are noticed under the articles on the pathology of the parts in which they form.

10. Adhesions in some one of the states described above (§ 1—4.) are liable to occur, as a consequence of certain grades of inflammation, in the following situations: — 1st, In the cellular tissue; 2d, between serous surfaces; 3d, between mucous surfaces; 4th, between synovial surfaces; 5th, in the internal surface of blood-vessels; and 6th, between the surfaces of morbid or accidental formations.

11. *A. Adhesions of cellular tissue.* — The first step of the process is the exhalation of a quantity of yellowish serum and of coagulable lymph into the cellules of this tissue, which ultimately agglutinates them together, upon the absorption of the former, and the concrescence of the latter. The consequence of this is, that the product of inflammation formed in the centre of the inflamed cellular tissue, consisting chiefly of the more fluid and least concrescible portion of the exhalation, is prevented from permeating the agglutinated cellules, and a barrier is set up against it. If resolution takes place and the purulent matter is absorbed, the surfaces of the cavity become united, and the medium of union is changed, as in cases of recent wounds, and in the manner described above (§ 5.). If the parts go on to the evacuation of the matter, adhesion is also effected, as in the cases of *consecutive* restorative adhesion (§ 7.); leaving, however, a cicatrix, which is gradually diminished, formed of the cellulo-fibrous medium of union. In all cases of inflammation of cellular tissues, adhesion of the cellules, from the exudation of a concrescible lymph, takes place; and it is this adhesion which forms the fibrous cysts to abscesses, isolates their contents from the surrounding structures, and in some respects excludes them from the economy. Adhesions of the cellules of this structure also strengthen the cysts of aneurisms, and form sero-fibrous cysts around foreign bodies that are accidentally lodged in it.

12. *B.* Adhesions between *serous surfaces* are the next most common; being formed through the medium, either of a more or less thick and firm inorganic albumen, in the form of a false membrane, or of this substance advanced to a more or less organised state, and assuming either the appearance of cellular tissue, with a surface partaking of the serous character, or one of the states about to be noticed. The organised nature of those adhesions has been denied by some; but the observations of Stoll, Hunter, Dupuytren, Baillie, Meckel, Home, Lobstein, Cruveilhier, Gendrin, Baron, and others, who have traced blood-vessels in them, have put the question at rest. Adhesions occur most frequently between the pleuræ, next in the peritoneum, and next to these in the pericardium. They are comparatively rare in the tunica vaginalis; and in the arachnoid they are still more rare.

13. It is not necessary to the formation of adhesions between opposite serous surfaces, that the pre-existing inflammation shall extend continuously to both. When the coagulable lymph is thrown out upon one of the two inflamed surfaces, — as, for instance, of the peritoneal surface of the small intestines, — it seems to act as an irritant to the opposite part of the omentum, with which it is brought in contact, inducing inflammation of that part only, and leaving the intervening surface both above and below it unaffected. The part thus irritated by the contact of the coagulable lymph, poured out by the part primarily affected opposite to it, becomes also inflamed, and exudes this concrescible fluid; and the inflammation thus secondarily induced in a part of the omentum may advance to the external surface of the omental duplicature, and, by means of the exudation of this product of inflammation in that situation, excite a similar state of action in the directly opposite part of the peritoneum reflected over the abdominal parietes. Thus the inflammation and its consecutive adhesions may proceed, without the disease having affected any of the continuous surfaces intervening between them. A similar circumstance is sometimes observed in respect of the convex surface of the liver and peritoneal surface of the diaphragm. Inflammation, commencing in a part only of the former, will excite it in the part of the latter exactly opposite, and be followed by adhesion; and the inflammatory action, not infrequently extending upwards through the diaphragm to the diaphragmatic pleura, will be further followed by the exudation of coagulable lymph on its free surface, which, irritating that portion only of the pulmonic pleura opposite to, or in contact with it, will inflame that part, and form adhesions with it, without affecting the continuous surface intervening between, and surrounding the adherent parts. The unadhering cavity, however, not infrequently contains a turbid or flaky serum, with patches of false membrane, arising from a less acute state of inflammatory action in those parts of the serous surface immediately adjoining the adhesions. Thus it is not unusual to find, in cases of acute inflammation affecting either the peritoneum, pleura, or arachnoid, and limited to a particular part, a similar state of disease, and the same product, formed only in the parts opposite, and most nearly in contact; whilst the continuous surfaces surrounding them are either altogether sound, or much less affected; — most commonly only so far as to give rise to a serous exudation, or slight albuminous coating in their immediate vicinity.

14. From this it will appear, that the near approach, and more especially the immediate contact of opposite surfaces, and the want of motion between the one surface and the other, will favour the formation of adhesions: thus they are most frequent at the superior parts of the pleura, between the convex surface of the liver and the diaphragm, and the serous surfaces of parts included in Herniæ. The different species of media, by which adhesions of serous surfaces are affected, are the following, according to M. Cruveilhier: — an inorganised false membrane; a filamentous adhesion, and a cellular adhesion,

in neither of which blood-vessels are evident; a permanent organised membrane; and a tuberculated membrane. All these originate in a concrescible lymph, as in adhesions of cellular tissues. (See art. on SEROUS MEMBRANES.)

15. *C.* Adhesions between *mucous surfaces* are not frequent. BICHAT denied the possibility of their occurrence, unless destruction of the mucous membrane had taken place. He was led to this conclusion more by the functions of this membrane in health and disease, than by observation of facts. There can be no doubt, however, that the opposite surfaces of canals, covered as they are by mucous membranes, occasionally adhere, in consequence of very acute attacks of inflammation; but this occurs very rarely, owing to the access of atmospheric air, to the presence of gases, to the various matters constantly passing through them, and to the nature of the fluid which usually proceeds from inflammation of these surfaces. The most common exception which takes place to the general inference adopted by BICHAT is met with in the vagina. I have observed several cases, at the Infirmary for Children, where adhesions of the opposite surfaces of this canal had taken place in consequence of inflammation,—some of them at so early a stage, that they were removed by merely forcibly separating the adherent surfaces, when the mucous membrane was found perfectly entire, but highly inflamed, and covered by an exudation similar to that which is thrown out upon inflamed serous membranes. Similar facts are recorded by MM. DUPUYTREN, VILLERMÉ, BRESCHET, and CRUVEILHIER. Adhesion also of the *os uteri*, as a consequence of inflammation, is sometimes observed. Occlusion of the Fallopian tubes, and even the adhesion of the opposite internal surfaces of the uterus, have been occasionally met with. WALTHER, RENAULDIN, and MECKEL observed these changes so often in prostitutes, that they attributed them to the frequent irritation of the parts, and imputed the barrenness of these females partly to this cause. But, in the cases of occlusion of the Fallopian tubes, more is to be imputed to the accumulation of an inspissated or albuminous mucus, the product of inflammation, which, from its tenacity and consistence, cannot flow along these tubes, than to actual organised adhesion of their opposite surfaces. The occasional occurrence of obliteration of the canals of the common bile-duct, and of the ureters from the impaction of a calculus, seems to proceed from the irritation and abrasion occasioned by calculi, and the consequent exudation of a concrescible fluid, which agglutinates their surfaces, and ultimately tends to reduce them to a cellulo-fibrous cord.

16. Adhesions are either never met with in the air passages, or so rarely, as to render their actual occurrence doubtful. I believe that, although albuminous concretions are occasionally formed in the bronchi, and frequently in the trachea and larynx, &c., they cannot be so produced as to give rise to adhesions of the opposite surfaces. They never, or at least very rarely, become organised; and, although they may completely obliterate the canals of several of the bronchi, they cannot have this effect on the trachea without causing immediate death. The organisation and form of the larger air-tubes completely prevent their adhesion; although they are often nearly filled up with concrete albuminous formations, as a consequence of certain states of inflammation. Adhesions of the internal surface of the œsophagus, or of any other part of the digestive tube, are never met with; although constriction, with thickening, &c. to the almost entire obliteration of this canal, is not infrequent. As in the air passages, nature has made in the functions, during health and disease, of the membranes which line them, sufficient provision to prevent this lesion from occurring. And we uniformly observe, when inflammation attacks any portion of those tubes, the preservation of the canal of which is essential to life, that, although a copious albuminous exudation will sometimes occur, its organisation will generally be prevented, and its detachment from the surface on which it is formed will be secured, sooner or later, by the secretion of a more fluid, or mucous, or muco-purulent matter underneath, which loosens the concrete albuminous coating or false membrane from its attachment to the surface on which it is formed. The circumstances which chiefly seem to favour the formation of adhesions between mucous surfaces, are: 1st, The abrasion of the epidermis which covers them; owing to which their secretions are changed, and they partake more of the characters of cellular tissue. 2d, Entire destruction of the mucous membrane in a great part, or the whole, of the circumference of a canal, favouring its gradual constriction, suppuration, and ultimate obliteration. The bile-ducts, ureters, urethra, rectum, and œsophagus occasionally furnish proofs of this change in some one of its stages. (See art. on MUCOUS MEMBRANES.)

17. *D.* Adhesions of the *synovial surfaces* of joints are rarely observed, excepting in cases of anchyloses, of which they cannot be considered even as the commencement, although they may accompany the earlier stages of this change, particularly in anchyloses consequent upon rheumatism. Many, however, of the alterations which take place in the synovial apparatus of tendons are consequent upon their adhesion and obliteration. Inflammation occurring in them primarily, or extending to them from contiguous parts, is generally followed by their adhesion, and reduction to a state of dense cellular tissue. Hygroma almost always terminates by adhesion.

18. *E.* The adhesion of the internal surface of *blood-vessels* takes place through the medium of the coagulated lymph secreted by the inflamed vasa-vasorum. The vessel becomes impervious in consequence of this exudation, which is poured out in the form of a false membrane from its internal surface. The lymph which is exuded, particularly when its coagulable or concrescible property is well marked, frequently produces coagulation of the blood in contact with it; so that, generally, the obliteration is occasioned both by this lymph, and the coagulum of blood which it occasions. In a short time the coagulum thus formed within the inflamed blood-vessel becomes more and more pale and dense, sometimes partially organised; and, as its density is increased, so is its bulk diminished: the coats of the vessel, at the same time, lose their specific characters; they seem constricted around the substance formed within them, the middle coat becomes less distinctly fibrous, and at last they are reduced to the state of a cellular, or fibro-cellular, chord.

This may be viewed as the primary form of their adhesions, and its usual results. When, however, suppuration takes place in their internal surface, the adhesion is formed consecutively in the manner described above (§ 7.); or the primary may pass into the consecutive form of adhesion, particularly when the false membrane is insufficient to fill up the entire canal of the vessel.

19. Adhesions take place more readily in veins than arteries; are produced in both, and in lymphatics also, in the manner now stated, generally in consequence of inflammatory action, attended with sufficient power of the constitution to form concrescible lymph (see the articles on ARTERIES and on VEINS); and sometimes, even after a very slow and slight grade of this action, when the opposite surfaces of the vessels are pressed together by any tumour existing exteriorly to them. When artificially excited in arteries, as by the application of ligatures, the inflammatory state which produces the adhesion is not so prone to extend along the axis of the vessel, or to occasion dangerous effects, as when it is excited in the same way in veins. When thus produced in these latter vessels, fault of constitution, an unhealthy habit of body, unwholesome state of the atmosphere, &c., or the other causes above assigned (§ 8.), will generally interfere with the process, and occasion that state of morbid action, and of its products, which will vitiate the current of the circulation, and even destroy life. (See VEINS — *Inflammation of*.)

20. *F.* Adhesions of the internal surfaces of cysts, and other morbid formations, sometimes take place from a consecutive state of inflammation extending to them. Large cysts, which in consequence of their situation cannot be removed, may be obliterated by their puncture, and the production of inflammation of their internal surfaces, so as to procure their adhesion.

21. *G.* Adhesions may also form between parts of the cutaneous surface, when deprived of the cuticle, and kept in close contact. This is not infrequent after scalds and burns, and is produced in a similar manner, as I have explained, in respect of adhesions taking place primarily, and without suppuration, or subsequently to the occurrence of this process in the cellular and mucous tissues. Adhesions also occur in other situations, as between the iris and capsule of the crystalline lens, &c.; but I have noticed those which more especially belong to my province.

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ADIPOSE TISSUE. *Tela adiposa*, Lat. *Tissu graisseux*, Fr. *Das Fett*, Ger. — ITS MORBID STATES.

CLASSIF. IV. CLASS, IV. ORDER (*Author, see the Preface*).

1. The adipose substance is frequently either *diminished* or *increased* far beyond the healthy standard. — *A*. Excessive diminution of this substance, *atrophy*, occurs naturally in very aged persons; and there seems to be, even in early life, a tendency to it hereditarily in certain constitutions, particularly in those of a peevish, anxious, and irritable temper. It is often met with as a consequence of, or conjointly with, pulmonary and other organic diseases, particularly those which interrupt assimilation and the supply of nutrition. But it is also a symptom of all diseases which impair the vital energies by morbidly increasing the secretions and evacuations; as in diabetes, diarrhœa, and dysentery. It also necessarily proceeds from long abstinence, &c.

2. Atrophy of this substance may be temporary or permanent. It is usually the former in early or middle life, and continues merely as long as the causes which occasioned it. It is usually permanent in advanced life, and in those of an active, peevish, restless disposition. In every case the removal of the fatty matter is produced by absorption; and, according to the experiments of MAGENDIE, TIEDEMANN, GMELIN, MAYER, &c., this process may be ascribed, at least in part, to the minute veins. The circumstance of fatty and oily matter being constantly found in the blood, but in variable quantity, as shown by TRAIL, BABINGTON, LE CANU, &c., seems to support this view; for, if taken up by the absorbents, it may have been changed or assimilated in its passage through the absorbent glands before it could have reached the blood.

3. *B*. *Excessive deposition* or *hypertrophy* of this substance (*adiposis*) is very common, affecting the body generally, but sometimes locally only. Persons have weighed as much as 500 or 600 lbs. owing entirely to this state of hypertrophy. This tissue is naturally abundant in females and eunuchs. Its hypertrophy is frequently occasioned by excessive venereal indulgences, particularly in early life, and when conjoined with high living and indolence. It generally is attended by a weak languid circulation, weak digestion, with craving appetite, defective secretions and excretions, and disinclination to active mental or physical exertion. It also evinces a marked hereditary character. Full living, particularly on food which abounds with the elements of the fatty substance, as sugar, spirituous and malt liquors, &c. tend greatly to promote it. The connection of this morbid state with deficient assimilation appears fully proved. It would seem that in persons whose vital energies are diminished, whilst the appetite remains unimpaired, or is excited by stimulating liquors, &c., the sanguifaction of chyle does not take place so rapidly nor so perfectly as in health; that a large portion of this fluid assumes an oily or fatty character, and is deposited in the adipose tissue, which thus becomes one of the emunctories of the frame, in which a substance that cannot readily be carried out of the circulation by any other organ is set apart for the purpose of future absorption, assimilation, and nutrition, as the wants of the system may require, and to prevent its hurtful accumulation in the circulating fluid. Thus, in persons otherwise apparently healthy, the excessive accumulation of fat is often one of the earliest and most remark-

able signs of diminution of the vital energies of the frame. (See Art. OBESITY.)

4. *C.* In many instances, when the powers of the constitution are either greatly reduced or otherwise perverted from the healthy state, the adipose matter is also changed in *colour*, *composition*, and *consistence*, becoming remarkably pale, or dark, reddish, or gelatinous. It may likewise be, particularly in cachectic persons, uncommonly watery, soft, smeary, or jelly-like; and, on the contrary, but more rarely, hard, waxy, or even horny.

5. *D.* It may be a question whether or not this tissure is liable to *inflammation*. Considering it merely as a modification of the cellular structure, chiefly in as far as it contains the fatty substance of the body deposited in its areolæ, the containing tissue only must be looked upon as that which is liable to inflammation or any other disease; the fat or contained matter being entirely passive, and modified only by the morbid states of the tissue which secretes and contains it. There seems little doubt that the adipose tissue participates in the various states of diffuse inflammation; whether that attending upon certain forms of erysipelas, or following accidents, or the inoculation of morbid matter. When thus inflamed, it rapidly passes into a state of sloughy and fetid suppuration; large portions of it being not unfrequently converted into an ash-coloured, semifluid pulp, mixed with shreds of cellular tissue and albuminous matter, or becoming entirely sphacelated.

6. *E. Effusion of blood* into the adipose tissue occurs under similar circumstances to those connected with hæmorrhage into the cellular substance, but much less frequently. This change has been occasionally noticed by HUXHAM, CLEGHORN, CRAIGIE, and by myself and others, in scorbutus, purpura hæmorrhagica, and in the liquescent or malignant forms of remittent fever in warm or unhealthy climates.

7. *F.* Of the *tumours* most frequently developed in this tissue, the most remarkable are, — *a. adipose sarcoma*, which is surrounded by a thin capsule of cellular tissue condensed around it, and consists of an unusual accumulation of fatty matter in cells, the component fibres of which are so firm as to give consistence to the tumour: it closely resembles a local hypertrophy of the adipose tissue, excepting that it is surrounded by a capsule; and it may have either a broad or narrow base: *b. steatomatous* tumours are chiefly a peculiar modification of the fatty secretion, which is accumulated in masses, surrounded by a spheroidal cyst: they are not formed of cells, in which the fatty matter is deposited, but consist of a simple semifluid substance secreted by the inner surface of the cyst: they occur more frequently in the cellular, than in the adipose tissue: *c. atheromatous* and *melicerous* tumours are either modifications of the steatomatous, or proceed from the change induced in small chronic abscess; but they are most commonly the former when seated in this tissue.

8. *G. Melanoid* deposition is sometimes found in both the internal and external adipose substance. It may be either disseminated in the form of small inky spots, or accumulated in spheroidal masses; or found in a semifluid state and brownish-black colour, surrounded by a cyst formed by the condensation of the contiguous cellular tissue. As to the state in which this peculiar matter is formed, great diversity of opinion exists. LAENNEC supposed that it is first secreted in a solid form, and, like tubercular deposits, afterwards becomes soft. I am, however, inclined to adopt the opposite opinion; viz. that it is secreted in a fluid or semifluid state, and that it afterwards becomes firm by the absorption of its more fluid parts. The observations of DRS. CULLEN and CARSEWELL, and of M. CHOMEL, seem to confirm this opinion.

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AFTER-PAINS. SYN. *Parodynia Secundaria Dolorosa*, Good.

CLASSIF. 5. *Class*, 3. *Order* (*Good*). II. CLASS, III. ORDER (*Author*).

1. DEFIN. *Pains, more or less severe, either continuing or supervening shortly after the expulsion of the placenta in child-birth.*

2. SYMPTOMS and DIAGNOSIS. Attacks of pain in the abdomen are usually experienced in the early part of the puerperal state. They proceed, when very severe, from the contraction of the uterus, irregularly excited by the presence of coagula. They usually soon follow delivery, are least severe after a first labour, are increased upon the application of the child to the breast, and last for a day or two. They are generally aggravated by flatulence and costiveness.

3. It is extremely requisite for the young practitioner to be on his guard respecting the nature and seat of pain after delivery, as the commencement of the most fatal diseases to which the sex are liable may be mistaken, if not carefully observed, for after-pains. These latter are the result of the natural contractions of the womb, and of its return to its former state; and are distinguished from disease, particularly inflammations of the uterus, ovaria, or pelvic peritoneum, by their remissions, and by the absence of tenderness or tension of the abdomen, especially on pressure. The uterine discharge also is not obstructed; the milk is secreted; there is no shivering nor vomiting; and the pulse is seldom increased in frequency.

4. When the patient's bowels have been neglected previously to confinement, and when much flatulence exists, the after-pains are often *complicated* with *colic*, or they assume a *colicky character*. In cases of this kind the abdomen is often somewhat more tense and distended than usual; the fits of pain are severe, with complete remissions; the patient complains of flatulence; the bowels are constipated: but the pulse is not much affected; the skin, particularly of the trunk, is not hot; the tongue is moist; and the feet are often cold; in a few cases there is retching. It is important to attend carefully to the character of pain consequent upon delivery, and to consider it in relation to the attendant symptoms, particularly the states of the pulse, and of the abdomen. We ought, therefore, to enquire into its exact seat, examine the pained part carefully with the hand; and, having ascertained in what manner it is affected by the examination, we readily arrive at just conclusions as to its nature. When it is felt in the regions of the uterus and ovaria, and accompanied by great fre-

quency of pulse, disorder of the lochial discharge, tenderness, and fulness of the hypogastric region, &c. the existence of the inflammatory diseases of the uterus, and of its appendages, are to be inferred. If it be complained of about the groin, it may be the forerunner of phlegmasia dolens; and if it be felt about the hip, or in the muscles of the pelvis, abdomen, or thighs, it may be rheumatic, owing to the application of cold in some form or other. The pains of rheumatism are readily recognised from their seat, their aching or gnawing character, the manner of their affecting the motions of the part, and the attendant symptoms. The diagnosis, however, of these diseases is fully pointed out under their respective heads.

5. Treatment. The exhibition of an anodyne, with attention to the state of the bowels subsequently, has generally been considered sufficient for the relief of after-pains. In the more severe cases, an anodyne liniment has been recommended to be applied to the abdomen, in addition to the exhibition of a dose of laudanum internally; and in protracted cases, Dr. Burns advises a purgative — certainly the best part of the treatment usually resorted to. I am, however, of opinion, from remarking the results of this practice, that the common or less urgent cases would have been better left to nature; and that friction of the abdomen merely with any of the liniments in the Appendix (F. 297, 298.), or friction followed by a purgative, or an enema, is all that is necessary. We ought to recollect that these pains are merely the result of the healthy tonic contractions of the uterus upon the congested veins, and the coagula remaining in it, occasioning their expulsion, and the discharge of the blood accumulated in its sinuses; and that the more effectually these ends are accomplished, particularly in unhealthy situations, and lying-in hospitals, the less risk will there be of the occurrence of dangerous forms of puerperal disease.

6. Whilst, however, anodynes allay the morbid sensibility of the uterus, they tend to diminish its tonic contraction, to induce a congested and relaxed state of its parietes and mouth, and to favour the admission of air into its cavity. Air, when admitted, particularly under certain circumstances, is productive of the most dangerous results, from its effects upon that portion of the surface of the womb to which the placenta was attached. Impressed with the justness of this view, I have usually recommended frictions with liniments over the region of the uterus, and a purgative, or purgative injection, which will tend essentially to favour the contraction of the uterus, and the expulsion of the cause of irritation.

7. In cases complicated with flatulency and colic (§ 4.), the above means are still more requisite; but much will depend upon the choice of purgatives. My own experience, derived entirely from consultation, is decidedly in favour of a draught, consisting of half an ounce of the oleum terebinthinæ, combined with the same quantity of oleum ricini; or an enema, containing the same medicines. The combination, also, of a purgative with assafœtida, or any other antispasmodic, and an injection, consisting of infusion of valerian, or containing assafœtida, with a due proportion of any aperient medicine (see F. 130. 135. 138.), will seldom fail of giving relief, by removing flatus, and promoting the restoration of the uterus to its natural state. In the more urgent cases, anodynes may be conjoined to the foregoing means; for, when thus associated, they will not act in preventing the contractions of the uterus. (For Hysteralgia, and the various diseases of the uterus in the puerperal and unimpregnated states, see Uterus.)

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AGE. Syn. *Ætas*, Lat. *Das Alter*, Ger. *Age*, Fr. *Eta*, Ital.

Classif. — Pathology and Therapeutics.

1. In the succinct view I purpose to take of the pathological and therapeutical indications which this subject will naturally suggest to the mind of the practical physician, I purpose, *first*, to sketch the successive epochs of life, and thus consider the word in its *generic* acceptation. When I arrive at those periods of existence to which the word *age* is specifically applicable, the changes which take place in the human frame, in respect both of organisation and function, with the advanced progress of years, — with age in its *specific* acceptation, will be fully stated, as furnishing important data for practical indications in the treatment of diseases of this epoch.

2. Of Age in its generic Acceptation, — *or different Epochs of Life*. Before I proceed to consider the subject in its enlarged point of view, I may briefly advert to the periods into which the usual natural duration of human existence may be divided. Without occupying my limits with the divisions adopted by ancient and modern writers, I shall adopt that arrangement of the different epochs of life which has been suggested to my own mind, from observing the varying manifestations of life and function, and the modifications of diseased action with advancing age. The division which I have thus adopted may require more to be said in support and illustration of it, particularly in respect of its physiological relations, than I am willing to advance on a subject which may be considered as nearly verging on the speculative. Leaving, therefore, out of sight many of the physiological and psychological views, which would arise out of an extended investigation of the subject, I shall merely briefly advert to topics of practical importance; — those which concern the medical jurist fall not within the scope of this work. (For epoch of *fœtal life*, see Fœtus.)

3. Before proceeding to consider the different periods of age individually, it may be useful to exhibit a view of the arrangement I intend to follow: —

I. Period, or *that of Infancy*.
    1st *Epoch*, to the commencement of the first dentition.
    2d *Epoch*, from the commencement, to the completion of the first dentition.
II. Period, or *that of Childhood*.
    Extending from the completion of the first to the completion of the second dentition.
III. Period, or *Boyhood — Girlhood*.
    From the seventh or eighth year to the commencement of puberty.

IV. PERIOD, or *Adolescence.*
  Commencing with the first appearance of puberty, and extending to adult age.
V. PERIOD, *Adult Age.*
  1st *Epoch*; or early adult age, or confirmed virility.
  2d *Epoch*, or mature age.
VI. PERIOD, *Declining and Old Age.*
  1st *Epoch*, declining age.
  2d *Epoch*, green old age.
  3d *Epoch*, advanced old age, ripe old age.
  4th *Epoch*, decrepitude, second infancy.

4. I. PERIOD, or that of INFANCY, (*Infantia*, from the privation of speech,) commences with birth, and extends to about the end of the second year, when the first dentition is completed. It may be divided into two epochs; the *first* beginning at birth, and extending to the sixth or seventh month, when dentition is fully commenced; the *second* proceeding from this age to the end of the period, the completion of the first dentition, when the relations of the young being with the external world are fully established by the developement of the sensorial and locomotive organs.

5. *A*. During the *first* epoch, or that preceding the commencement of dentition, all the structures are merely in the course of developement; particularly the osseous system, the cerebro-spinal nervous system, and the organs of locomotion. The functions are only acquiring activity, and several of them have not yet appeared. The vital phenomena gain strength, whilst certain of those functions, by which the young being is to hold converse with the objects around him, either begin to dawn, or have not yet merged into existence. The manifestations of life are chiefly vegetative, and the movements automatic. The *attitudes* are generally without variety, and the changes of the countenance express merely pleasure and pain to the spectator; but, to the medical observer, they convey important information, and often all that he can obtain respecting the maladies incidental to this period of life. At this epoch, the position of the limbs, the character of their motions, the cry, and its numerous varieties; and especially the changes of the countenance; the state of the eyes and eye-lids; the openness, contraction, &c., of the eye-brows; the appearance of the lips and nostrils; of the mouth, gums, and tongue; — all furnish means of ascertaining the nature and progress of disease.

6. *a*. At this age the organs of digestion are unsuited to any other food than that derived from the breast of the mother; and so little capable are they to assimilate any other, even of the blandest and most digestible kind, or the milk of other animals, that very few, not more than one in six or seven, ever arrive at the more advanced periods of life who are deprived of the kind of nourishment nature intended for this epoch. At this age the system is extremely susceptible of external impressions acting upon the lungs, surface of the body, and digestive organs; and particularly to the influence of cold. Recently removed from a constant and unvaried warmth, and having heretofore existed with all the mucous surfaces shut from the action of foreign agents, the young infant imperatively requires to be preserved, particularly during the first months of this epoch, from the influence of a low range of temperature, and from its sudden changes. The disposition to increased action in all the mucous membranes, and the great susceptibility of the respiratory nerves, require the surface of the body, and particularly the organs of respiration, to be guarded from atmospheric vicissitudes; the chief source of the diseases which are so prevalent and fatal at this age. A similar susceptibility of the digestive mucous surface also exists, and is but too frequently evinced by the slightest change in the milk of the mother, or addition of articles of food unsuited to the state of the digestive organs. Much of the mischief, however, which improper ingesta are calculated to produce is guarded against by the copious secretion of mucus, with which the internal surface of the stomach and bowels is covered, particularly in very early life.

7. The susceptibility of the mucous tissues to stimuli and irritants, and their proneness to inflammatory action at this age, extend also to the cutaneous surface, as shown by the frequency of acute exanthematous diseases, and of chronic eruptions. The intimate sympathy existing between both these structures is very strikingly evinced, by the frequent association of inflammatory excitement of the mucous surfaces, particularly of the digestive canal, with a similar affection of the skin. The co-existence and close connection of inflammatory irritation of the digestive mucous surface, and an analogous state of disease of the brain and its membranes, or the supervention of the latter on the former, are also often observed. During the first months of existence, vascular action in the brain is prominently developed, and engaged in perfecting the organisation of this organ: and partly owing to this circumstance, as well as to the quantity of blood sent to it, compared with the rest of the body, and to the various causes tending at this age to derange its circulation, is readily kindled into an inflammatory state of its substance or membranes, giving rise to active congestions, effusions of fluid in the cavities and between the membranes, and to various other organic changes particularised in their appropriate articles.

8. *b*. With the susceptibility to be impressed by the causes of disease, evinced chiefly in the nervous centres and mucous surfaces, and producing their effects, not only on them but also on the serous cavities, there is intimately connected a marked disposition to be affected by medicines, which exert their influence in an especial manner upon the nervous system. Of these the most remarkable are narcotics and irritating stimulants. The susceptibility to the influence of the former, particularly the preparations of opium, and their effects, primarily in increasing vascular action in the brain, and secondarily in favouring congestion in the same organ, according to the dose, have appeared to me so important, that, during an extensive public practice amongst this class of subjects, I have scarcely ever ventured, during this epoch, on the exhibition of these medicines, excepting under peculiar circumstances, which will receive a more particular notice in other places. A similar caution is also necessary in the use of stimulating and irritating substances. The aperient medicines which are so often re-

quired at this age should be chiefly of a mild and unirritating quality; and, whilst cold and moisture must be avoided, too warm clothing, particularly of the head, ought to be equally shunned. Exposure to a mild, healthy air, frequent ablutions of the surface, with cold water during the latter part of this epoch, — commencing first with warm water, and passing on to the use of tepid, and afterwards of cold water, as the infant increases in strength, — followed by frictions, and careful attention to the state of its evacuations, are means which should not be omitted in the management of this period of life. Although cold bathing is generally beneficial after the first months of infancy have elapsed, care should be taken not to subject the infant to the influence of cold beyond a minute or two, or longer than may be requisite to the perfect ablution of the surface; for, at this epoch especially, the impression of cold continued for any considerable time depresses the vital energies, and prevents the developement of that state of healthy secretion on the surface, which usually follows the momentary or brief action of cold, particularly when followed by dry frictions.

9. *B.* The *second epoch* of this period, extending from the commencement of the first dentition to its completion, embraces also the important period of weaning. The natural changes proceeding in the different structures and functions during the *first* epoch also continue through this. As this period advances, the functions of external relation, particularly speech and voluntary locomotion, commence, the phenomena of perception are more perfect, and the manifestations of mind begin to appear. The instinctive desires and emotions become more and more evident and active, and furnish, with the other functions, important indications of disease, and of the means of removing it. The susceptibility of the nervous system, and of the mucous surfaces, to be impressed by the usual exciting causes of disease, — particularly by cold, moisture, atmospherical constitutions, and vicissitudes, contagious or infectious miasms, and errors of diet and regimen, — is unimpaired.

10. *a. Teething*, which terminates the preceding epoch, and ushers in this, is commonly connected with more or less disorder of the system. In infants of a healthy constitution, and in whom the powers of life are energetic, disorder is scarcely perceptible unless from the operation of very efficient causes; but in those who are debilitated, whose conformation has been originally feeble, or imbued with any hereditary taint or morbid diathesis, or who have been weakened by unwholesome food and impure air, this process is often attended with great disturbance in the frame, and, owing to the morbid sensibility and irritability it excites, frequently kindles up most dangerous disease. During the process of *teething*, particularly at its early stages, the itching and irritation of the gums are a constant source of excitement, or focus, whence irritation extends to the salivary apparatus, as proved by the increased flow of viscid saliva. The continued desire evinced by the little patient to allay the itching of the gums, by pressing between them whatever it can lay hold of, and the evident distress expressed by it if this sensation, which is known to be more insupportable than pain, cannot be allayed, are indications which ought not to be overlooked. If this distressing sensation be not allayed by judicious means, the nervous system becomes inordinately excited, febrile commotion is induced, the functions of digestion are disordered; and we are, consequently, not infrequently called upon to remove inflammation of the membranes or substance of the brain, various convulsive affections, and inflammatory disorder of the digestive mucous surface, owing to the extension of irritation along the alimentary canal, as well as to the acidities formed in the stomach and bowels, from the imperfect digestion of the food. During dentition also, a marked disposition seems to exist in the pancreas to become excited, owing to its close sympathy with the salivary apparatus; and I am persuaded that several states of diarrhœa observed at this epoch originate in, or are perpetuated by, an increased secretion of pancreatic fluid.

11. Owing, moreover, to the excitement and irritation existing in the gums, affections of the respiratory and digestive mucous surfaces are more frequently associated with one another, and with increased vascular action in the nervous centres and their envelopes. It would seem that the irritation existing in the mouth disposes, from its influence on the nervous system, the mucous membranes not only to be invaded by the exciting causes of disease, but also to undergo the morbid action throughout. How frequently has the experienced practitioner observed inflammatory irritation of the digestive and of the respiratory mucous surfaces associated in the same case; and how often has he had cause to suspect the rapid supervention of irritation of the membranes of the brain, or of the brain itself, either with or without effusion, upon inflammation of the digestive mucous surface!

12. *b. Weaning.* — During this epoch *weaning* must take place. This should not be earlier than the eighth or ninth month, or later than the fifteenth; and the infant ought to have, at least, four teeth quite through the gums before it be commenced. The milk of the mother is the infant's only food during the greater part of the preceding epoch, or, at least, until the fourth or fifth month, unless the mother and child be in a weakly state. From this age upwards it requires food in addition to the nourishment afforded by the mother; but this must be given at first in small quantities, and not oftener than twice daily.

As the period of weaning approaches, food in larger proportion, and increased frequency, is necessary; and as soon as it shall have got teeth to masticate animal food, this may be given it in small quantity, and at first only twice in the week. Animal diet is seldom required before the completion of the first year, or previous to weaning; afterwards it may be given in gradually increased frequency, as the termination of the epoch approaches.

13. Whilst the infant is liable to most of the maladies which affect it during the first months, it is now also exposed to the invasion of many more; owing to the excitement occasioned by teething, the state of the milk, particularly during the last months of lactation, and the errors in respect of both the quantity and quality of the food. At the same time, however, its vital energies are more developed, and its functions more

perfect; and thus increased resistance is opposed to the extension of disease, and to its disorganising effects. All infectious and exanthematous disorders are very prevalent at this age; and, in addition to the maladies of the mucous surfaces already alluded to, the lymphatic glands, particularly those of the abdomen and thorax, are frequently the seat of disease; and worms often begin to form, particularly after the period of lactation. At this age also, owing to the changes in the infant's food, as well as to the irritation occasioned by dentition, the disorders which originate in depraved or imperfect digestion and assimilation are especially prevalent, particularly aphthæ, rickets, tubercules, marasmus, and tabes mesenterica, remittent fever, scrofula, and numerous cutaneous eruptions.

14. *c.* The *therapeutical* indications at this epoch chiefly relate to the care which is required to preserve the head cool, and ward off the vascular excitement to which it is liable. Anodynes are less injurious at this period than in that preceding it, and are often required, particularly in soothing the irritability of the nervous system arising either from difficult dentition, from the exhaustion occasioned by previous treatment, or by disease, and particularly in the advanced stages of whooping-cough and croup. The state of the gums requires particular attention; and where there is evidence of itching, this sensation requires to be allayed, first, in the way that nature points out, by pressing hard and smooth substances between the gums, as a coral, ivory ring, and what is best, a gold ring, when this may be directed. If the least appearance of local affection, as tumefaction, redness, &c., or even merely constitutional disturbance, manifest themselves, the gums should be freely and deeply scarified. Aperients, of a mild and cooling nature, are often required during this epoch; and in it, as well as in the preceding, blisters, even for a few hours only, particularly when the respiratory mucous surface is obstructed and its functions interrupted, or when the energies are exhausted and the vital resistance consequently reduced, must be employed with extreme caution, and give place to the use of those liniments which I shall have occasion to recommend as substitutes for them under such circumstances.

15. II. Period, or that of Childhood (*Pueritia*), extends from about the second to the seventh or eighth year, when the second dentition is completed. During this period the developement of the different textures and organs proceeds rapidly, and their functions are more and more perfect. The mental manifestations, particularly those which are intellectual, are developed, and the various moral emotions gain strength. The distinctions which exist between sexes throughout the whole physical and mental constitution at more advanced ages have not yet appeared. All the soft solids of the body evince increasing firmness, vital cohesion, and elasticity, and are protected by a firm covering of adipose matter below the integuments, and in the interstices between the muscles.

16. *a.* If the constitution be not vitiated by hereditary or acquired taint, defective nourishment, or previous ailment, or if the causes be not of a depressing nature, disease at this period assumes the sthenic character. Febrile diseases are generally acute; and, unless proceeding from sources of infection, usually the result of local inflammatory action, which evinces a marked disposition to terminate in the formative process, or effusion of coagulable lymph, particularly when the serous surfaces are implicated. The susceptibility to infectious diseases, particularly those with exanthematous symptoms, is very great; as well as to inflammations of the different textures and organs — to pneumonia, bronchitis, cerebritis, meningitis, gastritis, enteritis, &c.: besides these, glandular obstructions, chorea, verminous diseases, epilepsy, and the various forms of angina, are very prevalent at this age, particularly in those whose digestive organs have been neglected, and when morbid matters have been allowed to accumulate in the prima via.

17. *b.* The *therapeutical* indications applicable to this age present few peculiarities, besides the necessity of resorting to active depletions, with a cooling regimen and alvine evacuations in the majority of its diseases; and the keeping in recollection the tendency of mucous sordes and secretions to form and accumulate on the digestive mucous surface. Such accumulations furnish a nidus for the generation of worms, and sources of irritation to this surface itself, and to the nerves proceeding from it; and originate many of the affections which appear at this, and a subsequent period of existence. The necessity of enjoying, and the injurious consequences of the privation, of wholesome nourishment and active exercise in a pure atmosphere, and the advantages of sleeping alone in a large well-ventilated apartment, should not be overlooked, in their relation both to the production and to the removal of disorder. The employment of the faculties of the mind during this early stage of their developement should be left, until the last year or two of this period, more as a matter of amusement than of exertion; and, even then, greater attention should be paid to the developement of the physical powers, — the organisation upon which sound mental manifestations very intimately depend, — than to the precocious and even hurtful excitement of faculties which are merely budding into existence. The emotions of mind, however, particularly those which are connected with temper and disposition, ought first to receive attention; strict control cannot be prematurely applied in this direction. In this and the preceding epochs of life, it is indispensably requisite not to allow the child to sleep with persons in bad health, or who are far advanced in life.

18. III. Period, or Boyhood — Girlhood. From the seventh or eighth year to the epoch of commencing puberty, is chiefly characterised by the continued growth of all the structures, and the developement of the manifestations of mind. Towards the middle and end of this period the physical and mental distinctions of sex become more and more apparent. *a.* The frame, when free from disease or hereditary taint, evinces a sthenic diathesis, a predominance of the sanguine, or sanguineo-nervous temperament, and a liability to nearly the same diseases, particularly those proceeding from infection and inflammation, that prevail during childhood. There is a greater liability to be affected with idiopathic continued fever, with scrofulous enlargements and inflam-

mations, particularly of the lymphatic glands; with various nervous affections, as epilepsy, convulsions, chorea, &c.; with cutaneous eruptions; with inflammations of the throat and air-passages; with tubercles, especially in the lungs and alimentary canal; with flexures of the spinal column, and with verminous diseases. The nervous system possesses great susceptibility of impressions, moral and physical; and inflammatory action has a marked disposition to give rise to new formations, unless when appearing in the advanced stages, or as a sequela, of eruptive or infectious fevers, when it generally occasions serous or sero-albuminous effusions.

19. *b.* The diseases of this period generally require antiphlogistic remedies and evacuations, especially purgatives, either alone or in suitable combination, unless proceeding from depressing causes, particularly those of a specific kind; and even there the necessity of resorting to alvine evacuations, by means of laxatives, or purgatives combined with tonics, is imperative. The vital resistance is usually well marked, excepting in those who have been deprived of wholesome nourishment and pure air, or whose constitutions are radically in fault; and in these, whilst tonics and other means of restoration are required, the due evacuation of morbid secretions and accumulations is equally necessary. Care also should be taken during this, as well as in the preceding period, not to allow the young to sleep in the same bed with the old, nor even with those advanced in age or debilitated, nor with too many — not more than three — in the same sleeping apartment, which ought to be large and well aired. Want of attention to this, is one of the chief causes of disease in early life in London, and other large towns. Academies and boarding schools for both sexes are continually furnishing numerous proofs of this too generally overlooked cause of disease, not only at this, but also at a later stage of life. Attention is also necessary to the exercises of both the mind and the body. Active amusements in the open air are now particularly required. As this period advances, the mental powers acquire such a degree of developement as to admit of their further improvement and active exertion, — not only without risk to the organisation with which they are related, but with the certain prospect of advancing them nearer to the perfection to which our natures may attain.

20. During this and the earlier terms of life frequent changes of locality and of air, particularly from one healthy and open situation to another, and especially to one which is more salubrious, where this can be attained, are extremely beneficial, both in promoting the developement of the frame and in removing diseases, particularly those of a chronic kind, or which affect the digestive and assimilating organs. In many of these diseases I have often derived more advantage from change of air than from the use of medicine. But, during advanced convalescence from these and febrile diseases, the benefit deprived from change of locality is most remarkable.

21. IV. Period, or Adolescence, commences with the first appearance of puberty, and extends to the twentieth year of females, and the twenty-fourth of males. Puberty appears at various ages, according to the climate, the circumstances connected with education, and the constitution of the individual. The usual period in this country, is from the twelfth to the fourteenth year for females; and from the fourteenth to the sixteenth for males. In the northern parts of the island, it is often a year or two later in both sexes. It is often observed earlier in boarding-schools, both in respect of males and females. In the latter (in London or its vicinity), I have not infrequently met with instances of menstruation at ten and eleven years; especially in sanguine and plethoric constitutions; and where the apartments, particularly those for sleeping, have been crowded and close.

22. *a.* This is one of the most important epochs of human existence: for during it the natural developement of the sexual organs imparts a healthy and tonic excitement throughout the economy; bringing to their state of full perfection all the organs of the body and all the manifestations of mind, excepting those that are derived from experience. The organs of respiration and voice have acquired their full growth and tone, the muscles their due proportion, and the cerebro-spinal nervous system its beautiful organisation; placing man, by the exercise of its admirable functions, at the head of all animated creation, — the dread of all other animals, the wonder of himself. It is chiefly during this period of life that the mind becomes stored with ideas, derived both from the learning of the ancients, the science of the moderns, and the arts and accomplishments of highly civilised life; and is more particularly and more ardently engaged in decomposing the information thus acquired, and recombining it in new and useful and attractive forms.

23. As the functions and destinies of this period are important, so they require the supervision of the experienced and the good. For, with this developement and activity of both the physical and mental powers, the instinctive feelings and emotions of our nature have also reached the utmost limits of their activity; and many of them, particularly those which are related to the perfect condition of the reproductive organs, acquire an ascendency, that both the dictates of reason and moral restraint are required to control. Hence the propriety, both at this and the preceding period of life, of improving the moral affections of the mind; of inculcating sound principles of action and conduct, founded on moral and religious obligations; and of placing them in such relations to the feelings, the intellectual manifestions, and, moreover, to the accomplishments, the elegancies, and the endearments of life, as to render them attractive to a state of mind and constitution which is more easily allured by example than taught by precept.

24. The practices which both sexes are liable to acquire at this period of life, and to which they are more commonly addicted when they associate in numbers at seminaries and academies, demand the strictest supervision. They have been too generally overlooked, both morally and medically, from the circumstance of their consequences having been imperfectly appreciated. There is no practitioner of observation and experience, — certainly none of even limited knowledge, — who has travelled into foreign countries, and is yet

unacquainted with the physical exhaustion, the mental torpor, and all but annihilation of existence, which is the ultimate result of indulging them. From this source frequently spring, impotency hereafter; the extinction of families and hereditary honours — honours which such persons are incapable of achieving; the infliction, during after-life, of many of the diseases which proceed from debility, and the exhaustion of the nourishment and vital energy of the various structures and organs; of numerous nervous and convulsive maladies, as hysteria, epilepsy, neuralgia, chorea, melancholia, mania, idiotcy, &c.; the dangerous or fatal visitation of fevers; diseases of the heart, disorders of the digestive organs, premature baldness and old age, the formation of tubercles, and the production of pulmonary consumption; and, lastly, the transmission of weak and decrepid bodies and minds to the offspring; of scrofula, rickets, verminous complaints, marasmus, hydrocephalus, convulsions, tubercles, chorea, &c.: the curse is visited on the children to the third and fourth generation, until the perpetuated punishment extinguishes the very name of the aggressor.

25. *b.* The *pathological* conditions of this age are especially characterised by exalted action. At the approach and commencement of puberty, the glandular system is extremely prone to congestive inflammations, particularly the lymphatic glands of the neck and arm-pits. Tubercles are rapidly developed in the lungs; and this organ is much disposed to acute and chronic inflammations of both their substance and mucous surfaces. Pulmonary hæmorrhages usurp the place of the epistaxis of earlier epochs; and, in females, dysmenorrhæa, protracted or retained menstruation, chlorosis, hysteria, and occasionally menorrhagia or leucorrhœa, occur. The sanguine diathesis and plethoric habit, in those of a sound constitution, and the sanguine, irritable, and nervous temperaments, or the one associated with the other, most commonly prevail at this period of life.

26. The *progress* of disease is generally rapid, and its character acute. Inflammations are more prone to give rise to the formative processes; and febrile affections, when they terminate by crises, evince a preference to hæmorrhages and sweats. Idiopathic fevers, inflammations of the respiratory organs, and of the brain or its membranes, are the most common diseases of this age.

27. *c.* The *therapeutical* indications require but little remark; for the system has now nearly, or altogether, reached its full growth; and the general inferences which guide the practitioner in the employment of remedial means have now reference, especially, to states of habit, constitutional powers, temperament, and diathesis, — physical manifestations, which are now, in a great measure, developed, but which acquire their most predominant characters in adult age. As the maladies of this period are generally inflammatory, and evince a strong tendency to the formative process, and as the powers of life are now most energetic, vascular depletions, with the antiphlogistic regimen, are generally required, and are well borne; excepting in those whose constitutions have been originally in fault, or who have greatly injured it by the injurious practice of masturbation, from which so many suffer, both at this and subsequent epochs of life.

28. V. Period. Adult Age may be divided into the epochs, 1st, of *early adult age;* and 2d, of *mature age*, or *confirmed virility*. Of each of these I shall take a brief notice.

A. Early adult age may be dated from twenty to thirty in the female, and from twenty-four to thirty-five in the male. During this epoch, if the constitutional powers have not been injured previously, the whole frame and its individual organs continue to acquire strength; and, although the body has ceased to grow in height, it increases in bulk, particularly the muscles of voluntary motion and the parietes of the large cavities. It is also more capable of enduring continued exertion and privations; its vital endurance and resistance being greater than during the period of adolescence. The features and expression of the face; the character, disposition, temperament, and diathesis, are more unfolded, and towards the termination of this period fully display their manifestations.

29. *B. Mature age*, or confirmed virility, may be considered as being from thirty to forty, or forty-two, in the female, and from thirty-four to forty-eight in the male. During this time of life, the features of the countenance fully assume those modifications of character arising from the influence of the passions and emotions of the mind; and the appetites, habits, and occupations of life imprint upon the frame generally certain appearances, arising from their continued influence on the constitution. The muscular organs, particularly the muscles of the extremities, are prominently marked; the chest fully developed; the body spare and active; the adipose structure extremely scanty, and the abdomen small, in those habitually devoted to laborious employments, not of a sedentary nature, and to active exercise, either on foot or horseback. The sedentary, those addicted to the indulgence of the appetites, and particularly those given to the gratifications of the table, have large abdomens, small extremities, and large depositions of adipose matter beneath the integuments, between the muscles in the omentum and surrounding the viscera, with a weak and defective developement of the muscular parts. The studious present the chief marks of their occupations on the features of the countenance and character of the head; the appearance of the rest of the frame varying with the habits and indulgences with which study or the prosecution of science may be conjoined. At this period of life also the feelings, the anxieties, the disappointments, the losses, and the various moral emotions of life, begin to manifest those effects upon the frame, which become still more fully marked during the following epoch.

30. This and the preceding period of adult age are, upon the whole, the most exempt of all others from disease; but about the age of forty, and still more so as the age of fifty is approached, the sanguineous circulation becomes more and more languid, particularly in the veins: hence the frequency of venous congestions and visceral obstructions, with the various diseases depending thereupon, particularly hæmorrhoids; bilious derangements; bilious and gastric fevers; inflammations; affections of the heart; apoplexy and paralysis; derangements of the stomach and liver;

hæmatemesis; affections of the joints, as gout and rheumatism; diseases of the urinary organs; hysteria and uterine disorders; hypochondriasis, and affections of the mind. At this period therapeutical means require to be strictly regulated according to the sex, constitution, temperament, habits, and occupations of the affected.

31. VI. PERIOD. AGE, IN ITS SPECIFIC ACCEPTATION, may be divided into four epochs: viz. 1st, *Declining age*; 2d, *Green old age*; 3d, *Advanced old age*; 4th, *Decrepitude*, or second infancy. Before I proceed to consider these individually, I will take a view of the changes which supervene with age in the structures and functions of the body.

AGE, *in the specific acceptation of the word*, may be considered as commencing when the vital energies of the different organs begin to decline, — when the maturity of life glides into decay. The period at which this change supervenes varies very much in different persons, according to their constitutions, employments, and habits during the earlier epochs of existence. In many it is so gradual as to be imperceptible; in others it is more obvious; and in some it is induced rapidly and remarkably, by mental anxieties and bodily disease. The usual period of its advent, in both sexes, and the different epochs in which *age* may be divided, will be stated in the sequel.

32. As age steals on, all the functions are performed more languidly than in earlier life. The energies of the ganglial system decline, as evinced by the digestive, circulating, and secreting functions, which it actuates. The sensibility of the cerebro-spinal system, and of its dependent organs; the acuteness of our intellectual powers, our moral emotions and affections, and the activity and strength of the locomotive organs, — all experience diminution, great in proportion to the advances of age.

In noticing the pathological and therapeutical relations of age, those changes of structure and of function which supervene with it will *first* receive attention; *next*, the different terms into which it may be divided, with those modifications which diseased actions generally assume in each term respectively, and those indications which should guide our practice in the diseases to which each is most obnoxious, will be briefly considered.

33. *A*. The *modifications of structure* produced by age are occasionally slight; but most commonly they are very remarkable, particularly in certain organs. In some parts they are scarcely perceptible, in others more obvious, consisting chiefly of increase of density; and in many they amount to actual change of texture.

The *integuments*, particularly those of the face, and the *hair*, are amongst the earliest parts to exhibit the advance of age; and they most obviously indicate the different stages of its progress. The integuments of the face seem more developed than in early or mature age. They are denser and thicker, especially the cutis vera and rete mucosum; which latter assumes also a somewhat darker tint. The skin appears more loosely attached to the parts underneath it, chiefly owing to the diminution of the subjacent fat, and shrinking of the other soft solids. Hence it appears, particularly in the face, neck, and hands, flaccid and wrinkled.

34. The *hairs* of the head are, perhaps, the first to evince the commencement of age; and they present the most common indications of the progress of decay, either by a more or less complete change of colour, or a partial and general loss of them. The change of colour at first consists of a few white or grey hairs, scattered amongst those of a natural hue; but these gradually become more numerous, particularly on the temples, until the whole hair is altogether grey, and ultimately white and transparent. As this change proceeds, the hair also falls out, especially on the crown and forehead. There are, however, many circumstances which accelerate these phenomena, independently of age. Thus fevers, severe courses of mercury, masturbation, &c. will occasion the loss of the hair. But when it falls out from disease, the bulbous roots not being obliterated, its reproduction generally follows; whereas, when it is lost from old age or from masturbation, it is never reproduced. There are also various causes which occasion a change of its colour, particularly the depressing passions, intense application to study, anxieties of mind, venereal indulgences, &c., and which at the same time accelerate the loss of it. The change of colour, and subsequent loss of hair, seem to arise from deficient nutrition, and consequent atrophy, or destruction of the bulb, together with some change in the skin itself. In some cases it seems to arise from chronic disease of the rete mucosum and cuticle, as stated in the pathology of certain cutaneous affections.

35. The *adipose and cellular tissues* experience considerable change. The fatty deposit diminishes with the progress of age, and it sometimes becomes more fluid and watery, as well as of a deeper tint. The cellular tissue is somewhat denser, more fragile, and less elastic than in early life. In some situations it assumes a fibrous character, particularly that portion of it which invests the muscular fibres. The *serous membranes* are also more dense, more subject to ossific deposits, and their free surface drier than in early life. The *mucous surfaces* exhibit but little change, excepting as respects their greater paleness, and tendency to certain states of disease. The *fibrous structures* become more rigid, and in various parts the seat of ossific deposits. They also assume a deeper colour, and firmer and tougher consistence, whilst their physical cohesion is much increased as age advances.

36. The *muscles* of voluntary motion experience a very marked change, particularly at the advanced epochs of age. They are much diminished in bulk. Their fibres are more rigid, less readily influenced by stimuli, and less contractile than in early life. They are also less under the control of volition, much less energetic in their actions, more flaccid, and endowed with less vital tenacity. Their structure is also somewhat modified. They are paler, sometimes of a light yellow colour, and their fibres less distinct than in youth. The tendons and aponeurotic expansions of muscles, as well as the cellular tissue intervening, are often partially ossified. Portions of muscles, near their tendons, are sometimes converted into a tendinous structure; and the secretions poured into the sheaths of the tendons are remarkably diminished. From all these changes result the vacillating, embarrassed, and weak movements of the aged.

37. The *bones* acquire a dense structure, and even a somewhat increased size, particularly the bones of the head, the sutures of which become firmly united, first in the internal, and afterwards in the external surface. The *cartilages* are ossified, particularly those of the ribs. The intervertebral cartilages become hard, inelastic, and shrunk: hence the impaired flexibility of the spinal column, the bending forwards of the trunk, and diminished stature of aged persons.

38. The *blood-vessels* undergo very remarkable changes. The arteries are gradually diminished, in proportion to the bulk of the body, as age proceeds; and the predominance of the venous over the arterial system is more and more apparent. Whilst the arterial vessels become, on the one hand, more dense and rigid in their coats, their calibre diminished, their smaller ramifications altogether obliterated, and their *vasa vasorum* indistinct, the veins seem, on the other hand, somewhat thinner in their coats, more dilatable, and their calibre increased; they are also more tortuous, and hence their capacity is augmented: so that, although the quantity of blood contained in the body is diminished, particularly at the most advanced stages of life, about two thirds of it are contained in the veins. Besides those changes of capacity, the coats of the vessels present changes of structure. The arteries are liable to ossific and other deposits, rupture of their coats, &c.; the veins to varix, inflammation, &c.

39. The *brain and nerves* are also somewhat modified by age. The membranes of the former are generally slightly thickened and opaque. The bulk of the brain is diminished, and its substance firmer and tougher than natural, and less readily acted upon by chemical re-agents. The nerves seem to possess a diminished quantity of medullary substance, and their blood-vessels are indistinct. The *ganglia* become firmer, of a deeper colour, and smaller than in early life.

40. The *organs of sense* undergo important alterations. The eyes are changed chiefly by the diminished secretion of aqueous fluid into the anterior chamber, occasioning less prominence of the cornea, and a change of its refractive power. The crystalline lens acquires a yellowish tint, and is less transparent. The nerves of the eye, particularly the optic nerves and ophthalmic branch of the fifth pair, and the iris, are less sensible than before; and hence the dilatation of the pupil, the distant sight, and the confused appearance of near objects to aged persons. The ear experiences a change similar to that which takes place in the eye. The fluid occupying its internal cavities is diminished or altogether absorbed; and the auditory nerve rendered insensible to impressions, from this and other changes in the conditions necessary to its functions. The other organs of sense, particularly taste and smell, have also their sensibility similarly blunted.

41. But changes are not limited to the more elementary structures of the body; and organs of sense, the *viscera* of digestion, secretion, assimilation, sanguifaction, and generation undergo analogous alterations. The teeth loosen or decay; the gums are partially absorbed; and the jaws, deprived of teeth and of their alveolæ, approximate more closely. Hence the projection of the chin, its approach to the nose, and diminished capacity of the mouth. To these causes are partly to be imputed the change which takes place in the speech of the aged. The *stomach* and *bowels* are generally flaccid, owing to deficient contractility of their muscular coats; but the *liver*, *pancreas*, and *spleen* present but little change, excepting they are, or have been, the seat of disease, unless slight atrophy, or enlargement and increased density. The *urinary organs* are more frequently altered: calculi are not infrequently met with in the tubuli uriniferi and pelvis of the kidneys; and the urinary bladder is generally thicker and firmer in its coats than in early life; the prostate gland is commonly somewhat enlarged.

42. The *lungs* are not necessarily changed by age, further than that they become less elastic, their air-cells enlarged, some of the bronchial ramifications more dilated, and portions of them emphysematous. They frequently, however, present the remains of antecedent disease. The *heart* partakes, although in a less remarkable manner, of the changes experienced by muscular parts. The tone and energy of its fibres are lowered; its structure is softer, more flaccid, and occasionally also paler. It is sometimes diminished in size; or some of its cavities are dilated, and their parietes thinned; and cartilaginous or ossific formations, or both, occur in parts of its internal surface, particularly in the valves.

43. The *organs of generation* experience a marked alteration. The *ovaria* shrink, become dense, and their vesicular structure changed. The *uterus* is diminished in bulk, unless it is the seat of organic disease, to which it is very liable, particularly at its mouth and neck. The *mammæ* also waste, are soft, pendulous, and lastly are entirely absorbed. The areolæ become dark, and the nipples shrink. At the commencement of age they are subject to congestions, indurations, and scirrhous disease. The *testes* shrink, or become soft and small, or even nearly disappear. The *penis* is shrunk, seldom experiences the vital turgescence, and lastly not at all; the faculty of generation having previously disappeared.

44. In this rapid sketch of the chief changes which the structures and organs of the body undergo from age, there are several phenomena which must strike the reader. The chief of these are, the gradually increased density of the different textures, and the consequent diminution of their watery or fluid constituents, as well as of the blood itself. In childhood and early life the textures are succulent, and the circulating fluid abundant. But as age advances, they acquire an increase of their physical cohesion, whilst their vital attraction is diminished. This increase of density and diminution of the fluid elements of the structures, with the progress of age, are constantly observed in the vegetable kingdom of nature: and, as we advance upwards, through the various grades and classes of animals, we find this principle strictly adhered to. In addition to this, another phenomenon is remarkable; namely, the redundance of osseous matter, as evinced not only by the increased quantity of earthy matter in the bones and cartilages, but also by the deposition of this substance in the coats of the arteries and in other textures. Somewhat analogous to these formations, and sometimes even vicarious of them, is the abundance of sabulous deposits from the urine, frequently observed to occur either during

the secretion and retention of this fluid, or after its discharge.

45. Not only are the mechanical conditions of the different parts of the body modified by age, as now stated, but their chemical properties are also similarly affected. The gelatin disappears, or becomes changed to albumen; the fibrin is increased, and assumes a deeper hue, and is less easily affected by maceration or exposure to the air. The phosphate of lime is augmented, and often accumulates to a very hurtful extent, together with the other earthy salts and urea.

46. *B. Of the conditions of function characterising the advance of age. a.* Although the changes, which have been now described as supervening in the different structures with age, may have originated in those imperceptible and slow modifications which the various organic functions experience from peculiarities of constitution, of food and employment, or from acquired habits and indulgences; yet there can be no doubt that, when once induced, they modify still further these functions, and thus draw on other lesions, and ultimately still greater alterations of both function and structure, or even speedily fatal disease. But we are not altogether justified in considering these contingencies as the primary causes of the changes now described. We are rather to view them as more or less remote effects of the failure of the vital endowment of the frame, manifesting itself first in a less perfect performance of the different functions, and subsequently in modifications of structure, and ultimately in very obvious lesions of both function and structure.

47. *b.* It is supposed by some, that the embryo at its earliest formation is endowed with a certain sum or allotment of vitality, which, in the earlier epochs of life, is engaged in the formation of, and in bringing to perfection, the different structures and organs of the frame; that it is gradually exhausting itself ever after, until it at last expires; and that the greater the excitement of its different manifestations and functions during the subsequent stages of existence, the more rapidly will its termination be reached; that the oil with which the lamp of human, and indeed all animal, existence burns is filled at its commencement, and is never afterwards supplied; and that the more brilliant the flame, the shorter will be its duration. This captivating hypothesis, however, appears, on an intimate view, irreconcilable with many of the phenomena of health and disease. It cannot readily be conceded that the allotment of vitality bestowed upon the germ or germs can exceed that possessed by the parents, — for the hypothesis is, that the sum of vitality is greater the younger the animal; and that it diminishes with the advance of days and years, from the period of its endowing the embryo. But it is obvious, that the greater vital endowment cannot issue from the smaller; that the parents cannot possibly impart to the embryo more than they possess, they still retaining a portion afterwards: more particularly when we consider that the greater endowment is imparted not to one embryo only, but to several, as is the case in the lower animals, and often in the human species also.

48. The phenomena, moreover, of disease furnish us with proofs that this sum of vital endowment is neither thus early and at once bestowed, nor thus uniformly diminished, according to the waste it experiences, without occasional reinforcement. We frequently perceive all the manifestations of life reduced, at different epochs of existence, nearly to total extinction, particularly in several kinds of fever, when, having received the requisite aid from external stimuli, they have been gradually restored to their former activity. Indeed, the various circumstances in which the body is placed, and the different states it presents at different periods of life, and from numerous causes which affect it, seem rather to favour the idea that the sum of vitality, and its manifestations in the different organs, fluctuate more or less during the allotted period of existence; that a certain emanation of vitality proceeds from the parents, great in proportion to their constitutional powers; but that this endowment is constantly experiencing an accession, first from the mother, and subsequently from the common sources of air and aliment; that this reinforcement is thus constantly supplying the waste arising from the exercise of the various functions, and adding to the bulk of the structures, until manhood is reached; and that at this period the sum of vitality has reached its greatest amount, from which it gradually declines, owing rather to the waste, particularly that occasioned by the exercise of the generative functions, exceeding the supply, than from the continued expenditure of what is at first bestowed and never afterwards reinforced.

49. Having been induced by the foregoing, and other considerations, to relinquish the former for the latter hypothesis, I infer that the gradual diminution of the vital energies that accompanies the progress of age is more or less manifested throughout all the functions; that the functions first evince this decline, and that the organs themselves are at last modified in organisation, from the slightest and almost inappreciable shades to the most marked alterations. The changes of structure, once induced, tend most essentially to heighten and to perpetuate the previously slight disorders of function, until both the one and the other undergo, by reciprocity of influence, most important alterations, terminating at last in death, and the dissolution of the frame. I now proceed briefly to notice those changes of function, which, frequently related to the alterations of structure described above, mark the existence of Age.

50. *c.* I have, in another place, stated that, of all the different tissues of the frame, the ganglial system is the most intimately related, in every way, to the vital influence which endows the body. And it is precisely those organs which are most immediately connected with this system that first furnish proofs of incipient decline in the languor or imperfections of their functions. Amongst those functions are comprised those of digestion, secretion, circulation, assimilation, the preservation of the animal temperature, and generation. The functions of animal relation are not so soon affected; and at first the change in them is rather secondary, and owing to the pre-existing change of the functions of organic life, — of those functions which are excited or actuated through the medium of the ganglial system.

51. As very intimately dependent upon the state of the ganglial system, the *secretions* manifest, with the advance of age, the most remarkable

lesion. These are generally modified in *quantity*, in *fluidity*, and in *quality*. 1st, The quantity of the secretions, both recrementitial and excrementitial, is sensibly lessened. The salivary, gastric, biliary, cutaneous, and spermatic secretions evince this change. 2d, Their fluidity is diminished, as shown by the salivary, the lachrymal, cutaneous, and watery exhalations and secretions. And, 3d, their properties are modified, as proved by their marked tendency to assume, immediately as they are secreted, irritating and acrimonious qualities, as shown by their effects upon the tissues, with which they remain for any time in contact, and to pass rapidly into decomposition. The urine, and occasionally the lachrymal, the mucous, the biliary, cutaneous, and sebaceous secretions evince this change. It very generally happens that the secreted fluids experience more than one of the above alterations; they being diminished both in quantity and in fluidity, and at the same time deteriorated in quality. This is remarkably the case in respect of the cutaneous, mucous, and urinary secretions; the chief exception being furnished by the mucous fluid, which is sometimes increased, although it is of diminished fluidity and altered quality: but this is rather an effect of disease, than merely of advanced age.

52. Next to the function of secretion, and owing to the same cause, — the diminution of vital influence, — that of circulation is most sensibly affected. The action of the heart is slower than in early life, much less energetic, and occasionally irregular. The capillary circulation is more languid, and a much smaller quantity of blood penetrates the extreme ramifications and nutritious vessels, in consequence, most probably, of the diminished calibre of those vessels, and the increased density of the tissues in which they terminate. The venous circulation is more congested, and more prone to experience the consequences of engorgements, particularly varicose dilatations, giving rise to effusions of blood and other serious diseases. The blood itself is not only diminished in quantity, but is also of a darker colour, and is probably also slightly changed in quality, particularly in respect of certain of its saline constituents. The absorbent system is less frequently disturbed in its functions by age than almost any other part of the frame, although it occasionally evinces diminished power, but chiefly in connection with disease. To the predominance of the absorbent function over that of arterial circulation has been partly ascribed, and with apparent justice, the wasting and condensation of the structures characterising the most advanced epochs of life.

53. As intimately connected with the weakened energy of the ganglionic and vascular systems, the functions of digestion and assimilation are languidly performed. The gastric, pancreatic, and biliary juices are less abundantly secreted in the aged than in those of early or mature years; and the tonic contractility of the coats of the stomach and bowels is diminished. Hence result various dyspeptic ailments, flatulence, and a sluggish state of the bowels. The receptacles which nature has provided for the temporary retention of the secretions and excretions, particularly the biliary and urinary bladders, react imperfectly on their contents, owing to the lowered power of the nerves which actuate them: hence arise distension from the inordinate accumulation of the secretions poured into them, and changes of the properties of these secretions during their retention, either occasioning their expulsion, or producing actual disease.

54. As closely related, also, to the lowered energy of the nerves of organic life, and consequent languor of the circulation, the generation of animal heat in the aged is evidently diminished, although the causes which usually moderate it in the young,—namely, abundant exhalation and evaporation from the surfaces of the lungs and skin, —exist in a much less degree in the former. The functions of generation are, however, those most remarkably affected. In the female the faculty of conception is altogether abolished, and important changes occur in the state of her appropriate organs; yet the sexual desire still lingers for a while: and in the male, although the ability of procreation may remain, under favourable circumstances, for some time, it is at last entirely abolished.

55. Thus we perceive, that as the different viscera of organic life increase in density, and experience a diminution of vital expansibility and contractility, so their functions become more languid or imperfect, until some of them cease to be performed, and others are remarkably altered. But the change is not limited to this class of structures. Those organs which are devoted to the extension of our intercourse with surrounding nature, and are subservient to the manifestations of mind, as well as those manifestations themselves, in both their intellectual and moral relations, undergo, although at a more advanced period, in respect of some of them, very marked modifications.

56. The changes that take place in the muscular and their associated structures evidently would render them incapable of performing those actions, to which volition may impel them, with energy, rapidity, and steadiness, even although the nervous system of voluntary motion were altogether unaffected. But this system, owing probably to those slight, and nearly unappreciable, alterations noticed above (§ 36.), possesses much less energy and susceptibility of action than in the prime of life, and therefore actuates the muscles in a less vigorous manner.

57. The same condition of the brain and cerebro-spinal nerves, which contributes to render the actions of volition less precise and energetic, seems also to be connected with the less vigorous exercise of the intellectual powers, and the imperfect conditions of the functions of sense. These functions generally indicate incipient decay before the powers of mind are affected; and some of them are nearly abolished, particularly hearing and seeing, before the latter evince any marked change. But more commonly the decay of the senses is soon followed, occasionally as a necessary result, by a slight failure of some of the mental faculties. The memory, and the power of association as intimately related to memory, are the first to evince this declension, generally by a want of recollection of the names of persons, subsequently of the names of things and of recent events, or recently detailed information; the judgment continuing either altogether or but slightly impaired. With this declining state of the faculties, the emotions of the mind are often remarkably blunted; the desires and affections are

impaired, excepting in as far as respect early-formed associations and affections, which are often recalled with acute and even overwhelming emotion.

58. As age advances sleep is much lessened; and not only is the duration of repose abridged, but also its soundness; the rest of the aged being imperfect, and disturbed by dreams. It is difficult to explain this — indeed no satisfactory explanation of it has yet been offered; but it is generally observed, particularly in very advanced age.

59. Such are the changes induced by age in the various structures and functions of the body, as evidently caused by the gradual decline of the vital energy, from the period of full manhood to its ultimate extinction. I have described them as much divested as possible of the effects of disease. As now noticed, those changes gradually lapse into death, — the lamp of life having burnt out, its oil having been exhausted, after a gradual diminution of the supply, without any single organ evincing that state of disease to which the cessation of life can be ascribed. This is, however, not a common occurrence; for, during the gradual decay that marks the progress of age, some organ or other, owing to the deleterious influence of surrounding agents, or of mental emotions, and the weak resistance of the vital influence, experiences a more or less marked derangement, which increases to actual disease, and either abridges the remaining short period of existence, or renders it less supportable.

I now proceed to notice the different epochs of advanced age, with reference chiefly to the diseases incidental to each, and to the therapeutical considerations which should influence the treatment of them. (See Climacteric Disease.)

60. 1st *Epoch, or declining age* extends from forty or forty-two to fifty-two in the female, and from forty-eight to sixty in the male. *a*. During this period the appetites, occupations, and habits express themselves still more strongly upon the outward appearance of the frame than in that immediately preceding it; and the feelings, emotions, disappointments, and anxieties of life manifest more fully their effects upon the internal organs, as well as upon the external aspect. Venous congestions, visceral obstructions and engorgements, with all the specific forms of disease already enumerated, (§30.) are more frequent than during earlier epochs, particularly apoplexy and paralysis, hæmorrhoids, hepatic disorder, dropsies, structural change in the kidneys and bladder, hypochondriasis, hæmatemesis, gout, and chronic affections of the respiratory organs.

61. *b*. In this period, the second great change to which the constitution of the female is liable generally occurs, terminating that epoch in which her sexual constitution is especially marked; and with this change frequently commence, or are matured, several diseases of the female organs. Morbid changes of the uterus and its appendages, as well as of the breast, are now very frequent; and sometimes they assume a malignant character. Various maladies, to which the female was less exposed than the male, are now oftener met with; and her constitution, with its disposition to disease, approaches more nearly to that of the male than during the time of marked uterine activity.

62. 2d *Epoch*, or *green old age*, may be reckoned to commence about 53, and to extend to 60 or 65 for the female; and to begin about 60, and extend to 65 or 70, in the male. During this epoch the nervous, circulating, and muscular energies begin to languish, with the vital actions of the different internal organs. The functions of the sexual organs gradually disappear. The female no longer conceives; and sexual plethora ceases to supervene and to relieve itself by a periodical discharge. The ovaria begin now to be gradually diminished in bulk, and to assume a firmer structure; the appetite for procreation slowly disappearing (§ 43. 54.). The male organs also either become less disposed to their proper functions, or nearly altogether lose the faculty of performing them, particularly when the energies of the constitution have been exhausted by previous indulgences carried to an excessive length, or by mental exertions. The teeth decay, and the digestive functions suffer from the imperfect mastication of the food (§ 41.).

63. 3d *Epoch*, or *ripe old age*, dates from the preceding, and extends to 70 or 75 in the female, and to 75 or 80 in the male. During this term the sensiferous and sanguiferous systems languish more and more, and all the vital organs experience a rapid decline of activity. The teeth fall out, the gums are partially absorbed, and the digestive functions are greatly impaired. The sexual organs are nearly or altogether deprived of their functions; the digestive and assimilating viscera experience a marked diminution of power; and senile marasmus, or the leanness of old age, advances (§ 53.).

64. *a*. The diseases of this and the preceding epochs are chiefly weak or imperfect digestion and assimilation; chronic inflammations; general asthenia and cachexia; apoplexies; paralysis; loss of the senses of sight and hearing; senile gangrene; comatose affections; dyspnœa; diseases of the heart and liver; dropsies; organic changes in the urinary and sexual organs of both sexes; passive hæmorrhages, from the stomach, bowels, and urinary organs; mental disorder; and gradual extinction of the vital functions and energies. Febrile and inflammatory diseases have a much more marked disposition to terminate in organic change, owing to the diminution of vital resistance, than during the preceding epochs of life.

65. *b*. The *therapeutical* indications of this period are in some respects important, but chiefly with reference to the necessity of supporting the powers of life during the diseases to which it is liable. When inflammatory or febrile disorder is present, and depletions or evacuations are necessary, we should, particularly if we employ them actively, watch their effects, and resort to the use of means calculated to support the frame as soon as indications of exhaustion are manifested. Purgatives at this period should, if frequently repeated, always be combined with warm, tonic, or supporting medicines, or with a restorative regimen; and a strict reference ought to be made to the habits, constitutional powers, and feelings of the patient, in all the remedies we prescribe. Old habits must not be suddenly relinquished or opposed, and the powers of life should be carefully watched; for, if unheedingly reduced, they will, particularly in large cities, often sink most rapidly, without the power of rallying. When we

consider that, in persons advanced to this age, a considerable portion of the arterial system is often in a state of slow organic disease; that the venous system is prone to congestion, is sometimes relaxed and almost varicose, always deficient in vital contractility, and scarcely able to perform its functions; and that both the one and the other cannot thereby so readily accommodate themselves to sudden or copious losses of blood as in early life and when they are perfectly free from disease, we cannot be surprised at the sudden depression occasioned by vascular depletion, or other means which produce a rapid discharge by the emunctories of the watery parts of the blood, or a sudden depression of the nervous energy, even although symptoms seemed unequivocally to demand their employment.

66. The last *epoch*, or that of Decrepitude, or *second infancy*, commences at 70 or 75 in the female, and at 75 or 80 in the male, and terminates the life of those whose span of existence is thus far prolonged. During this period, all the physical and mental powers rapidly decline. The body emaciates, the muscles waste, and the adipose structure is absorbed; the integuments becoming lax, wrinkled, dry, and disposed to retain accumulations of sordes. The knees totter and bend under the weight of the body; the trunk stoops, and is incapable of any considerable motion, excepting forwards; and the features are wan, devoid of colour, wrinkled, and emaciated, and apparently consisting chiefly of integumental covering (§ 33.).

67. *a.* Congestions, enlargements, obstructions, and even atrophy of the internal viscera; effusions of fluid into the shut cavities; irregularity of the heart's action from loss of its vital activity, or structural change of its valves, its arteries, or muscular texture, or from disproportion between the capacities of its compartments; lesions of the vascular system generally, in which either those of the arteries or of the veins predominate. Passive hæmorrhages from the mucous surfaces, particularly those of the alimentary canal and urinary apparatus; general asthenia, or cachexia; and slow extinction of the vital and natural functions of the frame, — the ganglial, the cerebro-spinal, and the circulating systems; and the digestive, the respiratory, the secreting, and excreting organs, evincing individually, or either of them conjointly with others, more or less disease, — are the principal causes of death: and thus man, whose mental and physical constitution and organisation were objects of profound study and admiration to himself, passes away; the vital essence, that actuated the wisely devised frame with which it was so surprisingly associated, returning to the Divine source whence it emanated; and the gross materials, which it combined and preserved in wonderful states of association, assuming novel modes of existence, and serving to form new beings much lower in the scale of organised creation.

68. *b.* The rapidity with which acute disease generally runs its course at this period, and the celerity with which organic change will frequently supervene and extinguish the dimly burning taper of life, require great decision and circumspection on the part of the physician. The resistance which the energies of life usually oppose, both to the extension of disease to other viscera from that first attacked, and to its disorganising effects in its primary seat, is now so excessively weakened, that remedies, directed with a due regard to the previous habits of the patient, in support of those energies are particularly necessary. On the choice of cordial remedies, and on their appropriate application to the circumstances of individual cases, will depend their success, and the reputation of the physician. At this period, depletions and all evacuations, excepting such as are requisite to carry off accumulations of morbid matters from the *primæ viæ*, and which impart, along with their evacuating operation, a restorative and cordial influence, must be abstained from; and care should be taken that fainting, or even nervous depression, may not supervene from their action. Warmth, at this and the preceding terms of advanced age, is indispensably required, both in the clothing and apartments; but it should be equable, and not too high. The lungs of very aged persons should be guarded from the ingress of very cold air, as the impression of cold in this organ paralyses its functions, arrests those changes which the blood undergoes during respiration, and induces apoplectic or comatose seizures, and idiopathic syncope or inaction of the heart. For these reasons, also, atmospherical vicissitudes should be assiduously avoided, as far as the means of doing so are placed within our reach. There is scarcely any measure more influential in supporting the sinking vital energies of age as the communication of animal warmth, particularly from the young of our own species. This was well known to the ancients, and is one of the oldest restorative means of treatment practised, having been adopted by David. The aged ought also to avoid the use of very cold fluids, as being apt to depress the energy of the stomach below the power of healthy re-action. Medicines, also, particularly purgatives of a cold nature, as the neutral salts, if exhibited at all, require to be combined with warm aromatics or stimulants, in order to counteract their depressing influence upon the alimentary canal, and on the nerves of organic life.

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AGEUSTIA. See Taste, *Defect or Loss of.*

AGRYPNIA. See Sleeplessness.

AGUE. See Fever — Intermittent Fevers.

AIR. See Disease, *its Causation, Removal, &c.*

ALOPECIA. See Hair, *the Loss of.*

ALUSIA. See Illusion.

AMAUROSIS, from ἀμαυρός, obscure. Syn. *Gutta Serena, Suffusio Nigra*, Celsus, Lucretius, Pliny. *Obscuritas, Hebetudo*, Paulus Ægin. *Paropsis Amaurosis*, Good. *Cataracta Nigra*, Auct. Germ. quibusd. *L'Amaurose*, Fr. *Die Schwarze Staar*, Germ. *Gotta Serena*, Ital. *Stekelindheit*, Hol. *Suffusion, Drop Serene*, Milton. *Dimness of Sight, Blindness.*

Classif. 4. *Class*, Local Diseases; 1. *Order*, Impaired Sensations (*Cullen*). 4. *Class*, Diseases of the Nervous Function; 2. *Order*, Affecting the Sensations (*Good*). *Functional Amaurosis*, I. Class, IV. Order. *Organic Amaurosis*, IV. Class, III. Order (*Author*, see *the Preface*).

1. Defin. *Partial or total blindness, from affection of the retina, or of the nerves, or of that part of the brain related to the organ of sight, whether arising primarily from functional disorder, congestion, inflammation, or any other change of these parts; or occurring from sympathy with other organs.* Or, in other words, *Partial or total loss of sight, from other causes than those which obstruct the passage of the rays of light to the bottom of the eye.*

2. Amaurosis is met with at all ages; but most frequently in the more advanced terms of life. It is sometimes congenital; and in these cases it is often difficult to ascertain the nature and seat of the affection. When it occurs at advanced periods of life, an attentive enquiry into the history of the disease, of the previous habits and ailments of the patient, and of the various resulting and related morbid phenomena, will generally throw light upon its pathology.

3. I. Seat of Amaurosis.—1st, *In the retinæ.* Viewing the delicate structure of the retina; its relation to the optic nerve, of which it is an expansion of great tenuity; its connection with the choroid and hyaloid membrane, and its nervous and vascular communications; and considering the various morbid states it is liable to undergo, in consequence of its relations with these and other parts; a partial, and even total, abolition of its functions is to be looked for on some occasions. It is, like all other parts of the frame, liable to congestion and inflammation, with their usual results; and, like other nervous parts, its functions are subject to a partial or complete extinction without itself evincing any change of structure, its sensibility alone being impaired or abolished; owing either to some unappreciable change, or to some one or more of those alterations in its adjoining or related parts about to be noticed.

4. 2d, *In the optic nerves.* These nerves may be more or less changed in some part of their course, from the anterior pair of the corpora quadrigemina, along the thalami, the tubera cinerea, and their partial decussation, until they terminate in the formation of the retinæ. In appreciating, however, lesions in the course of the optic nerves, the results of experiments on them should be taken into consideration:—if an optic nerve be divided previous to this decussation, sight is altogether lost on the opposite side; but if the division be made between the decussation and the eye, vision is lost on the same side.

5. 3d, *In the ganglial nerves.* There is every reason to suppose that the retina is in intimate communication with other nerves, and that it mutually influences and is influenced by them. Branches of the great sympathetic may be traced upwards, from the first cervical ganglion, to the ganglion lodged in the cavernous sinus; whence branches proceed and communicate with the third, the first division of the fifth, and sixth pairs of nerves. Branches also pass from the cavernous ganglion directly to the lenticular ganglion. As the internal carotid artery passes into the cranium, it is surrounded by the sympathetic nerves, which accompany all its ramifications. The ophthalmic artery is invested with these nerves; its branches to the choroid, iris, and retina being similarly provided. Branches of nerves, moreover, proceed from the lenticular ganglion, as M. Ribes* and others have demonstrated, to the iris, giving more minute branches in their course to the retina. This connection being established, morbid states of these nerves and ganglia, or changes of structure in their vicinity affecting their functions, must necessarily impair the sense of sight.

6. 4th, *Other nerves*, as the fifth and third pair, are, in some cases, also the seat of amaurosis. It has been shown by Magendie and Desmoulins that the integrity of the fifth pair is necessary to the perfect function of the retina; and Mr. Mayo has furnished evidence that the third pair is requisite to the motions of the pupil. If the great sympathetic be divided in the upper part of the neck, the pupil becomes contracted and immoveable, and the eye wastes.

7. 5th, *Parts of the encephalon* connected with the optic nerves in their course are occasionally the seat of amaurosis, as pathological research and experiment have shown. MM. Magendie and Serres have proved that, when these parts are wounded, the sight of the opposite eye becomes either weak or extinct.

8. 6th, The *pineal* and *pituitary* glands are frequently the only parts in which any alteration can be detected in the examination of amaurotic subjects. The connection of these glands with the ganglial system is stated at another place. Besides these, other parts of the brain, when the seat of organic disease, are not infrequently the principal source of amaurosis, as shown hereafter.

9. II. Causes.—1st, The *predisposing causes* of amaurosis are very diversified. Amongst these, the influence of hereditary disposition is well established. Beer traced it in several families; in one of them through three successive generations, and particularly in the females of that family who had not borne children, it having appeared in them at the cessation of the menses. Beer also states, that dark eyes are much more liable to it than the light; the proportion being upwards of twenty to one.

10. Whatever tends to favour sanguineous congestion of, or serous effusion in, the encephalon, particularly insolation; forced exertions of the mind or body; excesses of passion; the pregnant and puerperal states; occupations requiring frequent stooping; errors of diet, and neglected ailments affecting the stomach and liver; the abuse of wine or spirituous liquors; suppressed discharges, particularly those from the nose and ears; interruption, or entire cessation, of the

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* Mém. de la Soc. Méd. d'Emulation, t. vii. p. 99.

menses; the gouty, rheumatic, and strumous diathesis; the retrocession or suppression of eruptive diseases; and habitual constipation;— whatever exhausts the vital energy of the brain, and nerves supplying the organ, as chronic diarrhoea, typhoid fevers, the excessive use of snuff, long-continued grief, prolonged suckling, neglected fluor albus, excessive venery, and manustrupation; — and lastly, whatever exhausts slowly the sensibility of the organs of sight themselves; as the incautious use of the eyes in a glaring light or on minute objects, and the existence of strumous ophthalmia in childhood, generally *predispose* to amaurosis.

11. 2d, The *exciting causes* are very numerous; indeed, any of the causes enumerated as merely predisposing to the affection may excite it, when acting long or intensely, although the successive or combined action of various causes are generally required. Amongst the most common exciting causes, are over-exertion of the sight; exposure to very bright light; its occupation on minute objects, or employment in candle or lamp light, and during the hours usually devoted to sleep. The sensibility of the retina may be destroyed, even by a single exposure to these causes. Lightning is another cause, which seems to act by extinguishing the sensibility of this very delicate part. In general, however, it is the long-continued over-excitement of the organs of sight that occasions the gradual abolition of their functions. Injuries on the eye, and in its vicinity, are also frequent causes of the disease.

12. Poisonous substances occasionally produce an attack of amaurosis; sometimes suddenly, at other times slowly. Belladonna, stramonium, solanum dulcamara, &c., fish-poison, various fungi, and animal poisons, occasionally have the former effect; but it is most frequently only of temporary duration; whilst other narcotics taken habitually, as opium and tobacco, produce the latter effect, and in a more permanent manner. The poison of lead, blows on the head, child-labour, and puerperal convulsion, frequent attacks of epileptic or other convulsions, cerebral apoplexies and paralysis, injuries of the branches of the fifth pair of nerves (three cases of which have come before me), and even irritation of these nerves, will produce this affection; it has also been observed to supervene to gastric and intestinal irritation, particularly when occasioned by worms; to hypochondriasis, and accumulations of bile in the liver, &c.; to frights, and to the irritation proceeding from carious teeth. The sudden suppression of epistaxis, of haemorrhoids of the lochia, of the milk in nurses, of the menses, or of the perspiration; the repulsion of eruptions on the head and behind the ears, and the drying up of old ulcers, have, severally, occasioned the disease. But most frequently it is the result of two or more of these causes, acting under circumstances of predisposition. Females with dark eyes are extremely liable to the disease, upon the cessation of the menses; and, like deafness, it is apt to appear after severe attacks of typhoid and scarlet fevers. Amongst the more rare exciting causes of this affection, are the gouty and rheumatic diathesis, or misplaced and retrocedent gout and rheumatism; the constitutional effects of syphilis, and hurtful influence of mercurial courses; — all which have been assigned as causes of the disease by some authors, and denied by others; but, undoubtedly, producing it on some occasions, although not so frequently as the former believe.

13. 3d, The *proximate* or *efficient causes* of this affection are various. It has been disputed whether or not it can arise from altered function only, and without change of structure. Mr. Travers believes that it does, but Mr. Mackenzie denies it can depend upon morbid function merely; and other writers take opposite sides of the question. There can, however, be no doubt, if we attentively consider the disease in relation to the exciting causes and the effects which are observed to result from them, that, although most commonly the consequence of some appreciable change in some one or more of those parts instanced as its seat (§ 3—6.), it is occasionally unattended with such change, — at least to such an extent as our observation of the effects proceeding from similar alterations would lead us to expect. It should not be overlooked that the operation of many of the causes which have been adduced above is entirely vital — upon the functions of life, as manifested in the organ, or in remote parts of the frame; — that their effects are sometimes almost instant, and before organic change could have been produced; and that the disappearance of their effects has been sometimes as sudden, and often before the restoration of morbid structure, providing that it existed, could have been brought about. I believe, after a careful perusal of the works which have been furnished by surgeons on this disease, that a too marked disposition has been evinced to consider it as a result of organic change in the organ and the nerves, and vessels connected with it, and without relation to constitutional and vital causes.

14. When describing the *seat* of amaurosis, the influence of organic changes has been briefly noticed; and a fuller reference to them will be made in the sequel. Amongst the numerous lesions of structure that occur in the brain and its membranes, there are many that affect the nerves of sight, more particularly the optic nerves, or which implicate them organically in some part of their course in a very remarkable manner. Alterations in the bones of the cranium, as well in the membranes, obstructing the functions either of these nerves or of the other nerves subservient to the perfect exercise of this important sense, are also not uncommon.

15. The EFFICIENT CAUSES of this affection, therefore, are, 1st, *vital or functional*, depending upon imperfect or abolished sensibility of the retina, or of the optic and other nerves subservient to vision, owing either to causes which, from their direct and local action, depress or exhaust this property, or to those which, from their primary influence upon the frame, have an indirect depressing effect, which is not limited to this organ, although manifested in it in a more marked degree, owing to various concurrent circumstances. This constitutes the *functional form* of amaurosis admitted by Beer, Wardrop, Travers, Sanson, and others, and which Beer divides into two subordinate kinds: *first*, that which proceeds from direct depression of the vital sensibility of the eye; and, *second*, that which is owing to inordinate excitement, and consequent exhaustion of this property.

16. 2d, *A congestive or inflammatory state of the vessels of the retina, or parts immediately adjoining, or the usual effects of these states.* Portal, Ploucquet, Prochaska, Rousseau, Sanson, Magendie, and other pathologists, have observed varicose states of these vessels; unusual injection of the minute arteries of the adjoining coats, and of the retina itself; a complete *retinitis*; exudations of lymph under the choroid, near the ciliary circle; inflammation of the external surface of the sclerotic; vascular injection, and firm adhesion of the retina to the choroid; partial detachment of the retina from this coat; and thickening, morbid density, and change of colour of the retina. Ossification; fibrous degeneration, with partial thickening; wasting, and malignant disease of the retina, and even the developement of transparent vesicles in it, have all been noticed by Haller, Morgagni, Heister, Sanson, and other authors.

17. 3d, *Lesions affecting the optic nerves.* These consist chiefly of tumours of various kinds—osseous, fibrous, encysted, steatomatous, puriform, aneurismal, &c.—formed in their vicinity, either in the brain, the membranes, or in the bones of the cranium, and involving, or compressing them, in any part of their course. They are likewise, occasionally, the seat of some one, or even more, of those organic changes of their proper structure and sheaths, to which nervous parts are liable. Their vessels may be varicose; their fibres may be infiltrated with serum; they may be injured by external violence, and they may be wasted; which last is very frequently observed. Adventitious deposits, as osseous and earthy matter, malignant formations, cysts and hydatids, may even form in their sheaths, although more rarely than the foregoing lesions. The writings of pathologists abound with instances of these changes. When only one eye has been amaurotic, the optic nerve of that side has been found wasted anterior to its partial decussation; and on the opposite side, posterior to this union. But this is by no means an uniform circumstance, and, when observed, the atrophy is not distinctly continuous. Indeed, the wasting has been detected on the same side, after the union of these nerves, as well as before. But if the opinion of Treviranus and Wollaston be correct,—that decussation of these nerves at their union is only partial, and that it takes place chiefly between the parts which are nearest each other,—wasting of one of them may be in one case more remarkable on the same side, and in another case more observable on the opposite side. When the amaurosis is accompanied with wasting of the optic nerve, from causes not primarily consisting of inflammation or its consequences in the retina or adjoining coats, this nervous expansion is also generally wasted, transparent, or changed in colour. When the cause exists in the pineal or pituitary glands, the wasting is often chiefly observable at the union of the optic nerves. In these cases, both eyes are affected. Facts illustrative of this have been recorded by Vieussens, De Haen, Rullier, Rayer, Ward, and Sanson.

18. 4th, *Lesions seated in the encephalon.* The scope of this article will not admit of further reference to the numerous changes which occasionally produce amaurosis, from their affecting the optic nerves in their different connections with various parts of the encephalon. All the alterations which are described in the articles on *morbid structures of the* brain and its membranes, will produce the disease, when they impede the functions of the optic nerves, although the structure of these nerves may be uninjured. The most frequent and remarkable of these are, organic lesions of the pineal and pituitary glands (§ 8.), sanguineous and serous effusions, various kinds of tumours, abscesses, softening of the brain, &c.

19. 5th, *Lesions of nerves subsidiary to the integrity of the organ and of its functions.* Injuries, compression, and even irritation of the fifth pair of nerves, particularly its ophthalmic branch, of the third and sixth pairs, and of the ganglia or their ramifications, by organic change in the brain, its membranes, bones of the cranium, or parts in the course of their branches, have been shown, in numerous instances, to have been the chief efficient causes of amaurosis.

20. III. Symptoms.—The symptoms of amaurosis are, 1st, those which the *patient himself experiences*; and 2d, those which the *physician detects* in the eyes, or in the various organic and animal functions. Each of these classes of symptoms are to be enquired into separately, commencing with either of them. Each eye should be carefully and separately examined; and it will be better that the other is excluded from the light, whilst the examination is being made.

21. 1st, The patient complains of impaired vision, which may be of gradual accession, or remarkably sudden, and amounting to almost total deprivation of sight. Hence the disease has been distinguished by the epithets *slow* and *sudden*, *incomplete* and *complete*, or *imperfect* and *perfect*.

22. At the commencement, the failure of vision is sometimes only occasional, for a short time, and after longer or shorter intervals (*amaurosis vaga*). In some cases, it assumes the form of *day-blindness*, in others of *night-blindness*: and it not infrequently recurs for a time after great exertion of the eyes, either with minute or bright objects. Transient and sudden attacks of the disease are often the consequence of disorder of the digestive organs, or rather the result of a state of the vital manifestations which occasions equally loss of sight as well as loss of the digestive functions. The failure of sight is often at first only partial—extending only to a part of the field of vision. In some cases intervening portions of the field are obscured (*visus interruptus*). In other cases, one half of it is hid from view (*hemiopia*). Occasionally objects are only seen in a particular direction (*visus obliquus*); and some patients discern objects in a distorted form—crooked, mutilated, shortened, lengthened, or inverted (*visus defiguratus*). Beer states that the flame of a candle will often appear elongated, and as if separated into several portions, to such patients,—a symptom indicating disease within the head.

23. In some instances the failure of sight assumes a *myopic* or a *presbyopic* form: but this is not so frequent as the occurrence of false impressions, in the form either of flashes of light, shining stars, globes of light, and various other lucid spectra (*photopsia*), or of muscæ volitantes. False impressions of colour (*chrupsia*) are also frequent attendants on the early stages of amaurosis. Luminous spectra are commonly met with in plethoric

persons, and when the amaurosis depends upon increased vascularity, or inflammation of the retina; motes, black specks, muscæ volitantes, and thick mists or clouds, when the affection is dependent upon exhaustion of the sensibility and vital energy of the organ, and when it occurs in dyspeptic subjects from exhausting causes. Double vision is also a common symptom, particularly when the cause exists within the head.

24. As the disease advances, the field of vision appears as if obscured by a cloud, or net-work; the latter appearing grey or black in a good light, but occasionally becoming white, silvery, yellowish red, and luminous in the dark. In addition to these, the patient sometimes complains, particularly early in the disease, of some intolerance of light, or of pain in the eyes on being exposed to it. But, in other cases, from the very beginning, diminished sensibility of the retina, and a constant desire for a stronger light — a thirst of light — are present.

25. Pain in the eyes, and commonly also in the head, is one of the most important symptoms of amaurosis. It should, therefore, be carefully investigated. We ought to ascertain its precise seat and extent; its character — whether it be acute, gravative, throbbing, occasional, or permanent. The circumstances which relieve or exasperate it should also be noted; as the horizontal posture, temperature, exercise, diet, the use of stimuli, &c. We should also notice whether it be accompanied with vertigo, tinnitus aurium, watchfulness, or stupor, coma, forgetfulness, inability of exertion, or failure of other mental manifestations; as, from the nature and grouping of these symptoms, we infer the nature of the efficient cause of the disease, particularly as they suggest its existence within the cranium.

26. Unusual dryness of the eyes and nostrils sometimes is observed in amaurosis; and in these cases benefit is often derived from a restoration of the secretions of the lachrymal gland, conjunctiva, and Schneiderian membrane. (Mackenzie.)

27. The general health, and previous ailments of the patient, require a particular investigation. The constitution and diathesis — whether he be strumous or gouty; whether he has had syphilis, or undergone long courses of mercury; whether he has had typhoid fevers, or inflammations of the brain, or apoplexy, paralysis, epilepsy, or injuries on the head; whether he has been subject to complaints of the digestive organs, or has been, or is, affected with worms: if a female, whether she has been frequently attacked with paroxysms of hysteria, or any of its anomalous forms, or with convulsions in the puerperal state, and particularly whether or no there exist any sign of disorder in the uterine organs — are all particulars most requisite to be known.

28. 2d, The form, colour, vascularity, and mobility of the different parts of the eye, and habit and appearance of the patient, next require investigation. The amaurotic patient walks with a gait of uncertainty, and a staring and unmeaning look. In some cases this want of convergency of the eyes towards an object may amount to slight squinting, occasionally with oscillation, and sometimes with unusual fixity of the eyes. In some instances, the motions of the eyelids, and of the eyes themselves, are more or less impeded, or even palsied, — the levator palpebræ superioris, and the orbicularis palpebrarum being often affected. These phenomena are chiefly remarked in cases where the motor oculi, or the facial nerve, is injured.

29. One or both eyes are often unusually prominent. The colour of the sclerotica is frequently somewhat changed — being either yellowish, bluish, or ash-coloured. This coat is often covered with small varicose veins. The consistence, also, of amaurotic eyes is occasionally altered; in some cases the eyeball is firmer to the touch, in others softer, than natural. In rarer instances, it is flattened on one or more of its sides.

30. The pupil is generally sluggish and limited in its motions, or altogether deprived of motion, and dilated. More rarely it is contracted. In many cases it is neither dilated nor contracted. A widely dilated pupil, although generally attendant on pressure on the brain, also occasionally depends on other causes. Early or incomplete amaurosis is rarely attended with dilated pupil; but after all vision is extinct, the pupil is generally more or less expanded and motionless. It should not be overlooked, that where only one eye is amaurotic, the motions of the pupil of the affected organ will often follow those of the sound one, when protected from, or exposed to light; and even, as observed by Janin, both eyes may be completely amaurotic, and yet both pupils will vary in diameter with the intensity of light to which they are exposed. This phenomenon can only be explained by referring to the nerves supplying the different parts of the organ. The iris, being chiefly supplied with ganglial nerves, will often retain its faculty of motion, when the efficient cause of the disease affects the optic nerves at any place between their origin and their communication with the third pair; or when the affection of the optic nerves within the cranium does not leave the retina altogether deprived of sensibility, although the impression cannot be conveyed to the brain, the subsidiary nerves, particularly the third and fifth pairs, and the branches from the cavernous and lenticular ganglions, still bestowing sufficient sensibility and mobility on the iris to admit of motion on being stimulated.

31. Besides the size of the pupil, it is necessary to attend to the characters of the motions of the iris. This part may contract on one side, or in one part, drawing the pupil to one side, or giving it an irregular appearance. It may also seem as protruded towards the cornea, or it may appear sunk inwards, and have a funnel-like shape. (Mackenzie.)

32. The appearance of the humours of the eye is also important. In hydrocephalus, or when occurring in young subjects, the pupil has the natural black hue. But in elderly subjects some degree of glaucoma accompanies amaurosis. This appearance is in general unfavourable.

33. The presence of the marks of injuries about the face and head is important, as marking probable injury of parts within the cranium, or of some nerves subservient to the perfect condition of the organ. The character of the countenance, the shape of the head, the state of the vessels of the head and eyes, and the general habit of body, require to be noticed. The inference which ought to be drawn as to the exact nature of the disease will be very different when it is met with in the plethoric, the highly fed, and the indolent, from that which will be deduced from its occurrence in

the emaciated, or exhausted subject. The probable predisposing and exciting causes should also be investigated, as they have an obvious relation to their effects. Attention should be directed to the previous habits, indulgences, ailments, occupations, and modes of life of the patient, &c., with the view of throwing light upon the causes and pathological relations of the malady.

34. The *duration* of the disease is extremely various. It may, in slighter cases, be only of a few hours' or days' continuance; may altogether disappear, either spontaneously or from treatment, and never afterwards recur; or it may return after an indefinite period, from errors in diet, disorders of the digestive organs, or from the operation of the causes usually producing the disease. It very frequently continues all the life of the patient.

35. IV. Stages, Grades, and Forms. — The stages of amaurosis are *incipient* and *confirmed*. In the former the sight is generally not altogether lost, although more or less impaired. Treatment will often retard or check the progress of the disease, and sometimes even bring about a perfect cure. But the blindness may be complete from the first: in this case, medicines are generally without effect. In the *confirmed* stage, the disease is usually stationary; but the sight is not always altogether lost: the patient often retaining a perception of light and shadow, or even of objects, when illuminated or strongly contrasted. When this power of distinguishing any object or colour is still retained, even in the slightest degree, the amaurosis is said to be *incomplete*. When the patient is insensible even to the presence of light, the disease is *complete*. It may be limited to one eye, in the incipient or incomplete states; or it may affect both equally, either in an incomplete or complete form. It may also be incipient in one eye, and confirmed in the other; and it may be more or less complete in either. It may likewise, in one or other of these states or forms, assume a *recurrent* or *remittent* type; but such cases are comparatively rare.

36. But, besides these stages and grades of the disease, other forms occasionally present themselves, which will be more fully noticed in the sequel. It may be *Idiopathic*, depending upon changes, either *functional* or *organic*, taking place *primarily* in the nervous apparatus of the eye, and existing *simply*, and without any other associated lesion: or it may be *complicated* with lesions of adjoining parts, or with other diseases of the eye, particularly of its humours, more especially with glaucoma and cataract. It may also be *consecutive* of other diseases; most frequently of organic changes within the head, or in the vicinity of the orbit, as in apoplexy, paralysis, &c. And, lastly, it may be *symptomatic* of, or supervening to, pre-existent disease of distant parts, particularly of the abdominal viscera; or it may be occasioned by pregnancy, and more rarely by diseases of the puerperal state. It is not infrequently thus symptomatic of colic from lead, accumulations of fæcal matters in the large bowels, hypochondriasis, &c.

37. According to these *states* of the disease, its different *species* will next be considered, and the treatment which is appropriate to each of them will subsequently be pointed out: for it is obvious, that the success of remedies will, in this very difficult and variously complicated disease, mainly depend upon the strict appropriation of remedies to its different varieties and states.

38. *Spec.* 1st, *Functional Amaurosis.* This form of the disease generally arises, — 1st, from suspension or exhaustion of nervous and sensorial power; from various local and constitutional causes (§ 13.); from inordinate excitement or exertion of the visual organs; from mental exertion, watchfulness, and sedentary habits; from the deleterious action of mineral, vegetable, and animal poisons, as lead, mercury, narcotics, &c.: 2d, from venereal indulgencies; excessive secretions and evacuations; depression of the vital energies from diseases of debility and exhaustion: and 3d, from temporary diminution of the local circulation; from simple congestion, or occasional determination of blood in the veins or arteries; and from the irritation or disturbance of the digestive organs, or of some other of the abdominal viscera.

39. The *symptoms* of this species are, chiefly, more or less obscuration of vision, occurring slowly or suddenly, the visus nebulosus, and muscæ volitantes; a somewhat contracted pupil, and clear state of the humours; equal imperfection of sight in both eyes; pale, languid countenance, and depression of the eyes in the orbits; a languid, small, or weak pulse; increased dimness, or sudden abolition of sight upon quickly assuming the erect, from the horizontal posture. An improved state of the sight after a light meal, or grateful stimulus; nervous headachs; weak digestion, sluggish state of the bowels, flatulency, foul or loaded tongue, and indisposition for, as well as incapability of, physical or mental exertion or occupation; weakness in the joints; occasionally nocturnal emissions, &c. in the male, and leucorrhœa in the female.

40. This species of amaurosis may be, 1st, *primary*, and *uncomplicated*. In this case it usually proceeds from causes which depress or exhaust the sensibility of the retina and its related nerves. 2d, It may likewise be *consecutive*; particularly of excessive secretions and discharges from the uterus, mammæ, kidneys, testes, and prostate; or from exhausting and debilitating diseases, as adynamic diseases, hæmorrhages, &c. 3d, *Symptomatic* of, or *complicated* with, hysteria, hypochondriasis, colica pictorium, diminished vital energy of the digestive organs, and all the various forms of indigestion; the presence of worms in the bowels; pregnancy; obstruction and accumulation of bile in the bile-ducts or bladder, &c.: and 4th, *Metastatic*, or supervening upon impeded or checked secretions and discharges; in which cases it is generally accompanied with congestion, or determination of blood to the head, in which the eyes may partake, but not to an extent constituting inflammatory action or organic change; and it assumes a state nearly approaching to that characterising the next species.

41. *Spec.* 2d, *Amaurosis from active congestion.* The existence of this species of the disease is more a matter of inference, than almost any other of those in which I have divided the disease. Yet it seems undoubtedly to exist; especially when amaurosis is consequent upon obstructed secretions and discharges, or the drying up of eruptions; upon frequent stooping, or wearing a tight neckcloth; upon fits of passion, when it occurs in plethoric persons; and after narcotic poisons.

42. The *symptoms* indicating it, are throbbing in the eyes, tinnitus aurium, turgescence of the vessels of the sclerotica and conjunctiva, a some-

what contracted pupil, and clear state of the humours; turgescence of the features, or lividity or bloatedness of the face; fulness of the jugular veins, prominence of the eyes, and impeded circulation through the lungs or cavities of the heart.

43. This form of the disease is seldom *primary* and *uncomplicated*. It is commonly *consecutive*, or *symptomatic*, generally of obstructed discharges, &c. (§ 12.), of disease within the head, particularly of sanguineous congestions, or effusions, and diseases of the lungs and heart. It not infrequently occurs transitorily from pregnancy, epilepsy, and hysteria; and more rarely from gout and rheumatism.

44. *Spec.* 3d, *Amaurosis from inflammation of the retina, and internal parts of the eye.* In stating amaurosis to be often a symptom merely of retinitis, I am supported by the opinions of many of the best British and Continental writers on the disease. But I believe it very seldoms occurs, that the inflammation is limited to this membrane, but that the choroid and iris generally participate with it in the morbid action; and that, when they, on the other hand, are thus affected, the retina is also inflamed. Amaurosis is therefore a consequence of inflammation of the internal structures of the eye: but does inflammation of these parts uniformly produce amaurosis? It is not always consecutive of iritis; and I believe that the retina may be inflamed, and yet but very slight amaurotic symptoms may be occasioned thereby, particularly during the early stages of the retinitis. It is chiefly when the inflammatory action has produced some degree of organic lesion of the affected parts, that amaurosis is manifested.

45. This form of amaurosis generally proceeds from nearly the sames cause as the foregoing (§ 10—12.). It may be produced by syphilis, mercury, eruptive and continued fevers, cold in any form acting upon the eyes or face; suppressed discharges, or eruptions on the head or behind the ears; injuries of the eye and adjoining parts; concussions, and the usual causes of inflammation in other parts.

46. The *symptoms* vary with the extent and intensity of the inflammation. In its slighter states, the progress of the disease, and of the symptoms, is insidious and slow. In these cases, little or no pain is complained of, either in the eye or in the head. The pupil is more commonly contracted than dilated, and the spectra are usually luminous, but sometimes not very sensibly so. With this slight and often chronic state of inflammatory action, the amaurosis may be increasing fast, and the observation of vision very great, and yet the symptoms may not be distinctive; if we except the appearances furnished by the sclerotic, which, in retinitis, as well as in iritis, abounds in red vessels, converging in distinct lines, and forming, by their delicate reticulations, a red zone round the cornea, and which thus furnishes the only symptom, that can be depended upon, of slight or incipient retinitis.

47. In the more intense states of inflammation of the internal parts of the eye, the amaurosis is attended with painful vision; intolerance of light; sparks of fire, or drops of a red colour falling from the eyes; flashes of light; pain darting through the head, either from, or to the bottom of the eyeballs; the pupils are dilated, and the humours thick or muddy; and there are more or less acceleration of pulse and constitutional disturbance.

48. This species of amaurosis is often *primary* or *idiopathic*; it may also be *simple* or *complicated*. When it occurs in a complicated form, it is, most frequently, associated with iritis, with meningitis, with eruptive or continued fevers, and with rheumatism, gout, or syphilis. It may also occur *consecutively*, and from *metastatis*, particularly after the disappearance of exanthematous eruptions, as in the measles, small-pox, erysipelas; of chronic eruptions; and after the suppression of habitual or periodical discharges, secretions, and evacuations (§ 12.).

49. *Spec.* 4th, *Amaurosis from advanced disorganization of the retina and adjoining parts.* Disorganization of these parts is usually a result of inflammation. But it is difficult to determine at what stage of the inflammation organic change commences. I am to consider it here as far advanced; yet, the inflammation that occasioned it may be still present. The *causes* of this species are the same as those of the foregoing; but the *symptoms* are somewhat different. The vision is more obscured. A film seems interposed between the eye and field of vision. The pupil is sluggish, and it is often scarcely dilated; it is frequently irregular. The margin of the iris sometimes partly adheres to the capsule of the lens. The sclerotic is often very vascular, and even livid, from the enlarged and loaded state of its veins, which are very numerous and tortuous. The shape of the eye is sometimes changed, particularly in the most advanced cases; it is prominent in some parts, and depressed in others. The eyeball is occasionally, also, softer or firmer than natural.

50. This form of amaurosis is always *consecutive* of the *second* and *third* species, more particularly of the latter; and hence, participates in many of their characters (§ 41—48.), and occurs under many of the same circumstances as they. It is occasionally *complicated* with cataract, with opacities of the cornea, or with disorganization of parts within the head.

51. *Spec.* 5th, *Amaurosis from external injuries of the eyes.* A blow on the eye-ball will not infrequently occasion blindness, without producing any apparent injury of its visible parts. It is difficult, or altogether impossible, to ascertain the nature of the mischief that has been inflicted. The concussion of the organ, and the lesion of the sensibility of the retina and optic nerve, may, in some of the cases, particularly when the consequent amaurosis is merely temporary, constitute the principal or only change. In more permanent and severe instances, it is very probable that the delicate connections of the retina with the adjoining parts are injured. Ecchymosis may also be occasioned, or inflammation may supervene. In these cases the pupil is either dilated, or of an irregular form; and according to the extent of injury will the phenomena partake of the characters which have been assigned to the *third* and *fourth* species of the disease.

52. *Spec.* 6th, *Amaurosis from disease within the head affecting the functions of the optic nerve,* or other *nerves subservient to the sense of sight.* It is obvious that disease within the cranium, either of the substance of the brain, or of its membranes,

producing pressure of, or interrupted circulation in, the parts with which the optic nerve is connected at its origin, or during its course, or acting in a similar manner on the nerve itself, will produce amaurosis. In these cases it is a *consecutive* affection — a symptom merely of disease, often existing for a long time previously. I have already alluded to the nature of these lesions, and to their extreme diversity (§ 17, 18.). Perhaps the most common and the most interesting of them are organic changes of the pituitary and pineal glands, hæmorrhage, sanguineous congestion, aneurismal and other tumours, &c. In these cases it is very common to find cerebral symptoms complained of long before the sight is affected; and to observe the gradual accession of the disease either in one or both eyes; or first in one and afterwards in another, with complete loss of vision, followed at last by changes of the structure of the eye.

53. When organic lesion of the pituitary and pineal glands has occasioned the disease, judging from the cases recorded by DE HAEN, WENZEL, VIEUSSENS, LEVEQUE, WARD, RULLIER, and RAYER, both eyes are generally gradually and equally affected, after the existence of cerebral symptoms, chiefly consisting of pain and weight referred to the more anterior parts of the head; of a repugnance to exertion, apathy, loss of memory, and weakness of the mental energies. In cases of sanguineous congestion, or hæmorrhages in the situations referred to, the attack is sudden, and the blindness is often not the most remarkable symptom.

54. In some cases resulting from organic disease within the head, cerebral symptoms, particularly those of an acute kind, are not complained of until the amaurosis is far advanced. In its progress, objects frequently seem to the patient disfigured or perverted. In many cases of amaurosis from organic change of the skull, membranes, or brain, the affection commences with intolerance of light, strabismus, giddiness, luminous spectra, convulsive motions of the eyes and eyelids, contracted pupil, and turgescence of the blood-vessels of the eyes, loss of hearing, smell or taste, or both, violent headach, rapidly followed by complete amaurosis, protrusion of the eyeball, and abolition of the external senses and of the powers of mind.

55. This species of amaurosis is often *complicated* with, or preceded by, epilepsy, paralysis, apoplexy, ottorrhæa, or disease of the ears, hysteria, and various nervous effections. It is chiefly by attending so these antecedent disorders, or other slighter cerebral symptoms, that we can form any idea of the nature of the amaurosis. The appearance of the eye, and particularly of the pupil, is not to be depended upon; for, although the pupil is usually dilated and immoveable, the exceptions are too numerous to admit of considering it as an uniform occurrence.

56. *Spec.* 7th, *Amaurosis from disease of the optic nerves, or of their sheaths.* This species of amaurosis always advances slowly, generally commencing in one eye, with a black cloud, which grows more and more dense, great disfigurement and perversion of objects, without pain of the head or eye. There is, however, a sensation of pressure at the bottom of the eye, as if forcing the eyeball from its socket. The pupil is generally, from the commencement, much dilated, and angular from irregular action of the iris. By degrees, according to BEER, glaucomatous change of the vitreous humour supervenes, and afterwards of the lens itself, but without any varicose affection of the vessels of the eye. At last the eyeball becomes somewhat smaller than natural, but complete atrophy does not ensue.

57. *Spec.* 8th, *Amaurosis from lesions of branches of the fifth nerve*, &c. The experiments of BELL and MAGENDIE first threw light upon this cause or form of amaurosis. I believe that it is by no means infrequent. Four cases of it have come before me in private practice; in three of which the principal trunk or branches of the ophthalmic nerve were implicated. In one of these the amaurosis was very slight; in the other two it was very considerable, although not complete, and was a consecutive phenomenon of very extensive disease. I saw two of them, in consultation with respectable practitioners in my vicinity. The fourth case very recently occurred in a member of my own family. In it the frontal branch on the right side was pressed upon by a common boil; the sight of the eye was nearly altogether lost, but was soon restored when the boil broke.

58. Numerous cases are on record, in which partial amaurosis is said to have occurred after injuries and wounds of the eyebrows, cheeks, and forehead; or from the irritation and extraction of diseased teeth. The appearance of the disease from these causes was noticed by MORGAGNI, PINEL, BEER, WARDROP, TRAVERS, PENADA, RIBES, &c., before the functions of this nerve were so well known as they are now. Its occurrence from wounds of the eyebrows is mentioned even in the writings of HIPPOCRATES.

59. Amaurosis from these causes is, in some rare instances, *complicated* with facial neuralgia, toothach, rheumatism of the face, and tumours or abscesses developed in the vicinity of the eye, and within the cranium in the course of the fifth nerve. I met with it in a case of ottorrhæa, terminating in caries of the bones, and extensive disease of the internal parts in the vicinity. It is also, in some cases, accompanied with paralysis of the upper lid, and in others with paralysis of different muscles of the eye. In these cases, the third or sixth nerves have, most probably, been chiefly affected. When the ophthalmic nerve is affected within the cranium, it is difficult, if not impossible, to determine the particular seat of lesion from the amaurotic symptoms. Facts have not been observed in sufficient number, and with requisite precision, to admit of any statement being made respecting the pupil and motions of the iris in this species of the disease. I believe, however, that serious organic, as well as functional, lesions of the organ may supervene to it.

60. There are other varieties of amaurosis particularised by BEER, WELLER, SANSON, and other German and French writers, some of them of rare or doubtful existence, or at least referrible to the species into which I have here divided the disease. From amongst these I may enumerate the following: — Gouty amaurosis; rheumatic amaurosis; amaurosis from the sudden repulsion, or cure of cutaneous eruptions, or old ulcers; amaurosis from suppressed secretions and evacuations; puerperal amaurosis, &c. It is

evident that these are only occasional, and by no means frequent, causes of the disease, which ought to be kept in recollection by the practitioner, but which can act only by inducing some one or other of the forms into which it has been divided; more particularly the *second*, *third*, *fourth*, and *sixth*. In as far as they may require a modified plan of treatment, they will receive attention in the sequel.

61. In addition to these, I may notice the *cat's-eye amaurosis* of BEER, which is only met with in the old, debilitated, thin, and emaciated; particularly those who are grey, or white-headed. At the commencement of this amaurosis, the iris retains its mobility; but it afterwards is slow and the pupil dilated. Deep in the bottom of the eye, a concave pale grey, or yellowish green, or reddish, variegated opacity is observed. The further the disease advances, the paler the bottom of the eye becomes, the paleness extending to the iris, until at last a slender vascular plexus — the ordinary ramification of the central artery and vein — may be discerned. With this state of the eye, decline or total abolition of vision is the consequence. This rare form of amaurosis seems to consist of a deficiency of the pigmentum nigrum, and of the tapetum of the uvea. It appears closely allied to far advanced glaucoma. This form of the disease is seldom or ever benefited by medical treatment.

62. V. DIAGNOSIS. — Amaurosis is liable to be mistaken for incipient *cataract*, and for *glaucoma*. When *cataract* is fully developed, the two diseases can scarcely be confounded. That a clear diagnosis should be made between incipient cataract and amaurosis is of the greatest importance in practice. (*A*) As to the impaired vision in both diseases at their commencement, it may be remarked that in *cataract*, the difficulty of sight increases very slowly, and is compared to a diffused mist, thin cloud, or gauze intervening between the eye and the object: whereas in *amaurosis*, the dimness or loss of sight is either sudden or partial, resembling a fly, spots, or motes covering parts of an object. However, a mist, or thin cloud, often is complained of in incipient amaurosis, and, increasing in density, at last deprives the patient of sight; but a complete deprivation of sight never occurs in cataract. As incipient cataract depends upon commencing opacity, generally at the centre of the lens, the appearance of a mist, &c., is generally most perceived when the patient looks straight forward; vision being more distinct when he looks sideways. This commonly does not obtain in amaurosis, although it sometimes does.

63. (*B*) The degree of light which the patient desires is also important. When amaurosis depends upon insensibility of the retina, there is a great desire of strong light, and he sees the best at noonday, or when objects are brilliantly illuminated. The opposite of this obtains in cataract; for a strong light, causing the pupil to contract, the rays of light reflected from the object must pass chiefly through the central and more opaque part of the lens. In addition to this we should attend to the antecedent and attendant symptoms of amaurosis; especially vertigo, headach, disorder of the digestive organs, without which cataract usually commences.

64. (*C*) Upon examining the pupil, incipient amaurosis presents either the jet-black colour of health, — excepting in the cat's-eye amaurosis of BEER, which is of rare occurrence, and presented to us under circumstances not to be mistaken, — or a paleness or greenness, visible only when the eye is examined in particular directions, constituting amaurosis with *glaucoma*. This appearance evidently arises from deficiency of the pigmentum nigrum, and incipient dissolution of the hyaloid membrane; and when it amounts to a high degree, constitutes the cat's-eye amaurosis of BEER.

65. MR. MACKENZIE remarks on this subject, that attention to the following circumstances will generally enable the observer to distinguish glaucomatous amaurosis and cataract: — 1st, The opacity in glaucoma is always greenish, whereas in incipient cataract it is always greyish. 2d, The opacity in glaucoma appears seated at a considerable distance behind the pupil, or deep in the vitreous humour; whereas in lenticular cataract, the opacity is close behind the pupil. In posterior capsular cataract, the opacity is deep in the eye, but is always streaked; whereas the glaucomatous reflection is always uniform, never spotted, nor radiated. 3d, Upon close examination of the surface of lenticular opacity by means of a double convex lens, it is seen slightly rough, somewhat dull, never smooth or polished — forming, in these respects, a striking contrast to the appearances presented by glaucomatous opacity. 4th, The eyeball, in glaucomatous amaurosis, always feels firmer than natural; while in cataract it presents the usual degree of firmness. 5th, Glaucoma proceeds very slowly in its course, scarcely increasing for years; whereas the vision, in cataract, much more rapidly declines, and keeps pace with the growing opacity.

66. (*D*) The mobility of the iris is a principal source of diagnosis. For, in incipient cataract, the contractions of the pupil are as extensive and as vivid as in health; but, in incipient amaurosis, the pupil is either dilated and fixed, or its motions limited and slow. Also, in the latter disease, the movements of the eyeballs and eyelids are often imperfect, or difficult; whereas no impediment of this description exists in cataract. In many cases of amaurosis, we observe a want of direction in the eyes, or a slight degree of strabismus, not infrequently with a want of power over the motions of the upper lid, — symptoms that never occur in cataract.

67. VI. PROGNOSIS. — This is unfavourable. When the cause of the disease is evident, and it is merely functional, or simply congestive or inflammatory, and the patient young, or in the prime of life, but under middle age, a complete cure is not infrequent. This may be obtained although much more rarely, even when the loss of sight is total. But in every case the predisposing and exciting causes, and the effects of remedies, must be taken into account in forming our prognosis. Much more commonly only partial amendment is produced. Amaurosis is generally less unfavourable when suddenly, than when slowly induced. When the pupil is only slightly dilated, still moveable, of its natural form, the eyeball neither firmer nor softer than in health, and no glaucoma present, the prognosis is obviously more favourable than when the pupil is fixed in the states either of expansion or contraction, or when the eyeball is either boggy or preternaturally hard, or when the bottom of the eye presents a greenish opacity.

68. If the attack has been sudden, and nearly complete, or if objects are seen in a perverted or distorted form or double; if the amaurosis be attended with want of power in the muscles of the eyeball or eyelids, we should suspect that the cause consists of general or partial pressure, or other organic disease, within the cranium, which, although indicating both danger and the permanent loss of sight, will sometimes be removed by energetic treatment. If one amaurotic and paralytic symptom slowly supervene on another, we should dread the gradual developement of tumours, cysts, exostosis, &c. within the head, the situation and nature of which can be suspected only, and chiefly from the nature of the attendant or preceding symptoms. But in all these the prognosis is necessarily very unfavourable.

69. VII. TREATMENT. — In order to employ remedies in this affection with any degree of benefit, it will be necessary to direct them with a very particular reference to the pathological conditions of the eyes, the brain, and system generally, as now pointed out. Having separated the disease into the foregoing species or varieties, in order that the treatment may be pointed out with greater precision, I proceed to detail the measures which I consider appropriate to each, conformably to the most experienced authors, and to my own observation.

70. *A. Of the first species.* The treatment of this, the most strictly functional form of the disease, should have strict reference to the causes which induced it, — whether those acting directly on the organ, or those which act indirectly, and in consequence of inducing disorder of other parts. When amaurosis proceeds from direct causes, either of a depressing or an exhausting nature, the appearance of the eye, as well as the character of the symptoms, require an attentive examination, chiefly with a view to ascertain the existence of inflammatory action, or even active congestion of the internal parts. A complete removal of the causes must be insisted on; and, if no symptoms indicative of inflammation (§ 46.) exist, but, on the contrary, debility, a languid circulation, *muscæ volitantes*, or dark spectra, &c. (§ 39.), tonics and stimulants, both internally and externally, are required. A light, nutritious, and invigorating diet, with change of air, repose of the organs, moderate exercise, vegetable, and afterwards mineral tonics, and the usual means of improving the digestive organs, and promoting the functions of the bowels and secreting viscera, are in these cases chiefly to be depended on. Small doses of *strychnine*, or of the extract of *nux vomica*, may also be given (FORM. 541. 565.). When, however, we find evidence of congestion or increased vascular action of the internal parts of the eye to have been induced, the means to be employed in the next species must be resorted to.

71. When this species of amaurosis proceeds from interruption or disorder of the digestive functions, as indicated by the symptoms of such disorder, by a foul tongue, acidity and flatulence of stomach, and torpid bowels (§ 39.), *emetics*, as recommended by RICHTER, OTTO, SCHMUCKER, FLEMMING, SCARPA, and MACKENZIE, may be exhibited; but, unless the symptoms of interrupted digestion, or of indigestible and injurious substances remaining upon the stomach, or of biliary obstruction, be unequivocally present, little advantage will be derived from them: in plethoric persons, or where these causes of disorder do not exist, they may be even injurious. Amaurosis from disorder of the digestive organ is generally imperfect, and sometimes slight; and its progress slow. In this form, SCARPA recommends *full vomiting* to be produced by the patient taking a spoonful, every half hour, of a solution of three grains of tartar emetic in four ounces of water; and, on the following day, opening powders to be commenced with, consisting of an ounce of supertartrate of potash and one grain of tartarized antimony, divided into six equal parts. The patient is to take one of these parts in the morning, another four hours afterwards, and a third in the evening, for eight or ten successive days. The effects of these are, nausea, and increased evacuations from the bowels; and, in the course of a few days, vomiting. If, during their use, the patient should complain of a bitter taste in the mouth, vain efforts at vomiting, and no improvement of sight, the emetic, as at first directed, is to be again taken; and this is to be repeated a third or fourth time, if the bitter taste, acid eructations, nausea, &c. continue. The repetition will often at last succeed in procuring the discharge of a yellowish or greenish matter from the stomach, to the relief of the head and eyes.

72. The stomach, and through it the liver, having been thus acted upon, the following resolvent pills of SCHMUCKER are to be taken, to the extent of fifteen grains, night and morning.

No. 11. ℞ Gum. Sagapen., Gum. Galbani, Sapon. Venet. āā ʒj.; Rhei ʒjss.; Antimonii Tartarizati gr. xv.; Succ. Liquor. ʒj. Divide in Pilul. gr. iij.

These pills are to be continued for four or six weeks. Instead of these, the pills recommended by RICHTER may be prescribed.

No. 12. ℞ Gum. Ammoniaci, Gum. Assafœtid., Sap. Venet., Rad. Valerian., Summit. Arnicæ, āā ʒij.; Antimonii Tartar. gr. xviij.; Syrup. q. s. M. et divide in Pilulas gr. iij.

From twenty to thirty grains are to be taken three times a day for some weeks.

73. If these succeed in improving the state of the stomach and sight, SCARPA directs means calculated to strengthen the digestive organs, and nervous system: such as the daily exhibition of bark and valerian, more particularly in periodic amaurosis; a light, digestible animal diet, with a moderate quantity of wine, and wholesome air and exercise. He further prescribes, as advised by THILENIUS and MORIGGIA, the *vapour of liquor ammoniæ* directed to the eye, with the view of exciting the nerves of the organ; and employed, three or four times a day, so as to occasion each time a copious secretion of tears. In conjunction with the use of this vapour, other external stimulants, as blisters to the nape of the neck, behind the ears, or to the temples; irritation of the nerves of the nostrils by sternutative powders; and, lastly, sparks of electricity may be resorted to. Various volatile substances, spirituous, saline, and oleaginous, have been recommended to be applied to the eyes, either in a state of vapour, or of solution and dropped into them, by WARNER, SAGAR, MANARDUS, DUNCKLER, CHOMEL, ST. YVES, and SCHMUCKER; but these require to be cautiously resorted to. Substances of a like description have also been prescribed in the form of *collyria*, in this species of amaurosis. PLENCK recommends for this purpose a drachm of the *crocus metal-*

lorum dissolved in rose water; or a portion of the following: —

No. 13. ℞ Spirit. Lillior. Conval., Spir. Lavand., Spir. Rorismar., Muriatis Ammon., āā ʒj.; Spir. Bals. Vitæ Hoffman. ʒss. M.

to be poured in the palm of the hand, and held before the eyes. The application of cold and slightly stimulating washes and baths to the eye, and bathing the whole head, or eyes, in cold water, have been approved by Richter and Beer. Mr. Travers, however, states, that he has never obtained any decided advantage, in amaurosis, from applications made directly to the eyes. Both electricity and galvanism have received the recommendation of Ware, Lentin (*Beyträge*, iv. b. p. 102.), and Osiander (*Abhandl. Med. Soc. zu Erlang.*, i. b. No. 8.). *Moxas* applied in the course of the facial nerves have been used by Larrey; and the *actual cautery* behind the ears by Khlodovitch. (*Archives Génér. de Méd.*, t. xvi. p. 452.)

74. In this species of amaurosis, both in cases of the above description as well in those which proceed from the over exertion of the sight, the *external application* of *strychnine* promises to be of considerable advantage. Mr. Liston, Dr. Short (*Lond. Med. Gaz.*, vol. v. p. 541.), and Dr. Heathcote (*Medico-Chirurgical Rev.*, July 1830.), have thus employed it with decided benefit. After blistering the temples, and removing the cuticle, from one eighth to one fourth of a grain of pure strychnine was applied to the denuded surface on each side daily, and the application renewed each day, and gradually increased to a grain. In one case the quantity was increased to three grains, but it is seldom requisite, and it may sometimes not be safe, to exceed half this quantity. In some cases it will be necessary to re-blister, oftener than once, the surface, after repeated applications of the strychnine. Cataplasms of *capsicum* have also been employed with advantage to the temples. Gahn mentions them with approbation; and I have seen them used in amaurosis with decided benefit by the native doctors in warm climates. Hoffmann and Trew employed the cajeput oil in this manner, and Warner the animal oil of Dippel.

75. Mr. Travers and Mr. Lawrence are not advocates for the use of *emetics*. The former prefers to remove the gastric disorder by a course of blue pill, with gentle saline aperients and vegetable tonics. He recommends the combination of blue pill with colocynth, rhubarb, and aloes; and of soda with columba, gentian, or rhubarb; with the view of promoting or regulating the abdominal functions. After these he advises the use of general tonics, as the mineral acids, bark, steel, and arsenic. Mr. Lawrence chiefly approves of attention to the general health, by residence in a pure air; out-of-door exercise; mild, plain, but nutritious food; gentle aperients, and occasionally an active purgative; repose of the affected organ; counter-irritation by a succession of blisters, an open blister, or setons. Beer is also against the use of emetics. He prefers the employment of brisk cathartics; followed by the use of anthelmintics, when we suspect the presence of worms in the bowels. Rubefacients, stimulants, and blisters to the temples and eyebrows, are favourably mentioned by him.

76. There can be no doubt of the propriety of the measures recommended by the above writers: but are we to remain content with them alone, in cases where amendment from them is either slow or not apparent? I think not; and therefore are we required to devise additional means. Those already recommended by the eminent Continental authorities, as stated above (§ 71, 72.), and the external medication already described (§ 73, 74.), have both authority and reason in their favour, if duly followed. But it may be useful to suggest others. For, in cases of this disease, the practitioner will have reason oftener to regret the want, than to be perplexed by a diversity, of rational resources.

77. After having had recourse to evacuations, to emetics with great caution, and under the circumstances stated above (§ 71.), always to aperients, alteratives, and occasionally to brisk purgatives, promoted by enemata, suited to the peculiarities of the case, and repeated as long as the secretions are impeded, and the evacuations offensive, or of an unhealthy colour, other internal means must be sought for, if necessary. Amongst these, in this species of the disease, *camphor*, combined with *arnica*, and in considerable doses, has been recommended by Flemming (*Hufeland's Journ.*, &c., Jan. 1810, and May 1812.); the *rhus toxicodendron*, or the *rhus radicans*, in the form of tincture, by Basse and Hufeland (*Journ. der Pract. Heilk.* &c., Jan. 1811.); and *phosphorus*, by Loebel (*Horn's Archiv.*, Nov. 1812, p. 397.) Musk, castor, assafœtida, valerian, and zinc, have also been favourably noticed by Beer.

78. It is chiefly in this form of the disease that advantage, if any, will be derived from the use of *aconitum*, which, however, has received the approbation of Boehmer, Collin, Stoeller, Reinhold, Gesner, and other respectable authorities, particularly when the affection is connected with chronic rheumatism, or atonic gout, or occurs in the gouty and rheumatic diatheses. *Guaiacum* has been recommended by Wintringham; and, under the circumstances of disease now alluded to, particularly when combined with camphor and ammonia, and given after due alvine evacuations have been procured, is calculated to prove beneficial. The *arnica montana*, which has been prescribed by Baldinger, Collin, Franck, Thilenius, and Angeli, is applicable to this form of amaurosis only. It is most probably from having employed it in very different states of the disease, — in the inflammatory, or those depending upon organic change within the head, — that it has been disapproved of by Richter and Schmucker.

79. The chief *complications* of functional amaurosis require no very different treatment to that which has been described. The not infrequent association of the disease with *worms* demands the use of anthelmintics, followed by purgatives, and the administration of vermifuge enemata, &c. (see Art. Worms.), and afterwards by vegetable or mineral tonics. But, in the majority of cases of even functional amaurosis, the use of the preparations of iron requires caution. When the disease is occasioned by lead, or accompanied with the *lead colic*, or attended by paralysis of any other parts of the body, the exhibition of calomel, with camphor and small doses of opium, followed by purgatives, and antispasmodic and aperient enemata, is extremely serviceable. After the secretions and functions of the abdominal viscera are restored by these means, *strychnine*, or the

extract of nux vomica, may be prescribed both internally and topically. (FORM. 542. 565.) The connection of the disease with hysteria, hypochondriasis, obstructions of any of the abdominal secretions, chiefly requires the combination of antispasmodics with aperients; chlorine, iodine, or sulphureous baths; the occasional exhibition of a brisk purgative; and, afterwards, the warm salt water bath, tonics with stimulants, and strict attention to the secretions and functions of the digestive organs, and to diet, air, and exercise. After all obstruction is removed, cold bathing, or chalybeate or salt water baths, followed by frictions of the cutaneous surface, may be used.

80. *B. Of the second species.* When amaurosis is attended with those symptoms which I have described as marking active congestion of the internal parts of the eye, or of the head or thoracic viscera (§ 41.), a very different treatment to that enjoined above is requisite. In the first species of amaurosis, *bloodletting* is generally prejudicial — it has even caused the disease: but in the congestive species, bloodletting, either general or local, or both, according to the circumstances of the case, is indispensable. In every form of the disease the means of cure must be regulated by the apparent vascularity of the eye, the plethoric state of the countenance and body, and by the state of the arterial pulse, examined not only at the wrists, but also in the carotids and temples.

After depletion, to an extent which the well-informed practitioner will be led to adopt according to the particular characters of the case, the promotion of the alvine discharges, and of the cutaneous and alvine secretions, will next require his attention, as salutary modes of derivation and evacuation; and afterwards the application of blisters, setons, issues, and other counter-irritants, behind the ears, or to the nape of the neck, will generally be necessary to complete, or to render permanent, the cure. The tartarized antimonial ointment, moxas, the mezereon issue, the actual cautery to the nape of the neck, or to the occiput, and errhines, have severally been recommended by eminent Continental writers in this state of the disease.

81. The *shower bath*, sponging the head with cold water night and morning, the *cold douche*, or the effusion of a stream of cold water on the head, are means which ought not to be neglected in those cases in which the congestion is of an active character, or approaches to the inflammatory state. When this form of the disease is consecutive of interrupted or suppressed discharges or evacuations, the restoration of these must be attempted. If the menses be suppressed, leeches to the pudenda, or the insides of the tops of the thighs; or bleeding from the feet; the preparations of iodine, aloetic purgatives, and other emmenagogues; stimulating pediluvia, and the *hip bath*, with the other means usually resorted to in cases of amenorrhœa, are to be employed. If it proceed from suppressed hæmorrhoids, leeches may be applied to the vicinity of the anus, and purgatives, with calomel, colocynth, and aloes, prescribed. If it supervene on the disappearance of gout or rheumatism, sinapisms and irritating cataplasms may be directed to the extremities, and free alvine evacuations procured; after which colchicum, combined with alkalies or magnesia, and, in some cases, with ammonia or camphor, may be exhibited, or aconitum combined with antimonials, and purified sulphur; and rubefacients applied behind the ears, or to the temples. When it appears after the suppression of eruptions, and healing of old ulcers, the use of the tartar emetic ointment, setons, and perpetual blisters behind the ears, are particularly indicated. If it follows a suppressed cold, WELLER recommends weak sternutatories, with calomel or hellebore.

82. Mr. TRAVERS has very justly remarked, that a loss of balance of the circulation, producing undue determination of blood to the head, often exists independently of general plethora, and is aggravated by sanguineous depletion. It is sometimes even met with in corpulent persons; and is not infrequent after over-excitement and chronic inflammation. Instead of requiring loss of blood for its removal, this state of the disease demands an equalization of the circulation, by promoting the various secretions, and the derivation of the excessive supply to other parts by the means now stated, assisted by an abstemious and regular diet, gentle exercise in the open air, the promotion of the functions of the liver and bowels, and the means usually employed to benefit the general health. Even in some of these cases, the local means noticed above, as the vapours of ammonia, &c. (§ 73.), may be serviceable in restoring the tone of the vessels of the eyes.

83. *C. Of the third species.* Inflammation of the internal parts of the eye, particularly of the retina, requires decision, in the more intense cases, and a vigorous but judicious application of the usual antiphlogistic remedies. In the slighter cases, the exact nature of the disease may be mistaken for either of the foregoing species. Slight or slow inflammatory action may exist without any material affection of the pulse, or pain of the organ; but the appearance of the blood-vessels of the sclerotic, and the state of the iris, will often indicate its presence when other signs are wanting. When the attack is acute, both general and local depletions are required. In these cases PLENCK has advised the performance of arteriotomy; SPIGELIUS and HOFFMANN, of blood-letting from the frontal vein; and SAUVAGES, from the jugulars. But vascular depletion is not to be relied upon alone. Active evacuations from the bowels, determination to the skin by small and repeated doses of antimonials, and the use of the tartar emetic blister or plaster, behind the ears, or to the nape of the neck, are to be also adopted.

84. If these means fail of producing a very decided improvement in a very short time, we must endeavour to affect the mouth slightly with mercury, without producing salivation. In order that this may be done with rapidity, and with as little mercury as possible, the preparations of this mineral to be employed will be advantageously combined with James's powder, or antimonial powder, and small doses of camphor. The treatment is, in such cases, similar to that usually resorted to in iritis. Much of the advantages to be procured from the use of mercury in this form of amaurosis, as well as in iritis, depends upon the promptitude with which it is employed. In this, TRAVERS, LAWRENCE, MACKENZIE, and others agree. Indeed, the use of calomel, and other

preparations of mercury, either alone, or combined with other substances, has been adopted in the inflammatory states of amaurosis, from the time of Heister and Boerhaave. Bang, Hudemann, Schmucker, Zuicken, and Breiting, agree in recommending them. Boettcher advises the combination of calomel with belladonna; and Hey, calomel with camphor: both being judicious modes of combining this medicine. Mead, Stahl, Hoffmann, and Isenflamm, advise the production of salivation; but I agree with Travers in considering the affection of the mouth as sufficient. The use of mercury is much praised by Beer in such cases, as well as in those of a syphilitic origin, or which are complicated with engorgement of any of the abdominal viscera. Care should be had not to employ it in debilitated or scorbutic persons, and when the eye is soft or boggy. Many of the Continental writers, and Mr. Ware, prefer the sublimate to other preparations. It is best exhibited, as recommended by Van Swieten, dissolved in brandy, and taken in a basin of sago or gruel. It may be continued for six weeks, or even longer.

85. The success which has resulted from the exhibition of the *oleum terebinthinæ* in iritis induced me to prescribe it, after depletions, in two cases of this form of amaurosis; and with satisfactory results in both. In persons far advanced in life, in scrofulous subjects, and in debilitated persons, this oil is certainly a less hazardous medicine than the mercury exhibited so as to affect the system.

86. In the slighter or more chronic inflammatory forms of amaurosis, particularly when met with in the description of subjects just now alluded to, much circumspection is necessary in the use of depletions: general bloodletting is here inadmissible, particularly when this class of patients are ill fed, and live in close and ill ventilated streets and apartments in large towns, and local depletions only are indicated. In cases of this description, and under these circumstances, the oleum terebinthinæ will prove a valuable medicine; and even, although we may deplete thus locally, the internal exhibition of tonics, with a nutritious diet, attention to the alvine secretions and evacuations, and a wholesome air, will prove the most beneficial remedies.

87. This form of amaurosis, as well as the preceding, will occasionally supervene from suppressed evacuations and eruptions, and more rarely from misplaced gout and rheumatism. (§ 48.) In such cases, the treatment already recommended, as appropriate to each of these (§ 81.), will be equally applicable here.

87. Besides the above means, it has been recommended by Bromfield, to insert an issue in the scalp; by Hoffmann, to apply leeches to the insides of the nostrils; by numerous authors, to employ errhines and sternutatives, with the view of provoking a copious secretion from the Schneiderian membrane; and by as many others, to use the actual or potential cautery, setons, moxas, &c. to the nape of the neck, or to the occiput. Leeches and counter-irritants are safe, and sometimes useful, remedies in this and the preceding species; but errhines and sternutatives may be hurtful, unless the affection has arisen from suppressed discharges from the nostrils. They are most serviceable in the functional state of the disease. The safest that can be employed in this species of amaurosis is the one recommended by the late Mr. Ware. It consists of ten grains of the hydrargyrus sulphuratus, well mixed with a drachm of common sugar: a small pinch of it generally produces a copious discharge of mucus from the nose.

89. D. *Of the fourth, and remaining species.* When we have reason to suspect that the amaurosis depends upon advanced organic lesion of the internal parts of the organ consequent upon inflammation, we should still bear in mind that, with the supervention of such lesion, whatever it may be, the inflammatory action seldom altogether subsides, but continues, more or less, in a chronic, atonic, or disorganizing form. Therefore the propriety of still having recourse to local depletions, particularly if these have been neglected early in the disease, to purgatives, derivatives, or revulsants; the cold douche to the head; and, afterwards, to the use of stimulating vapours, when we have reason to suspect that the change continues rather in consequence of lost tone of the vessels, and inaction of the absorbents, than from increased action. Under such circumstances, the vapour of camphor and acetic acid, or of the liquor ammoniæ, may be tried.

90. *a.* If the amaurosis have arisen from *external injury of the ball of the eye*, or concussion of the organ (§ 51.), the chief indication is to prevent, or to repress, increased vascular action, by the means already recommended; to attend to diet and regimen, and to keep the organ in a quiet inactive state for some time; after which, if the affection still continue, the treatment must be directed according to the particular lesion, functional or organic, that may have been primarily or consecutively produced.

91. *b.* When the history of the case leads us to suspect the dependence of this affection upon *disease within the head* (§ 52.), or tumours pressing upon the *optic nerve*, &c. (§ 56.), the treatment must necessarily be directed, according as the symptoms referrible chiefly to the head may lead us to infer the nature of the primary lesion. If such symptoms, particularly the temperature of the head, and the action of the carotids, indicate the existence of congestion, interrupted circulation, or increased action, the treatment must be accordingly. But under almost every circumstance, counter-irritation, and external as well as internal revulsants, will prove safe, and sometimes serviceable, means of cure.

92. If we have reason to suspect the formation of tumours; thickening, or other change, of the membranes or of the bones, particularly as a consequence of syphilis; and extravasations of blood, or of serum, within the cranium, or in the course of the optic nerves, &c. (§ 52.), the internal use of the preparations of *iodine*, and particularly of the *hydriodate of mercury* or of *potash* (see Form. 323, 324.), should not be overlooked. I have employed these preparations with much benefit in three cases of amaurosis connected with paralysis; two of them consequent upon apoplectic seizures. In the intervals between the courses of iodine, deobstruents, and alterative doses of blue pill, with the extracts of sarsaparilla and taraxacum, or with the decoction or other preparations of sarsaparilla, should be prescribed.

93. *c.* When the affection seems connected with *lesion* of the *other nerves subservient* to vision (§57.), the treatment must necessarily depend upon the seat and nature of this lesion, and, in some rarer cases, upon the state of the associated derangement. If it be connected with neuralgia of the nerves of the face, disorder or irritation of these nerves may exist at their origin, or in their course through the membranes and bones of the cranium. The cause may also be external — in a diseased tooth or stump, or a partially separated external branch of the opthalmic trunk of the fifth nerve. In all such cases, as well as in the other forms, states, and associations, of the fifth, sixth, seventh, and eighth species, which have been enumerated, the treatment must vary in each, and be directed according to the very numerous pathological conditions, which the well-informed pathologist will detect, either as their efficient causes, or as their related effects.

94. Throughout the treatment of this disease, the practitioner should keep the following facts in recollection: — 1st, An appropriate, and hence successful, method of cure should have an intimate relation to both the remote and proximate causes of the disease, and the natural or morbid diathesis of the patient: 2d, It must be directed after a minute inspection of the eyes, and examination into symptoms connected with the head and the digestive viscera: 3d, It must be modified according to the nature of its related, associated, and symptomatic disorders: and, 4th, That much of the success will often depend upon the strict regulation of the patient's digestive and organic functions; upon diet and regimen; and upon a regulated exercise both of the organ of sight and of the body, with a pure and temperate air. Keeping these indications in recollection, the practitioner will modify and adapt the treatment to the presumed nature, seat, complication, and relations of the disease.

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AMENORRHŒA. See Menstruation.

AMNIOS. See Dropsy of the Amnion.

ANÆMIA. See Blood, *Deficiency of.*

ANÆSTHESIA. See Sensations, *Morbid States of.*

ANASARCA. See Dropsy of the Cellular Membrane.

ANEURISM. See Aorta, *Aneurism of;* and Arteries, *Morbid Structures of.*

ANGINA. See Croup. Fauces, *Inflammations of.* Larynx, *Inflammations of.* Pharynx, *Inflammations of.* Throat, *Inflammations of.*

ANGINA PECTORIS. Syn. *Cardiogmus Cordis Sinistri*, Sauvages. *Angina Pectoris*, Heberden. *Asthma Arthriticum*, Schmidt. *Diaphragmatic Gout*, Burton. *Asthma Dolorificum*, Darwin. *Syncope Anginosa*, Parry. *Angor Pectoris*, J. Frank. *Asthma Convulsivum*, Elsner. *Pnigophobia*, Swediaur. *Sternodynia Syncopalis*, Sluis. *Asthenia Pectoralis*, Young. *Stenocardia*, Brera. *Asthma Spastico-Arthriticum*, Stoeller. *Sternalgia*, Baumes and Good. *L'Angine de Poitrine*, Fr. *Brustbräune, Herzklemme, Brustklemme*, Ger. *Angina di Petto*, Ital. *Suffocative Breastpang*, Eng.

Classif. 2. *Class*, Diseases of the Respiratory Function; 2. *Order*, Affecting the Lungs, their Membranes, or motive Power (*Good*). II. Class, I. Order (*Author*, see *Preface*).

1. Defin. *Acute constrictory pain at the lower part of the sternum, inclining to the left side, and extending to the arm, accompanied with great anxiety, difficulty of breathing, tendency to syncope, and feeling of approaching dissolution.*

2. This affection was not recognised as a distinct disease by medical authors, until Dr. Heberden described it as such in the Medical Transactions of the London College of Physicians (vols. ii. and iii.); but the works of Morgagni and Hoffmann show that they were not unacquainted with it in practice. It was also noticed by Poter (*Opera*, No. 22. p. 302.), under the head "Respirandi difficultas, quæ per intervalla deambulantibus incidit;" and he remarks respecting it, that the attacks were sometimes so severe that persons had been suddenly carried off by them. Obscure notices of affections, which probably were of this nature in some instances, may also be detected in authors from Hippocrates downwards. From amongst these, the reader may refer to Aretæus (*Opera*, p. 7. Oxon. 1723.), Cœlius Aurelianus (lib. ii. c. i. p. 348.), Barteletti (*Methodus in Dyspnœam*, Bon. 1632.), and others, adduced by Zechinelli (*Sulla Angina di Petto*, Pad. 1813.), who supposes that the case of Seneca (*Opera*, t. ii. p. 136.), which he has himself described by the term *suspirium*, was actually this malady. Dr. Cullen has passed Angina Pectoris over in his work; but it has been well described by Drs. Fothergill, Wall, Duncan, Butter, Percival, Darwin, Macbride, Hamilton, Macqueen, Johnstone, Haygarth, Parry, Nicholl, and Good, in this country; and by Jurine, Brera, Lentin, Desportes, Kreysig, Ritter, Zechinelli, and Stoeller, on the Continent; and by Dr. Chapman in America.

3. Pathology.—I. Symptoms. An attack of this disease is often preceded by considerable derangement of the digestive organs, especially by flatulence, acid or acrid eructations, or other symptoms of indigestion, with torpid bowels, pains in the limbs, and occasional spasms about the chest: but it frequently also attacks a patient, particularly when walking or ascending an eminence, without any, or with but slight, premonition.

4. *A.* In its *acute form*, the patient is seized with a sense of painful constriction of the chest, particularly at the cardiac region, about the lower part of the sternum, inclining to the left, and extending to the left, occasionally also to the right, arm — at first, no further than the insertion of the deltoid muscle; but the pain often successively reaches to the elbows, wrists, and sometimes even to the fingers. This is the mildest form of the disease, and soon subsides with the disappearance of its exciting cause.

5. In the more violent form of the attack, the pain and sense of constriction in the chest, and pain in the left arm, which also frequently extends to the right, amount to excruciating agony; being likened, by Laennec, to the piercing of nails or the laceration by the claws of animals. This feeling is accompanied by a sense of syncope or suffocation, sometimes with suffocative orthopnœa, convulsive dyspnœa, and palpitations; always with extreme anxiety, and a sense of approaching dissolution. The suffocative sensation is characterised by concomitant tightness and fulness of the chest, and flatulent distension of the stomach, and irritative feeling in this organ, which is relieved by eructations. During this period the pulse is variously affected, sometimes little changed, at other times extremely weak, irregular, or intermittent; and occasionally it is full, active and bounding. If the attack has been induced by walking or exercise, the patient suddenly stands still, from a feeling that perseverance in either would produce a total suspension of living power. In the slighter attacks, or early in the disease, rest merely will often immediately remove it; but this is seldom the case in the protracted and severe forms in which it frequently occurs.

6. The paroxysm continues from a few minutes to one or more hours, according to the severity and the duration of the disease. When the malady has assumed a chronic form, and its attacks occur during the night, or when the patient is at rest, the paroxysm is less violent, but generally of much longer duration; whereas, when it is induced by exertion, &c. it is of extreme violence, but of short continuance: the average duration of the fit may be about half an hour. Upon its cessation the patient merely retains a slight feeling of the various symptoms, with numbness of the arms, particularly the left. When the disease is of short standing, the paroxysms occur at long intervals, which are gradually shortened, until there is but little exemption from them, and the affection assumes a less acute character.

7. *B.* The *chronic* form of the disease is characterised by the circumstance of its being frequently a consequence of the acute; by the occurrence of the fit from the slightest causes, and after short or imperfect intervals of exemption; by its recurrence when the patient is at rest, or asleep; and by its much longer duration, but less extreme violence. Even if this form be induced by exercise, rest has little influence in shortening its duration, as in the preceding; and the paroxysm has been protracted not only for some hours, but even for several days. Palpitation of the heart, irregular and intermitting pulse, are more frequently concomitants of this state of the disease, than of the other. In the case of a very eminent and learned member of the profession, whom I long attended in this form of the disease, the attack has often continued as now described, with little remission for several weeks. Sometimes the irregularity of the pulse is observed only during the paroxysm; but in some cases it is continued, as Dr. Fothergill has correctly remarked, during the intervals, particularly when they are marked by imperfect relief.

8. This form of the disease may also occur primarily. It has twice presented istelf to me in this manner. During the severity of the attack, leipothymia, a feeling of dissolution from the intense agony, and these followed by palpitations, and an irregular state of the pulse, generally occur. In some cases the agonizing pain extends not only to the arm or arms, but ascends also up the throat and lower jaw, accompanied with a severe sensation of spastic constriction. In the majority of cases the above sensations are only present, when excited by motion, by assuming suddenly the erect posture, or even by attempting to read; a neuralgic kind of pain generally, however, being felt under the sternum, and extending to the arms: but in some cases, and in two which occurred to me, the exacerbations were often referrible to no very evident cause, they sometimes occurring during the night, although the above causes generally induced them.

9. Notwithstanding the remarkable distress characterising the paroxysm, this disease, particularly in its acute state, sometimes does not early affect the constitution, or entail any permanent lesion; the patient often enjoying tolerable health in the intermissions, and performing all his functions naturally, and without embarrassment, until shortly before an attack. After its protracted continuance, however, the vital energies of the frame, particularly as they are manifested in the digestive and circulating organs, give way. Marked disorder of the chylopoietic viscera, attended with various dyspeptic symptoms, occasionally with great irritability of the stomach and bowels, impeded respiration, anxious and pale countenance; flabby state of the integuments and muscles; marked derangement of the circulation, œdema, dropsy, &c.; at last supervene. But it more generally happens that the patient is carried suddenly off by a paroxysm before this state of the system is occasioned; or he sinks under the complicated derangement proceeding from an attack, and from some one of the organic changes which the continuance and repeated fits of the disease had induced.

10. II. Causes. — 1. *Predisposing.* This disease usually attacks the middle aged, and those beyond it; and men much more frequently than women. Of nearly one hundred cases, about seventy were upwards of fifty years of age; and seventy-nine out of the number were males; nearly one half terminated fatally, and almost the whole of them suddenly. It has been said also to occur more commonly in robust and corpulent persons with short necks. But Jurine and Chapman dispute this. My own experience agrees with theirs in respect of its being equally common in persons of a spare as of a full habit. It is most prevalent in those of gouty and rheumatic diathesis, and who lead an indolent, or studious and sedentary life, or who have been subjected to much and continued anxiety and distress of mind, or indulged in much food, and spirituous or other

liquors. JURINE and PARR state that they have scarcely met with it under fifty years of age. The most violent and distinctly marked case of it which ever came before me, occurred in a gentleman at the age of thirty-four. During 1821, I attended an unmarried lady, aged twenty-six, who laboured under it in a slighter form; and recently, in 1830, another single female, at the age of twenty-five, came under my care, with the disease in its most violent grade. In both these females, it seemed perfectly unconnected with uterine disturbance, menstruation being regular, and no tendency to hysteria having at any time evinced itself, or could be detected, my attention having been directed to this point. They both ultimately recovered after a long treatment, and the employment of very decided measures. Nearly all the cases which have come under my observation were more or less referrible to mental causes, particularly to disappointment, anxiety, and other depressing passions. Dr. HAMILTON conceives that there is an hereditary disposition to the affection. If we consider it to be of gouty origin, as contended for by BUTTER, MACQUEEN, RITTER, STOELLER, THILENIUS, ELSNER, and CHAPMAN, an hereditary disposition may be also conceded. But, although very satisfactory proofs have been adduced by these authors, and particularly by Dr. CHAPMAN, in an able paper he has recently published on this disease (*American Journ. of Med. Sciences*, No. xiii. p. 67.), yet it does not seem always to depend upon gout. Of the four cases which occurred to Dr. BLACK, of Newry, one only was subject to gout (*Med. Chir. Trans.* vol. vii.).

11. 2d, The *disease is usually excited* by walking, especially walking against the wind, or up hill; by ascending a flight of stairs, or any acclivity, particularly when the stomach is full or distended by flatus. It is also readily induced by either the exciting or the depressing passions, and by whatever perturbates the mind, or occasions emotion. It may also be induced by the most trifling causes, in some susceptible and irritable habits, as by gentle walking, coughing, speaking, or reading aloud; by suddenly assuming the erect posture; by straining at stool; or even by a meal, however moderate, &c. It may also occur in a state of absolute repose, particularly when the disease has become chronic; and the patient may be roused from sleep by an attack.

12. I have seen it occasioned by rapid changes of temperature, particularly by a rapid change to great cold; but different persons seem differently affected by extreme states of atmospheric temperature. In some slight cases the fit has been shortened, by the patient struggling to overcome it, by frequently attempting to make a full inspiration; but this has also failed. The patient is incapable of making this attempt in the more severe paroxysms.

13. III. DIAGNOSIS. — Angina pectoris is more liable to be confounded with asthma, than with any other disease. But a close attention to the phenomena attending upon both affections, will readily disclose a very great difference between them. The paroxysms of asthma always come on during the night, or at the close of the day: they are characterised by a heavy dyspnœa, wheezing, and cough; are relieved by expectoration and exposure to fresh air, and subside gradually towards morning. They are not excited in the same way, nor by similar causes, nor marked by the acute and peculiar pain in the sternum and left arm, which is distinctive of angina pectoris. The stethoscope and percussion furnish us with no signs peculiar to the disease under consideration, unless it be complicated, as is sometimes the case, with organic lesion of the heart and lungs, or with effusion of fluid within the cavity of the pleura or pericardium, when they materially assist us in ascertaining the nature of the complication; and they also serve, by enabling us to ascertain other affections of the heart, to distinguish between it and them.

14. IV. PROGNOSIS. — In recent cases, of no very violent character, recovery will frequently take place under judicious management. But when the disease has become inveterate from neglect, or from being associated with, or from having given rise to, organic lesion, and when it has appeared in a decayed constitution, or has been preceded by other diseases of the heart or lungs, an unfavourable result should be apprehended sooner or later to take place: but the period of its occurrence is uncertain; and the event is generally sudden — sometimes like an electric shock; the movements of the heart being instantly arrested. This issue is often occasioned by a full meal, or by exercise or mental emotions; but it also occurs in old or chronic cases, when the patient is at rest, and apparently uninfluenced by any circumstance or occurrence. When it is followed by symptoms of effusion of fluid within the thorax, or œdema of the extremities, a fatal termination is seldom far distant.

15. V. PROXIMATE CAUSE, &c. Notwithstanding the number of examinations which have been made after death from this disease, but little light has been thrown upon it. This is not so much owing to the absence of morbid appearances, as to the extreme diversity of those which have been observed. Like epilepsy, or dyspnœa, it has presented almost every lesion, to which the organs which it affects are liable. Many of these may be viewed as accidental concomitants, or as concurrent causes; and not infrequently as results of the repeated functional disturbance occurring during repeated attacks. In several instances, not the slightest morbid appearance could be detected: but more frequently the heart and the large vessels in its vicinity have presented marks of disease, generally varied in its nature, and opposite as to its characters. The most common of these are ossification of the coronary arteries; ossification of the valves of the heart, or of the arterial trunks; enlargement of some of the cavities of the heart, either with diminished or increased thickness of their parietes; but most frequently with softening, paleness, and tenuity of the muscular structure of the organ; varicose dilatation of the coronary veins (BRERA); depositions of adipose matter, to the extent of impeding its functions; effusions of serum, blood, &c. into the pericardium or cavity of the pleura, &c. (FOTHERGILL, BLACK, &c.) It has justly been remarked, by my friend Dr. UWINS, "that there is scarcely any malformation of the heart, or its blood-vessels, that has not been occasionally found after death, from what would be considered angina pectoris: while, on the other hand, individuals have fallen victims to the affection, fully marked, and the most accu-

rate post mortem examination has not been able to detect the slightest indication of structural derangement." (*Compend. of Theoret. and Pract. Med.*) In some cases, the only morbid appearances observed have been in other, and distant organs, from that which seems to be, if not the chief seat of the disease, at least the organ chiefly affected in its functions by it — the heart and large vessels having been altogether exempt from lesion. These appearances were adhesions of the serous surface of the lungs to adjoining parts; serous effusions into the pleura; thickening of the respiratory mucous surface; dilatation of the bronchi; œdema of the intervesicular cellular tissue of the lungs; abscess and tumours in the mediastinum; ossification of the cartilages of the ribs (WICHMANN, JAHN); tubercles, enlargement, scirrhosity, &c. of the liver (PERCIVAL, LATHAM, BRERA, and WALKER); scirrhus of the pylorus, &c.

16. These lesions serve less to throw light on the precise nature of the disease than an attentive examination of the morbid phenomena during the life of the patient, and a calm appreciation of their relations, particularly with respect to the agents tending to diminish, remove, or to exasperate them. This affection has been considered by many authors as spasmodic, "although the part immediately concerned seems not to have been designated or understood." Dr. CHAPMAN remarks, that this hypothesis is rendered probable, by the general complexion of the disease — its causes, symptoms, and cure — and by its analogy to other disorders confessedly of this character.

17. Dr. FOTHERGILL supposed it to be occasioned by obesity, and particularly by a collection of fat about the heart; he also considered that it was sometimes symptomatic of water in the pericardium or cavity of the thorax. PARRY, JENNER, BURNS, KREYSIG, BOSTOCK, and some others, have viewed this affection as a species of syncope occasioned by the accumulation of blood in the heart, from an ossification of the coronary arteries. Drs. HOSACK and FORBES conceive that it most frequently arises from a plethoric state of the blood vessels, more especially from a disproportionate accumulation of blood in the heart and large vessels. To the first and second of these opinions it may be objected, that there is no obvious connection between the effect and the cause; for, as the cause is permanent, the effect should be continued, or at least present but little abatement, whereas the intermissions between the paroxysms are often characterised by a return of the healthy functions. It may be further stated, in opposition to this hypothesis, that many fatal cases have occurred in which this particular lesion was not found on dissection. LAENNEC states that he has examined several subjects who had laboured under this disease, and in none of them did he find the coronary arteries ossified. Besides, cases are recorded by MORGAGNI, SENAC, WATSON, CORVISART, ANDRAL, and others, in which ossification of these vessels were not productive, during life, of the sufferings characterising this disease. Indeed the coronary arteries are often found ossified in old persons, who had not complained during life of any affection of the heart, and who certainly never were attacked by this malady. As to the last of the above opinions, viz. that adopted by Dr. HOSACK, Dr. CHAPMAN has very justly observed, "that even allowing the fulness and irregularity of the circulation contended for, which I am by no means disposed to do, as uniform concomitants, these I should take to be rather the effects of previous irritation or excitement, than the cause of the disease. Do we not also know, that such a condition of the vessels can exist without inducing angina pectoris? Were fulness and irregularity in the circulation only required for the production of the disease, instead of a rare, would we not have it as a daily occurrence? The fact, moreover, is, that angina pectoris, though oftener, perhaps, attacking the plethoric, is to be met with, as I have before said, in the feeble and attenuated." I may add to this, that the severest case of the disease which has ever occurred to me was that of a gentleman who had suffered severely from repeated and profuse hæmoptysis, and other symptoms of disease of the lungs. All these disappeared, but were followed, after some time, by angina pectoris. He was feeble and attenuated; but it was considered advisable to try the effect of blood-letting to a moderate extent: this gave no relief; it was repeated, but the symptoms were evidently aggravated by the measure.

18. Dr. JURINE considers the disease as a nervous affection; and he supports this opinion by referring to the sudden and unexpected manner of its attack — to its sudden termination in death, or restoration to health — the nature of the exciting causes of the paroxysm — the equality and regularity of the pulse, in the majority of cases, during the paroxysm — to the state of the respiration — to the painful sensation extending to the upper extremities — and lastly, to the circumstance of antispasmodics being beneficial in its treatment. The proximate cause, he adds, consists of an affection of the pulmonary nerves, disturbing the functions of the lungs, impairing the decarbonisation of the blood, and producing the pain in the sternum. This affection of the pulmonary nerves is communicated to the cardiac plexus, and deranges, secondarily, the heart and large vessels. The imperfect decarbonisation of the blood diminishes its stimulating influence on the heart and lungs, giving rise to repeated attacks, until it occasions the death of those organs, and then of the brain.

19. MM. DESPORTES and LAENNEC have adopted a nearly similar view of the disease, with this difference, that they consider its particular seat may vary according to circumstances. Thus, M. LAENNEC states, that when there exists, simultaneously, pain in the heart and lungs, we may presume that the affection is seated chiefly in the pneumo-gastric nerves; but where there is simply stricture of the heart, without pulmonary pain or difficulty of breathing, its site is in the nerves which the heart receives from the great sympathetic. But he supposes that other nerves may also be implicated at the same time, either by direct anastomosis or by sympathy; and that the branches of the bronchial plexus, particularly the cubital, are nearly always so affected. "The anterior thoracic originating in the superficial cervical plexus are, moreover, frequently implicated; and this is sometimes further the case with the branches derived from the lumbar and sacral plexuses, when the thigh and leg participate in the attack, which occasionally happens."

20. **Brera**, **Zechinelli**, **Averardi**, and some others, consider the disease to be occasioned by pressure of enlarged abdominal viscera on the heart, particularly of enlarged liver. **Joseph Frank** conceives it to proceed from congestion of the cavities of the heart, occasioned by defective nourishment of its muscular structure; this defective nutrition itself resulting from previous inflammation, or from metastasis of gout or rheumatism, or from disease of the coronary arteries. (*Prax. Med. Univ. Precep.*, t. ii. p. 260.) Respecting these, it may only be added, that the symptoms of angina pectoris are very seldom associated with enlargement of the abdominal viscera; and that, although they are much more frequently connected with the lesions alluded to by **Frank**, this connection is by no means uniform, and is obviously not one of cause and effect; these lesions being rather coincident and partial results of the morbid state of the nerves, the altered sensibility of which constitutes one of the chief characteristics of the disease. It may be further stated, that Dr. **Darwin** views it as a particular species of asthma, producing cramp of a peculiar kind in the diaphragm, or the other muscles of respiration; and Dr. **Butter**, while he conceives it to be of gouty origin, also refers it to the respiratory organs, particularly to the diaphragm. On these opinions it is unnecessary to comment.

21. Dr. **Chapman**, to whose valuable paper I have already referred, states, "That the disease is a species of neuralgia, I am entirely persuaded, commencing for the most part in the pneumo-gastric nerve, and spreading in different directions, as other nerves may become involved. The derangement of the heart and other structures, with which it is sometimes associated, I hold to be coincidences or effects, and not the cause; since, among many reasons which might be adduced in corroboration of it, the disease has undoubtedly prevailed independently of such organic lesions, and, conversely, these have existed without occasioning it. But what is the immediate cause of the irritation of the nerves, inducing this neuralgic condition, giving rise to the subsequent phenomena of the disease? This is a question, which hitherto has not been clearly answered. My conviction is, that it is derived from irregular gout, which misplaced, thus operates as an irritant of the nerves, and probably first of those of the stomach."

22. It will be remarked from the foregoing, that **Jurine**, **Desportes**, **Laennec**, and **Chapman** agree so far as to impute the disease to a species of neuralgia of the pulmonary and cardiac nerves, affecting the functions of the heart and respiratory organs, and extending by nervous connection to other parts; the organic lesions found in fatal cases being either coincidences, or effects of the disease; and after an attentive examination of the phenomena attendant on several cases of the affection which have come before me, I see no reason for differing materially from this opinion. With regard to the origin of this affection of the nerves in misplaced gout, I cannot so implicitly agree with Dr. **Chapman**. The connection had been previously remarked by several physicians, as I have already stated, particularly by those whose names have been adduced, as well as by **Schmidt** and **Burton**, — a circumstance favourable to the idea that it is founded in truth; and evidence of it may even be found in Dr. **Musgrave**'s very excellent, but now scarcely ever noticed work, on Anomalous Gout. **Wichmann**, however, has disputed this connection, and apparently with much reason. The notice which had been taken of this morbid relation is very candidly referred to by Dr. **Chapman**, who has adduced the particulars of six cases in which this affection was evidently connected with gout, and in which recovery took place; after means had been successfully employed to invite this disease to the extremities. In the majority of those cases the patients had never previously suffered a gouty attack, and yet the means employed were successful in causing it to appear in the lower extremities.

23. But whether this disease is merely a form of misplaced gout, or an affection *sui generis*, which, when occurring in persons of a gouty diathesis, the induction of the regular gouty paroxysm in the extremities generally removes, my experience does not enable me to decide. In two persons whom I was lately called to treat, and with whom I have been long acquainted, I have no reason to suspect a gouty tendency; but the connection so satisfactorily established by Dr. **Chapman** is evidently by no means infrequent, and is one which ought never to be overlooked during the treatment of this most distressing and dangerous disease. I believe that, in addition to the nervous character of the malady, the substance of the heart is often weak, thin, pale, and attenuated, or even softened, as if its substance were imperfectly and unhealthily nourished; and that its cavities, consequently, become occasionally dilated and congested. This view is accordant with the treatment generally found most successful in removing it. In a great proportion of the cases before referred to (§ 10.), of which I had made notes, chiefly collected from authors, dissection had been made in about fifty of those which were fatal; and out of this number nearly forty presented some degree of disease of the heart or large vessels; — most frequently ossification of the valves, coronary arteries, and aorta; and softening and emaciation of the heart. But whether these lesions were rather the consequence than the cause of the disease may be disputed.

24. VI. The **Treatment** of this disease necessarily respects, 1st, the measures which may be adopted during the paroxysm; and, 2d, those which should be resorted to in the intervals, with the view of effecting a perfect cure.

25. 1st, *In respect of the means which may be employed during the fit, with the view of diminishing its duration and violence*, no very precise or dogmatic direction ought to be given. Much will depend upon the peculiar characters of the case. The patient should always be placed in a state of tranquillity; and, particularly, if the countenance be pale, and the carotids pulsating feebly, in the supine or reclining position. The propriety of *bleeding* in the fit has been discussed by several physicians, and depends entirely upon the particular features of the attack. Where the symptoms are urgent, the patient plethoric or vigorous, or the pulse full and possessed of tone, there can be no doubt as to the propriety of the measure. Dr. **Read** (*Dub. Med. Trans.*, vol. i. p. 105.) has recorded a case which well illustrates the good effects of this treatment during the paroxysm. In more questionable cases, where the pulse is weak,

and the countenance is collapsed, bleeding from the arm ought not to be had recourse to. It is doubtful whether or not cupping even should be employed; but where this latter state is not extreme, and especially in cases of intermediate grades of severity, cupping between the shoulders, to a small or moderate extent, as the case may seem to require, will generally afford relief, particularly if used simultaneously with derivatives to the extremities.

26. But in nearly all cases, and still more particularly in those characterised by syncope, and an imperfect action of the heart, *frictions* with stimulating and irritating substances ought to be previously employed over the anterior parts of the thorax, and *stimulants* and *antispasmodics* exhibited internally. As to the extent and repetition of the blood-letting, whether general or local, the practitioner ought to be able to decide, being guided in this, as in other remedial means, by the apparent energies of the constitution, and the state of the vascular system; if these admit, and especially if signs of plethora, or of congestion of the cavities of the heart and large vessels of the chest, exist, the depletion may be carried to a considerable extent, or repeated, according to the relief obtained. The object here is to reduce the body to be moved to a nearer relation to the state of the moving power, at the same time that we endeavour to increase the energy of the latter.

27. I should add, that the propriety of bleeding, in the paroxysm particularly, has been much disputed; and especially by Continental authors. Where the pulse is feeble and soft, and the action of the heart weak, it is generally inadmissible; but, wherever we entertain doubts respecting it, the external and internal use of stimulants and antispasmodics, with frictions, should be cautiously premised, and only local depletions adopted; or depletion of every kind should be entirely omitted until after the paroxysm, when either general or local blood-letting, according to the particular circumstances of the case, may be practised with necessary precautions. I have employed moderate blood-letting in three cases, in which the propriety of the measure seemed questionable, the patients being of spare habits of body, and weakened states of system; but every precaution was taken to prevent immediate ill effects from the operation. In one of the three relief was afforded; in another, the advantage was very doubtful; and, in the third, the disease was evidently exasperated by it, although slight benefit seemed to result from it at the time. In one of those cases the serum of the blood had a milky appearance, from the presence of an oily matter, resulting from imperfect assimilation. From this evidence, therefore, I infer, that, where there are no signs of vascular plethora or cardiac congestion, or where the vital energies of the patient are depressed, and we presume the substance of the heart is attenuated and imperfectly nourished, we should be extremely circumspect in having recourse to vascular depletions of any description, and should particularly avoid bleeding from a vein; but, at the same time, we should be equally careful not to administer too active stimulants.

28. Next to the employment of depletion, under the above restrictions, in suitable cases, and with the concomitant means recommended, the bowels may be opened by a *purgative medicine*, combined with some warm *antispasmodic* and *carminative*, as ether, spiritus ammoniæ aromaticus, camphor, musk, castor, spiritus anisi, &c.; and these may be given, at intervals, subsequently. In the slighter attacks, and where the state of the vascular system and constitutional energies render it prudent to withhold depletion, friction, with stimulating liniments over the thorax and epigastrium, (as the following: —

No. 14. ℞ Linimenti Camphoræ Comp., Linim. Ammoniæ fort., āā ℥j.; Tinct. Capsici ʒiij. M.)

the internal administration of antispasmodics, and the exhibition of a purgative medicine, will be sufficient to give some immediate relief. The following will generally fulfil the intention: —

No. 15. ℞ Infus. Valerianæ ℥xj.; Spirit. Ammoniæ Fœtid. ʒss.; Tinct. Castorei ʒss. M. Fiat Haustus bis terve in die capiendus.

No. 16. ℞ Infus. Sennæ Comp. ℥jss.; Tinct. Sennæ ʒij.; Spirit. Ammon. Arom. ʒss.; Tinct. Cardamomi Comp. ʒj. M. Fiat Haustus statim sumendus, et repet. si sit occasio.

Or the following: —

No. 17. ℞ Mist. Camphoræ ℥j.; Liq. Ammon. Acet. ʒij.; Spirit. Æther. Sulph. Comp. ʒj.; Tinct. Camphoræ Comp. ʒj.; Syrup. Papaveris ʒj. M.

29. *Emetics* have been spoken favourably of by Dr. Good (*Study of Med.*, t. i. p. 667.). In a case of great severity, in which vomiting occasionally occurred when the paroxysm was excited by taking food into the stomach, I was induced by this symptom to try the effect of an emetic during an attack, but no benefit was derived from it.

30. The employment of *derivatives* to the extremities, particularly the lower, is generally beneficial; and ought not to be omitted in the paroxysm, whether we adopt the opinion as to the gouty origin of the disease or not. *Stimulating pediluvia*, and *sinapisms* or *blisters*, with all the other measures employed under similar circumstances in irregular or misplaced gout, had the effect, in the six cases of the disease published by Dr. Chapman, of inducing the regular gouty paroxysm, and of affording speedy relief. The *affusion of cold water* has been recommended by some authors, but it is a dangerous remedy in this disease. *Cold epithems* to the head have been mentioned by J. Frank (*Prax. Med. Univers.*, part ii. p. 273.), as having been used with advantage; they seem less objectionable. A similar remark may be applied to the tepid affusion on the head.

31. 2d, *The means which may be employed during the intervals or remissions between the paroxysms* are either *general* or *topical*. With respect to the *first* of these, a most studious attention to avoid the exciting causes of the disease must be inculcated. Next to this, all existing disorder of the digestive organs should be attended to and removed; and the diet and regimen of the patient strictly laid down and enforced. As the powers of the digestive organs are generally diminished, and the bowels either costive or irregular, *vegetable bitters*, with an occasional alterative aperient, either given alone, or in combination with an antispasmodic or anodyne, will often prove beneficial. With the view of thus strengthening the digestive organs and removing spasm, Schæffer (*Volkskrankheiten*, Jun. 1807.) recommended vegetable bitters with opium, musk, camphor, or assafœtida, and Elsner prescribed the *muriate of ammonia*

with Hoffmann's anodyne. *Sulphate of zinc*, recommended by Perkins (*Mem. of Med. Soc. of Lond.*, v. iii.), in doses of a grain, with a quarter of a grain of opium, given twice a day, has a similar action: but it generally is necessary to give it more frequently, and to increase the doses. With the same view I have given the *prussic acid*, either simply, or combined with the oxide of zinc, forming a *prussiate of zinc*, and in one case particularly, with greater advantage than from any other means. I have reason to believe that the *prussiate of iron* will prove equally beneficial; but my experience of its effects is too imperfect as yet to allow me to speak decidedly as to its merits in this disease.

32. In a case which occurred to me a year since, I employed the *preparations of iron*, particularly the carbonate, being led to adopt them by the neuralgic characters of the case, and certainly with apparent advantage; but I should add, that local means were also in operation at the same time. Wherever we have reason to suppose that the heart is debilitated, imperfectly nourished, or attenuated, the employment of tonics, particularly bark, and the preparations of iron, either alone or with antispasmodics, is particularly indicated, with strict attention to diet and regimen. *Auscultation* will be found of service, by intimating to us the particular state of the heart, which must in a great measure regulate our practice.

33. In a case of the disease which came under my care in 1824, I prescribed the *nitrate of silver* triturated with a vegetable extract, as recommended by Sementini. This substance was continued in increased doses, until it occasioned an eruption, resembling nettle-rash, on the skin, — an effect noticed by this physician. The relief afforded by it, after this eruption began to appear, was decided. The patient is, at the present time, in the enjoyment of tolerable health. At the period of my prescribing this substance, I conceived that its exhibition in this disease had originated with myself; but I subsequently found that it had been given in two cases of angina pectoris, with advantage, so long ago as thirty years, by Dr. Cappe (*Duncan's Annals of Med.*, vol. iii.).

34. *Arsenic*, in the form of Fowler's solution, had been recommended in this disease by Dr. Alexander (*Med. Comment.*, vol. xv. p. 373.), at a period antecedent to the introduction of the nitrate of silver into practice, as an internal medicine; and subsequently by Sir G. Blane, who gave it with advantage, combined with digitalis and mercury (*Med. Chir. Trans.*, vol. iv. p. 136.).

35. Besides these, preparations of *bark*, and other vegetable tonics, have been recommended, either alone, or in combination with antispasmodics and anodynes. The *hydrosulphuret of ammonia*, in gradually increased doses (from eight drops to thirty) twice or thrice daily. The different preparations of *valerian*, the *cuprum ammoniatum*, and *sulphate of quinine*, have likewise been employed, and occasionally with decided advantage: from the last of these, combined with an anodyne, particularly with opium and camphor, I have observed much benefit to be derived. The following formulæ may be employed.

No. 18. ℞ Infus. Rosar. Co. ʒ xj.; Quininæ Sulph. gr. j.—ij.; Acidi Sulph. Arom. ♏ x.; Spirit. Æther. Sulph. Comp. ʒ j.; Tinct. Opii, ♏ xij. M. Fiat Haustus bis in die capiendus. Or,

No. 19. ℞ Extract. Anthemid. ℈ ij.; Quininæ Sulph. gr. xij.; Massæ Pilul. Galban. Comp. ℈ j.; Camphoræ Subactæ, gr. xv.; Syrup. Papaveris, q. s. Misce benè et divide in Pilulas xxiv., quarum capiat unam ad binas vel tres bis terve quotidiè.

Having derived much advantage from the internal use of the *sub-borate of soda* in dyspeptic irritability of the alimentary canal, I was induced to employ it in a case of this disease which occurred to me a few years since, in doses of from twenty to thirty grains, given in the decoctum althææ. It produced some relief; but the case was of the greatest severity, and little benefit, at least of a permanent description, was derived from any means which were adopted, excepting from the prussic acid.

36. *Mercurials* have received the sanction of Brera. I have employed them in two cases: at first as an alterative; five grains of blue pill having been directed occasionally at bed-time, and subsequently so as to affect the mouth. In one of these the alterative dose had a beneficial effect upon the state of the stomach and bowels; but this was of short duration. When, however, pushed further, so as to affect the gums, great irritability of the system, fever, restlessness, and increased pain, anxiety, and sinking, were occasioned by it. In the other case, evidently connected with hepatic disorder, the blue pill was also at first given as an alterative, on alternate nights. It affected the gums after a few doses, and afforded relief. It was now pushed with the intention of inducing salivation; and a somewhat violent effect was produced on the mouth, which was relieved upon exciting the salivary glands. Decided advantage was now procured; the bowels were kept open by means of a stomachic aperient, an issue inserted in one of the thighs, and change of air recommended. This patient perfectly recovered.

37. Where plethora exists, *blood-letting* in the intervals, will be serviceable, with a light abstemious diet. When the paroxysms are apt to occur during the night, I have found an opiate given at bed-time, as recommended by Dr. Heberden, of great service. In one case of this description I gave the *acetate of morphine*, in the dose of an eighth of a grain, but it occasioned such distressing feelings of sinking, and general depression of the powers of life, that stimulants were required; yet the same patient had experienced relief from opium combined with camphor. On one occasion I tried the effects of *iodine* in the form of the tincture; but although its use was adopted with great caution, seven drops only having been given three times a day, it occasioned an increase of all the symptoms, apparently owing to its irritating effects on the digestive mucous surface, and the idiosyncrasy of the patient. I may here notice the practice recommended by Schlesinger (*Hufeland's Journ.*, vol. i. p. 57.), consisting in the exhibition, every two hours, of the extract of the *lactuca virosa*, in doses of two grains, with half a grain of *digitalis*. What effect may we expect from the use of *colchicum*? Where the disease seems to originate in gout, the colchicum might be tried; but its use would require great circumspection. In my opinion, it should only be given in combination with stimulants, or antispasmodics and tonics, the spiritus colchici ammoniati being the most promising preparation of it in such a case.

38. Although the patient labouring under this

disease is generally incapable of any, excepting the most gentle, exercise; yet this should be taken under favourable circumstances; and change of air, particularly to healthy, dry, and elevated situations, should not be overlooked. It will generally be observed, that persons labouring under the worst form of the disease, incapable even of walking or sitting upright for any time, will bear well, and even be benefited by, rapid travelling in a carriage. This was first evinced to me by the case of a gentleman of great scientific and literary attainments, residing for a time at Paris, where I was called to him in the summer of 1829. He was anxious to return to England, from a dread of dying abroad. He undertook the journey with me, and was better during it than either previously or subsequently. He has since taken long journeys, with similar advantage, but no means which have hitherto been employed have afforded him more than temporary relief.

39. *Secondly*, Much benefit will be often received from *topical* means. Under this head *issues* and *setons* deserve particular notice. They have been employed on the insides of the thighs by MACBRIDE and DARWIN. KREIGELSTEIN and WOLFF also have observed advantage to be derived from them, when inserted either in this or in other situations. I have resorted to a peculiar form of issue in several cases of this disease, and, upon the whole, with much benefit. In one case, however, it failed of having the least good effect.

40. The *form of issue* to which I allude, and for the knowledge of which I am indebted to my learned friend Dr. HUTCHINSON, is the bark of mezereon root, deprived of its external cuticle, and, after having been soaked for some time in a little water, placed upon the surface of the part from which we wish to procure a discharge. This bark should be confined to its place by means of adhesive plaster, spread on paper of larger dimensions than the part covered by the mezereon bark. The bark may be renewed every night, until it procures a copious discharge. In some cases the effect is produced in a single night, or in twenty-four hours. When the discharge becomes copious the bark may be renewed less frequently. The adhesive plaster serves both to keep the mezereon in its situation, and to retain the discharge, so as to preserve it from soiling the clothes. When it is abundant the plaster may be renewed, and the secretion removed, as its occasional acrimony often tends to heighten and to extend the irritation. In a severe and chronic case of this disease, which occurred to me lately (in 1830), I employed this form of issue, and kept a surface of about four inches square over the left small ribs discharging as long as the patient would endure this treatment. The disease disappeared, and up to this time it has not returned. The advantages of this issue are, that the patient can manage it from the beginning with great ease; and it may be readily increased to any extent, and the discharge augmented, according to the exigencies of the case.

41. *Artificial eruptions*, from the *tartar emetic* ointment or plaster, have now usurped the place of setons and issues; but, from a very extensive experience of the former, both previous and subsequent to the publication of an article on them in the London Medical Repository for April 1822, I consider them of inferior efficacy in some diseases, and particularly in this, to the pea-issue, or the issue now described. It is singular that the advantages to be derived from the production of artificial pustulation, in the treatment of various disorders, were so little known or appreciated until the appearance of Dr. JENNER's pamphlet on the subject, since the practice had been recommended long previously in the Lectures of the second and third MONROS on Morbid Anatomy, as being frequently preferable to the use of blisters; and had been found serviceable by GOODWIN, AUTENRIETH, and KREIGELSTEIN, in this affection, in which it had been employed by them at the end of the last century.

42. *Blisters*, either frequently repeated, or kept discharging for a longer or shorter period, have received the sanction of PERCIVAL and many others. But little benefit will be derived from them, unless they be used in the way now named. THILENIUS recommends (*Med. und Chir. Bemerkungen*, i. p. 183.) repeated blisters applied between the shoulders. I agree with him in the selection of this place in preference to others for their application, as well as in the propriety of repeating them frequently. M. LAENNEC states that he has derived great advantage from *magnetism*, used in the following manner, both in alleviating the paroxysm and in preventing its accession: — He applies "two strongly magnetised steel plates, of a line in thickness, of an oval shape, and bent so as to fit the part, — one to the left præcordial region, and the other exactly opposite, on the back, in such a manner that the magnetic current shall traverse the affected part." (*Diseases of the Chest*, p. 705.)

43. When the affection is *complicated* with other diseases, particularly with organic lesions of the heart, or enlargement of the liver, the treatment should be modified accordingly. In order to ascertain the nature of such complications, auscultation may be resorted to; for, although it gives us no information respecting the simple disease, it often enables us to detect the lesions with which it is sometimes associated, and to direct our means of cure more appropriately, and with happier results, than we could otherwise do. When the substance of the heart is weakened or attenuated (§ 23.) tonics, particularly sulphate of quinine, sulphate of zinc, and the various preparations of iron, given in decided doses, are particularly indicated. In other cases, as well as when the liver is affected, issues are generally serviceable. When the disease is connected with enlargement, &c. of the liver, mercury is almost indispensable. In all cases, whether simple or complicated, attention to diet and regimen, a pure air, amusement without excitement, and an equable and contented state of mind, are not only requisite to recovery, but are also necessary to render it permanent.

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ANIMATION, SUSPENDED. See Asphyxy.

ANTIPATHY. Syn. 'Αντιπαθὴς, Gr. *Antipathia*, Lat. *Der Widerwille, die Antipathie*, Ger. *Antipathie*, Fr. *Antipatia, Avversione*, Ital. *Antipathia Sensilis, et A. Insensilis*, Good.

Classif. — 4. *Class*; 4. *Order* (Good).
I. Class; IV. Order (*Author*).

1. Defin. *Internal horror and distress on the perception of particular objects, with great restlessness, or with fainting.*

2. This singular affection has merely been mentioned by Cullen: it has, however, received more attention from Sauvages, Linnæus, Vogel, Ploucquet, Passament, and Good. The last named writer has needlessly divided it into two species — *sensile* and *insensile* antipathy; the former arising from objects or subjects which strike some one of the senses; the latter from the presence of an object, as soon as it comes within the sphere of some unknown influence, although unperceived by any of the senses.

3. There are numerous instances of singular antipathy on record; and most persons of observation have met with others in the course of their experience. The vulgar explain them generally by considering that the mother had experienced a fright from the objects of antipathy during the early months of pregnancy — and there are, no doubt, some facts which countenance the supposition. Thus, James the First could not endure the sight of a drawn sword: Rizio was killed at the feet of Queen Mary when pregnant with him; and many other instances are mentioned by writers: but more frequently the persons themselves, who are thus affected, have experienced frights during the early months of infancy, or have had their minds early and indelibly impressed by certain subjects. Peter the Great had a fall from a bridge into the water, when an infant, and he could not afterwards endure to hear the rattling of a carriage passing over a bridge. Persons often retain the antipathy to the sight of crabs, lobsters, &c. which had been occasioned by fright from them in infancy or childhood. A man-servant in the author's family, advanced in life, had so great an antipathy to the sight of a mouse, that he would fly as fast as he was able from the place where one was seen; and become quite frantic at the sight. He stated that his mother, who likewise had an antipathy to mice, had been distressed by one thrown upon her when pregnant of him. Some persons cannot endure certain odours, from the faintness, or sickness, or sense of anxiety and distress they occasion. This appears to proceed from peculiar idiosyncrasy. I have likewise seen persons who could not touch certain smooth objects without feeling a peculiar shudder or horror, followed by faintness in some. This appears to arise from associations excited in susceptible or sensitive minds.

4. The most singular instances of antipathy are those which occur at the presence of objects unperceived by any of the senses; forming the *insensile* antipathy of Dr. Good. Thus, a cat concealed in a room has been known to produce a most indescribable distress or horror in a person who has not perceived it by any one sense, and has been, in no other way, informed of its presence. Some singular idiosyncrasy, doubtless, exists in such cases. Sauvages conceives that an effluvium proceeds from the animal, which, combining with that emanating from the person thus affected, occasions the unpleasant sensations upon his peculiar organisation or idiosyncrasy. This is, perhaps, the only opinion that can be formed on the subject.

5. The Treatment to be adopted for the removal of antipathies consists chiefly of resolute endeavours to overcome the morbid impression, by gradually accustoming the mind to its influence. Indeed, this is the only remedy that can be resorted to. Its adoption, successfully or otherwise, will entirely depend upon the mental energy of the patient. But there cannot be a doubt, that all impressions, however unpleasant or distressing, may be ultimately overcome by repetition, and a firm resolution either to endure, or not to be affected by them. The following works will furnish some curious information on this subject, with much trifling, silly hypothesis, and irrelevant matter: —

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ANUS. See Rectum.

AORTA. Syn. *Arteria Magna*. *Aorte*, Fr. *Aorta, die grosse Schlagader, Hauptstamm aller Körperpulsardern*, Ger. Its Diseases.

1. This most important vessel is liable to all the lesions which have been noticed under the article Arteries. Some of them, however, when seated in this artery, are so important, particularly as respects their effects upon adjoining viscera, and their extremely dangerous consequences generally, that I propose to give a succinct account of them in this place. In doing this, I shall so far depart from the alphabetical arrangement, in respect of the subordinate heads of the subject, as may be requisite to the consideration of it in strict pathological order. Functional disorder, therefore, of this vessel will be *first* considered; *next*, inflammation; and, *lastly*, those lesions which usually result from inflammation, &c., as aneurism, constriction, obliteration of the vessel, &c.

2. I. Nervous Pulsation of the Abdominal Aorta. II. Class; I. Order. This is not an infrequent affection in weak, emaciated, and delicate persons, and particularly hysterical females. It is often *associated* with collections of air in the colon; and with accumulations of fæcal matters or morbid secretions in the cæcum. It is also not infrequently consequent upon neglected dyspepsia.

3. *A.* The *Symptoms* are generally very characteristic of the nature of the complaint, and sufficiently serve to distinguish it from organic lesion of the vessel. The morbid pulsation is generally associated with nervous or hysterical symptoms, and is of a variable character. It is increased and diminished, sometimes without any evident cause, but more frequently by mental or moral affections and emotions, or by constitutional causes. Disorders of the stomach, and irregularity of the

uterine functions, also sometimes occasion or reproduce it; and I have observed it to follow upon the paroxysms of sinking or leipothymia to which very delicate females are occasionally liable.

4. Upon pressing the stethoscope firmly over the aorta, the pulsation will be generally felt limited in extent, in its transverse or lateral direction, but it will be very perceptible in the course of the vessel from the bifurcation to the epigastrium. Instead of the gradual, steady, and strong motion or impulse attending aneurism, there is felt a vigorous and smart jerk; and the sound is either merely a slight whizzing, or is scarcely to be heard.

5. The *Treatment* of nervous pulsation of the aorta will entirely depend upon the peculiar circumstances of the case in which it occurs. If the paroxysm is severe, the preparations of æther, assafœtida, valerian, and ammonia, should be exhibited. I have seen much benefit afforded by strong coffee and green tea in these cases. The dependence of the affection on mental emotions indicates the propriety of advising a tranquil state of mind, and a mild diet, with attention to the regular functions of the bowels. In cases evincing much irritability, mental or corporeal, hyoscyamus, conium, or the acetate or sulphate of morphine, in very small doses, particularly hyoscyamus combined with camphor, will be found useful. The preparations of morphine, however, should be cautiously administered in this affection. In a case which occurred to me some time ago, the sixteenth part of a grain only of the acetate of morphine was followed by unpleasant depression. Upon the whole, more advantage will accrue from the antispasmodics than from the sedatives just named; but in cases characterised by attendant irritability, the combination of substances belonging to both these classes of remedies will be of great service.

6. In all cases of this affection occurring in females, — and the great majority of them do occur in this sex, — the state of the menstrual discharge should receive the utmost attention. When the more distressing state of the affection subsides, a more tonic regimen and plan of cure may be adopted. The bitter infusions and decoctions, particularly those of calumba, cinchona, cascarilla, and camomile, with the alkaline preparations, &c., and subsequently the preparations of iron, the shower bath, cold salt water bathing, chalybeates, regular exercise in the open air, and light nutritious diet, are the means chiefly to be depended on. When *associated* with other ailments, it is generally symptomatic of them, and therefore in such cases the treatment must be directed to the primary complaint.

7. II. INFLAMMATION OF THE AORTA. *Aortitis. Aortite*, Fr. *Die Aortenentzündung*, Ger. II. CLASS; II. ORDER. Inflammation of the aorta occasionally takes place, but more frequently in a chronic than an acute form, and commonly consecutively of inflammation of the internal surface of the heart, and during the course of certain states of fever. The internal membrane of the vessel is sometimes alone inflamed, particularly when the disease takes place during fevers, or extends to it from the internal surface of the heart's cavities; but, in several cases, the subjacent cellular tissue, or both it and the internal membrane, are chiefly affected. Aortitis seldom originates in the exterior coats of the vessel.

8. The CAUSES of aortitis are, — 1st, External injuries, as blows, contusions, falls, &c.; 2d, Violent, or too long-continued exertion; 3d, The use of hot, stimulating, and acrid ingesta, spirituous liquors, and the introduction, by absorption or otherwise, of irritating poisons and morbid secretions, &c. into the circulation; 4th, The extension of inflammation from the heart, lungs, pleura, and pericardium, and the suppression of the eruption in eruptive fevers; — M. PORTAL states (*Anat. Med.*, t. iii. p. 127.) that he has met with it in cases of this description; — and, 5th, The causes which are productive of diseases of the heart.

9. The SYMPTOMS can scarcely be stated with any hopes of enabling the practitioner to distinguish this disease, which is generally met with in conjunction with other maladies; particularly fevers, and inflammations of the heart, lungs, pericardium, and pleura, and disclosed to us only by *post mortem* examination. *a.* When inflammation more or less *acute* extends along the descending aorta, the patient generally complains of a smarting and painful sensation in the direction of the spine, with a violent feeling of pulsation of the aorta; extending to the iliacs, without any appearance of enlargement or tumour; and unaccompanied by smallness of pulse in the remoter arteries, particularly those of the superior parts and extremities of the body. In the more acute cases, a sensation of heat is felt in the region of the vessel, sometimes with oppressive anxiety, leipothymia, or tendency to fainting, and always increased force and vivacity of the pulsations of the vessel.

10. *b.* The *chronic* states of this disease admit not of recognition until they have produced some one of those organic lesions, which occasion marked obstruction of the circulation, or aneurismal dilatations. Dyspnœa upon slight exertion, emaciation, a pale yellowish tint of countenance, palpitations, hypertrophy and dilatation of the heart's cavities, œdema of the extremities, &c. are then the usual symptoms; and, although they furnish no certain evidence of the existence of this disease, yet when they are present, without the signs of narrowing of, or obstruction in, the orifices of the heart's cavities, and of the origin of the aorta, chronic disease of the aorta may be presumed to exist.

11. The PROGNOSIS of this disease, when its existence is presumed, is always unfavourable; on account both of our ignorance of much that is important respecting its symptoms, complications, and consequences, and of the fatal nature, sooner or later, of a great part of the effects to which it gives rise.

12. Aortitis, particularly in its chronic states, is occasionally *complicated* with hypertrophy of the left ventricle; the hypertrophy either causing the inflammation of the aorta, or the later occasioning the former, particularly when the canal of the vessel is narrowed or obstructed by the effects of the inflammation. The other complications have been already noticed (§ 7—9.). It is chiefly owing to the more frequent occurrence of the disease in a complicated, than in a simple form, that it is so commonly overlooked, and so difficult to be ascertained, even when its existence is suspected.

13. The LESIONS produced by inflammation of the aorta are nearly the same as those I have enumerated in the article on the lesions of arteries.

But as these changes, when affecting this important vessel, are often the first step to the formation of aneurism in it, I shall here briefly allude to them as they actually appear upon examination. *Aortitis*, whether occurring simply, or with disease of the heart or other related viscera, presents the results of various grades of activity. In the more acute cases, the internal surface of the vessel is of a deep or dark red, sometimes approaching to purple; and both the internal membrane and the middle coat are easily torn. The connecting cellular structure and the fibrous coat are much more injected with blood than natural; and coagula, more or less firm, and of a fibrous character, sometimes adhere to the internal surface of the inflamed part: but this is not often observed in the aorta, as the current of the circulation through it seems to wash away the fluid as soon as it is effused, and before it coagulates on the surface which produced it. *Obliteration* of the aorta (see § 53.) may, however, arise either from external pressure, or from false membranes formed in its internal surface, so as to obstruct the current of the circulation in it; or from depositions of lymph between its coats, sufficient to produce the same effect, the obliteration being thus a remote consequence of the obstruction.

14. The results of chronic aortitis, are more frequently met with than those of the acute. These are yellow spots, or yellow curdy matter deposited under the inner membrane, which may burst from the distension and the friability occasioned by the inflammatory state; the curdy matter projecting like a tubercle into the canal of the vessel; bony deposits, which are also just formed under the internal membrane, and in like manner become exposed and washed by the current of the blood in the vessel; thickening and induration of the coats of the aorta; friability and softening of one or more of them; ulceration commencing in the lining membrane, and extending more or less through the exterior tunics, till at last dilatation of the external coats in the form of a pouch, or fatal hæmorrhage, ensues; and cracking, and laceration or dilatation, which, with the former lesions, generally originate the different forms of *aneurism* to which this vessel is liable. (See § 18.)

15. Dilatation of the coats of the aorta may first occur, and then the inner or middle coats give way when it has reached a certain pitch: or the laceration of the inner coats, with or without previous ulceration, may take place previous to the dilatation. But either state of disease — dilatation or laceration — especially the latter, seems to proceed from a nearly similar pre-existing change of the internal tunics, one evidently connected with slow inflammatory action. Even dilatation, which has been attributed to debility of structure, is more frequently a result of inflammation, which in fact occasions here, as it does every where else, debility of structure; defective vital cohesion of the texture being a general result of inflammation.

16. Treatment. Aortitis requires the same treatment as other acute inflammations. General and local blood-letting, perfect repose, both moral and physical, and the rest of the antiphlogistic regimen, are indispensable. The preparations of *digitalis* in order to quiet the heart's action, cooling aperients to remove fæcal accumulations, and counter-irritants to elicit a determination of the fluids to external parts, are amongst the most efficacious means. In resorting to counter-irritation, care should be had not to employ substances calculated to excite general irritation by their use in this way. The tartarised antimonial ointments or liniments (see F. 305. 749.) are the only means of this description; excepting issues, which should be used in this disease.

17. When those symptoms appear which have been stated to result from *chronic* aortitis, or its effects, local depletions, — particularly when signs of congestion of either the heart, lungs, or head, appear — a restricted diet and regimen, perfect repose of body and mind, attention to the abdominal functions, and the use of the tartarised antimonial ointment, or setons or issues, are the chief means that can be called to our aid. Other remedies may, however, be employed, with the view of alleviating or removing the contingent symptoms and ailments that may supervene.

18. III. Aneurism of the Aorta, — *Aorteurysma. die Aortenweitung*, Ger. IV. Class; II. Order, — is a not infrequent consequence of inflammation, particularly of its more chronic forms. The changes in the parietes of the aorta, constituting aneurism of it, are the following: — 1st, *Simple dilatation* of the whole circumference of the vessel; 2d, Dilatation of one side only, in a sacculated form, without rupture of its coats, or *true aneurism*; 3d, Dilatation of the external or cellular coat of the vessel, occasioned by rupture or ulceration of the internal and middle coats, or *consecutive* or *false aneurism*; and, 4th, Ulceration or rupture of the internal coats taking place after their dilatation, and occasioning the still further dilatation of the cellular coat, constituting *mixed* or *compound aneurism*.

19. *A. Simple dilatation* of the whole circumference of the aorta may occur to a greater or less extent along the vessel; it may be limited to a small portion only; or it may occur in several parts, giving the vessel an irregular shape, and forming several oval expansions of it. The second of these is the most common. The dilatation is various in extent: it is frequently as great as twice or thrice the natural calibre of the vessel, or even greater. It is usually more evident in one side than in another, and is attended with some one or more of the organic changes described as consequent upon chronic inflammation of the aorta (see § 13—15., and Arteries, *Pathology of*), particularly thinning and thickening of the coats, thereby resembling passive and active aneurisms of the cavities of the heart. The situations in which this change of diameter of the vessel occurs most frequently, are the ascending portion and arch; but it is not infrequent in the descending aorta. Dilatation of the pulmonary artery is very rare. This simplest form of aneurism, although frequently accompanied with various morbid depositions in the coats of the vessel, never contains laminated coagula, unless the lateral dilatations very nearly approach the state of sacs or pouches, constituting the next variety. In some cases of this form of aortic aneurism, similar changes are also met with in some of the large arterial trunks, as the subclavian, cœliac, and iliac arteries.

20. *B. True aneurism*, or extensive dilatation of a portion of the circumference of the aorta, frequently has a neck of less diameter than the body of the sac. It seems to arise from a loss of elasticity and vital resistance of the portion of the

vessel thus affected, in consequence of chronic inflammation and its effects. Owing to this cause the dilated portion of the vessel often presents many of the lesions described as consecutive of the inflammatory state, particularly reddened spots, minute fissures, atheromatous, cartilaginous, or ossific deposits, &c. This variety most commonly affects the ascending portion and arch of the aorta, and shoots out from its anterior or lateral parts. It often attains a considerable size, being sometimes as large or larger than the fœtal heart, and generally inclines towards the right side of the chest. The dilated coats of the vessel are generally thicker, and but very rarely thinner than natural, unless in parts of the aneurismal pouch. When it arises from the root of the aorta, and the inner and middle coats burst, fatal extravasation takes place within the pericardium; no false aneurism taking place in this situation, owing to this part of the vessel being destitute of the cellular coat. Coagula do not frequently form in true aneurism as long as the current of blood in the sac continues to be not much obstructed; but when, owing to the narrowness of its mouth, or to retardation of the current of circulation in it, a partial stagnation takes place, coagula then form, frequently in an irregular or confused state, but sometimes in regular layers.

21. *C. Aneurism with ulceration of the internal coats, or false aneurism.* This variety arises, 1st, from *rupture* or *fissures* of the internal coats, owing to a loss of their vital cohesion, and to friability consequent upon chronic inflammation, associated with fungous, calcareous, and steatomatous deposits; and is often occasioned by accidents, or violent or sudden extension of the vessel: 2d, from *ulceration* following scrofulous and chronic inflammations, and the detachment of various depositions formed in the internal membrane. Cases have been recorded by LAENNEC and GUTHRIE, wherein fissures of the internal coats of the vessel, instead of producing aneurismal dilatation of the external coat, had dissected it from the fibrous tunic along the greater part of the length of the vessel; but such occurrences are very rare. This variety of aneurism cannot be formed at the commencement of the aorta: it is most frequently met with in the descending aorta, and the part opposite to the tumour or sac is generally not in the least dilated. Numerous instances of this variety of aneurism are recorded by modern authors.

22. *D. Mixed* or *compound aneurism.* After all the coats of the vessel have been dilated to a certain extent, forming either simple expansion or true aneurism, but, owing to the less extensible properties of the internal coats, conjoined with the effects of previous or existing inflammatory action, rupture or ulceration of them takes place, the impulse of the current of the circulation dilates still further the yielding cellular coat of the vessel, and a sac or cyst is thus not infrequently formed of this coat surmounting the primary aneurism. In this case the perforated internal coats form the neck of the cyst, which is always narrower than the cyst itself. When the ruptured part of the internal coats is considerable, so that the impulse from the current of blood prevents its coagulation in this cyst; or, when in this, as in the other varieties of aneurism, coagulable lymph is not formed, so as to give rise to layers of fibrinous coagula within the sac calculated to support it, rupture of the sac will sometimes occur, and a diffused form of aneurism be the result.

23. *E. Of certain changes connected with aneurism of the aorta.* In some rare instances an aneurism of this vessel has been observed by HALLER, DUBOIS, DUPUYTREN, and LAENNEC, consisting of hernia of the inner coat through the ruptured fibrous coat. But it is obvious that aneurism, or tumours of this description, can seldom reach any considerable size without being either ruptured, owing to the more friable nature of the internal membrane, or confined by granulations and adhesions on its external surface, as shown by the experiments of HUNTER, SCARPA, and HOME. Solid small tumours, of the size of nuts, and closely attached to the aorta, have been described by CORVISART and HODGSON; the latter of whom supposes, with LAENNEC and BERTIN, that they are the remains of spontaneously cured aneurisms, their sacs having been filled with coagula, and their size afterwards diminished by absorption. The deficiency of the coats of the vessel, at their points of union with it, seems to confirm this opinion.

24. *a.* One of the most important changes connected with this disease is the deposition of fibrine and the formation of coagula on the internal surface of the sac. This process generally appears to proceed by progressive steps; and the deposition thus presents successive layers. The most central of these generally consist of blood only, more or less firmly coagulated; and each layer becomes firmer, drier, and paler, and more and more fibrinous, until the parietes of the sac is reached. In many cases, the most external layers chiefly consist of a whitish or greyish yellow fibrine, more or less, opaque and friable. Sometimes they nearly resemble dried paste. The more recently formed coagula are soft, loose, and often only partially adherent to the layer next it. In some cases, blood seems infiltrated between the layers. Those next the vessel are generally united to it by a fine cellular-like tissue, furnishing appearances of a partial organisation. These depositions evidently proceed from the effusion of coagulable lymph from the internal surface of the aneurismal sac, and the partial stagnation or retardation of the blood, favoured by the narrowness of the neck of the sac, and the inflamed, uneven, or rugged state of its internal surface. When neither of these states exists, as is often the case in respect of the first two varieties of the disease, and particularly when the neck of the pouch is wide, neither coagula nor layers of fibrinous deposits are formed. When, however, inflammation of the internal surface of the dilated vessel or of the sac exists, and when a morbid secretion takes place from it, this will originate coagulation of a portion of the blood which comes in contact with it, and form, at the same time, a bond of union between the coagulum and the internal surface of the dilated coats of the vessel. The thickness and compactness of the coagula in aortic aneurisms are often remarkably great, and are chiefly to be imputed to this mode of origin. (See art. BLOOD.)

25. *b.* As the aneurismal tumour enlarges, it generally occasions important changes both in itself and in adjoining parts. Those which respect the sac itself are chiefly thickening of the

dilated coats, or thinning of them; and, in some instances, of both these changes in the same case. When the extension of the sac is considerable, or when moderate, if opposed by a firm substance, as cartilage or bone, ulceration or absorption of the parietes of the sac, inflammation of its more exterior parts and adhesion to adjoining structures; and, ultimately, as the tumour increases, perforation or rupture of the more prominent part, followed by fatal hæmorrhage, take place. The mode in which the aneurism bursts is different, according to its situation and the structure which it compresses and destroys: thus it not infrequently breaks by ulceration and perforation of a limited part of the sac. In some cases, particularly when it opens into a serous cavity, distinct laceration of the more exterior covering occurs; when it reaches a mucous surface or the skin, a slough is formed on its most prominent part, which is soon detached, and fatal hæmorrhage is the result. In the majority of such cases, the proper coats of the vessel may have been long previously destroyed at one part or other of the sac. But, if the aneurism form at the root of the aorta, rupture or ulceration of the proper coats of the vessel is followed by instant effusion of blood into the pericardium. Rupture of the aneurismal tumour, as respects the coats of the vessel, whether bursting into a hollow cavity or upon a surface, or forming a diffused aneurism, is generally transverse; but it is, in some cases, longitudinal, when it implicates all the coats of the vessel; or the rupture of the internal coats is transverse, and that of the external coat longitudinal; the former being almost universally transverse. The effects of aneurism upon adjoining parts require particular notice.

26. *F. Of the effects of aortal aneurisms on adjoining parts, and the situations in which they break.* The effects of aneurisms on adjoining parts necessarily depend upon their volume, firmness, and position. The heart, lungs, trachea, large bronchi, œsophagus, pulmonary artery, large veins, thoracic duct, and various organs contained in the abdominal cavity, may be displaced, atrophied, or partially destroyed, by the compression occasioned by them.

27. *a.* The vena cava is not infrequently more or less obstructed by the pressure of aortal aneurisms. M. Reynaud (*Journ. Hebdom.* t. ii. p. 109.) met with a case in which this vessel was very nearly obliterated by an aortal aneurism, and M. Bouillaud mentions a case in which the superior vena cava was so much compressed by an aneurism at the arch of the aorta, that apoplexy was caused by it (*Dict. de Méd., et Chir. Prat.*, t. iii. p. 403.); and Corvisart (*Journ. de Méd. par MM. Corvisart*, &c., t. iii. p. 85.) and Bertin, relate similar instances. The thoracic duct has also been destroyed by it, as was observed by M. Laennec. Mr. Hodgson and Sir A. Cooper met with cases in which the common carotid, and subclavian arteries were completely obliterated by the pressure of aortal aneurism.

28. *b.* When the pressure of an aortal aneurism destroys an adjoining viscus or structure, the ulcerative inflammation is often extended from the parietes of the sac to them, followed by the adhesion and absorption or ulceration of the parts most compressed, until the tumour bursts, in one of the modes now stated (§ 25.), into one or other of the following situations: — Aneurism of the ascending or pericardial aorta generally opens into the pericardium: in three cases it bursts into the pulmonary artery, recorded by Dr. Wells (*Trans. of Society for Improvement of Med. and Chirurg. Knowledge*, vol. iii. p. 85.), M. Sue (*Journ. de Méd. Contin.*, t. 24. p. 124.), and MM. Payen and Zeink (*Bul. de Fac. de Méd.*, No. 3. 1819.). Aneurism of the arch of the aorta may break into the trachea, œsophagus, pleural cavity, or into the pericardium. That of the descending aorta generally bursts into the pleura, œsophagus, posterior mediastinum, or into the lungs. Aneurisms of the pectoral aorta most frequently burst into the left pleura; they have, however, been known, but in two instances only, — recorded by M. Laennec and Mr. Chandler, — to open into the spinal canal, having destroyed the bodies of the vertebræ, which are generally more or less injured in cases of aortal aneurism of considerable size. When seated in the ascending aorta, they often destroy the sternum; in both cases causing interstitial absorption of the bone, and often of the parietes of the sac and fibrinous layers of coagula in contact with it, so that the blood washes the bone itself. The cartilages usually resist the pressure of aneurisms, either altogether, or much longer than the bones; and when the periosteum is inflamed by the pressure of the aneurism, an ossific deposit is not infrequently formed around the tumour.

29. *c.* Aneurism of the aorta may, however, destroy life, even without breaking in any of the above directions; either by impeding the action of the heart and displacing it, or by compressing the organs of respiration, or by occasioning congestion, infiltration, and hepatization of the lungs; or by compressing the œsophagus, or injuring some of the thoracic ganglia; or it may destroy or compress the thoracic duct and large veins, as stated above (§ 27.), to a fatal extent.

30. *d.* The bursting of an aneurism of the aorta is not necessarily followed by instant death, as has been shown by MM. Laennec and Manjolin, and very recently by Mr. S. Cooper. In a case read by this very able surgeon, at the Medico-Chirurgical Society, where the aortal aneurism had pointed under the left shoulder-blade, but subsequently broke into the œsophagus, several pounds of blood were discharged by vomiting and stool, yet the patient lived for many months afterwards, and pursued a laborious occupation; a second hæmorrhage at last proving fatal. When the sac of an aortal aneurism bursts, and the blood flows into a cavity or viscus, from which it is readily discharged, death usually is soon produced. But when the opening in the sac is so situated that the blood is effused into the cellular structure, and what was before a true or encysted abscess becomes a diffused one, life may be prolonged for some days or weeks, or even longer. This, however, will depend upon the situation in which the rupture takes place, and the nature of the parts into or upon which the blood is effused. When the sac of an aneurism is ruptured, the laceration is generally in the same axis, or nearly so, with the opening into the sac, owing to the impulse being greatest in this direction, unless a divergence is occasioned by the unyielding nature of the parts in this situation, and by the slight resistance opposed by parts immediately adjoining.

31. G. *Of the causes of aneurism of the aorta.* Diseases of arteries, and consequently aneurism, are much more frequent in men than in women. Mr. HODGSON states, that of sixty-three cases of aneurism, external as well as internal, seen by him, only seven were in females. But the proportion of cases of aortal aneurism met with in females is certainly much larger than this. I have seen three cases of aortal aneurism in females; but I have certainly not seen nearly twenty-four cases in males, which is the proportion here indicated. Syphilis and the use of mercury have been considered predisposing causes of aortal aneurism, but upon no just grounds. I am inclined to believe, with Mr. GUTHRIE, that the habitual use of ardent spirits has a more marked predisposing effect than any other cause with which we are acquainted. A more immediate state of disposition is created in the vessel itself by inflammatory irritation of its parietes, and the consequent diminution of its elasticity and vital cohesion, or power of resistance opposed to the casually augmented impulses of the heart, especially during mental excitement and corporeal exertion. Hypertrophy of the left ventricle, particularly if consequent upon chronic inflammation of the vessel, and influenced by moral and physical causes, will tend to produce dilatation or rupture of the coats of the aorta. The most frequent *exciting causes*, undoubtedly, are excessive mental emotions, and violent exertion, particularly of the trunk of the body, and when suddenly made; but it seems evident that a morbid state of the vessel has existed previously, at least in the majority of such cases.

32. *H. Of the symptoms and diagnosis of aortal aneurism.* These naturally divide themselves into, — 1st, the rational or general signs; and, 2d, those which are detected by auscultation.

a. The *rational symptoms* of aneurism of the the aorta, whilst the tumour still remains concealed in the large cavities, are very equivocal. The effects produced by it also proceed from various other diseases. Those symptoms, even when considered collectively, are extremely fallacious; but when viewed in connection with those which are detected by auscultation, they are very important aids to diagnosis. 1st, Aneurism of the *pectoral aorta* occasions a sense of oppression or infarction in the chest; but this is felt in various diseases of the thoracic viscera. Dissimilarity of the pulse in both wrists is sometimes present; but this is also met with from diseases of the subclavian artery, from tumours pressing upon it, or from an irregularity in the distribution of the brachial or radial arteries. A *purring tremor*, as pointed out by CORVISART, is sometimes perceptible when the hand is placed upon the middle and upper part of the sternum: when distinctly felt, it indicates aneurism of the ascending aorta: it is also felt above the clavicles in aneurism of the arch, and is one of the surest symptoms of the first and second varieties of the disease; but it is often indistinct when the aneurism is sacculated and contains layers of coagula. This tremor, however, sometimes proceeds from other causes than aneurism, more particularly from the mucous rattle seated in the large bronchi; but, in this case, the purring tremor is not so constant or continued as in aneurism.

33. Pressure from this disease on the trachea and large bronchi occasions a wheezing or sibillous respiration, which is generally permanent, referable to the lowest part of the throat, and sometimes with a whispering or croaking voice; the breathing is also anxious and laborious. Pressure of the tumour on the œsophagus renders deglutition of solids difficult and acutely painful or lancinating, and sometimes even impracticable. But these effects upon the function of respiration will be produced by various diseases of the larynx, and by frequent accumulations of viscid mucus in the upper part of the trachea. The attentive observer will, however, readily ascertain the existence of these affections. Other tumours may also exist and occasion similar symptoms both of respiration and of deglutition; but, in such cases, the diagnosis is often impossible.

34. When the aneurism has eroded any of the bodies of the vertebra, a gnawing or boring pain is felt in the spine; and, when the tumour affects the brachial plexus of nerves, an aching of the left shoulder, extending to the neck and scapula, with impaired power, formication, and numbness of the arm, is complained of. Rheumatism of the shoulder-joint, or parts adjoining, and severe spinal disease, are often attended with similar sensations; and the symptoms referred to the shoulder and arm are frequently present in pericarditis, organic diseases of the heart, and angina pectoris, from the ramification of branches of nerves from the cardiac ganglia to the brachial plexus.

35. Pulsation felt beneath the sternum, or ribs, at the upper part of the thorax, is amongst the most certain signs of this disease: but we should recollect that it will also be occasioned by any tumour interposed between the thoracic parietes and the aorta, and in contact with the latter; by adhesions of the pericardium to the heart and effusions of fluid into the former, and by considerable enlargement or dilatation of the heart itself. Pulsation above the clavicles, although a frequent symptom of aneurism of the ascending aorta or of its arch, may likewise proceed from other causes, as enlarged glands, or various kinds of tumours, receiving the impulse of the subclavian arteries; from subclavian aneurism, and aneurisms of the innominata and common carotid, between which and aortal aneurism the diagnosis is most difficult, as BURNS, COOPER, MONRO, and HODGSON have pointed out. Violent pulsations of the carotids have been adduced as a sign of aortal aneurism; but they may arise from nervous affection of the heart, hypertrophy of the left ventricle, or from obstruction of the flow of blood in the descending aorta, or in the subclavian arteries.

36. When aneurism of the ascending aorta attains a certain size, a tumour is usually formed about the fifth and sixth ribs of the right side: when seated in the anterior part of the arch, it appears at the third and fourth ribs of the same side, at their sternal extremities: when in the upper part of the arch, the tumour rises above the sternum and sternal ends of the clavicles. When aneurism is seated in the descending thoracic aorta, and in the lower part contained in the thorax, it often points, after destroying the ribs and bodies of the vertebræ, under the left shoulder-blade, and pushes out this part. The strong pulsations always present in the tumour indicate its nature.

Notwithstanding, it may subside, or altogether disappear for a time under an appropriate treatment. Previous to the appearance of the tumour, the symptoms are, as already shown, extremely fallacious.

37. In the advanced stages of aneurism of the thoracic aorta there are generally coughs with mucous or bloody expectoration, dyspnœa, and even orthopnœa, dysphagia, attacks of spasmodic suffocation, pain in the left shoulder, axilla, inner side of the arm, and ascending up the left side of the neck, with pricking pains in the tumour, and sometimes with a sense of whizzing or rushing at the top of, or under the sternum, and occasionally sensible to the hand. A dragging downwards of the larynx is sometimes complained of. All febrile symptoms are generally absent. Although these are the rational symptoms which are most to be depended upon, they must be viewed with those reservations which I have particularised in the preceding paragraphs.

38. 2d, When the aneurism is seated in the *abdominal aorta*, acute pain is complained of in the lumbar region, occasionally shooting into either hypochondria, and downwards into the thighs and scrotum. It is generally constant, but is also sometimes intermittent. It is often exacerbated into violent paroxyms, being dull and fixed in the intervals. It is aggravated by constipation, change of position, or pressure on the loins, and is unattended by any sense of heat in the part. In some cases there is also numbness of the lower limbs, as in that recorded by Mr. MAYO (*Med. Gaz.*, April, 1829), where the aneurism was situated between the crura of the diaphragm and the dorsal pains were excruciating. The patient often complains of severe fits of colic, accompanied with spasm of the abdominal muscles, and occasionally there are nausea and irritation of the stomach, but with little loss of appetite. Constipation is always present. Decubitus on the left side or back often produces great distress, and occasions palpitation, which generally subsides upon turning on the face or right side. Coldness, formication, pricking, and numbness of the lower extremities, are not infrequent; and in some cases paraplegia has occurred, with involuntary evacuations of the urine and fæces.

39. The tumour may not become perceptible externally; but as it increases it will press injuriously upon, and sometimes displace, one or other of the abdominal viscera, particularly the stomach, liver, and even the heart. When the tumour can be detected externally, it has generally been in the left side, nearly on a level with the last dorsal vertebra. When large, it often impedes the action of the diaphragm, and thus deranges the respiration. In some cases it has pressed upon the pericardium, and thus had the double pulsation of the heart communicated to it. (See *Cases* by Drs. GRAVES and STOKES, *Dub. Hosp. Reports*, vol. v. p. 24.)

40. *b. Signs furnished by auscultation.*— Dulness of sound upon *percussion* of the upper sternal portion of the chest and cartilages of the right ribs, although present in aneurism of the *pectoral aorta*, also occurs in other lesions of the thoracic viscera. Dr. ELLIOTSON states, that a thrilling sensation given to the hand only, or chiefly, when applied *above*, or to the right of the cardiac region, and a bellows-sound heard in the same situation, may justly give a strong suspicion of the disease. But that neither the bellows-sound nor the thrill, always occurs. In four cases out of seven he found both wanting. LAENNEC never observed the thrill before the tumour became visible externally. He considers that the chief diagnostic of aortal aneurism is a strong and single pulsation, discernible by the ear in the situation of the aneurism, synchronous with the pulse at the wrist, stronger and louder than the action of the ventricles, and unaccompanied by the sound of the auricles. When, however, the aneurism comes in contact with the pericardium, a double instead of a single pulsation of the heart is communicated to the tumour. This was remarked in the cases recorded by M. CRUVEILHEIR, and by Drs. GRAVES and STOKES.

41. Dr. HOPE, in his work, which appeared after this article was prepared for press, observes, that it is unimportant whether the pulsations be *single* or *double*; for, though the latter, they may be distinguished from the beating of the heart by unequivocal criteria, viz.: — "1st. The *first* aneurismal sound coinciding with the pulse, is invariably louder than the healthy ventricular sound, and, generally, than the most considerable bellows-murmurs of the ventricles. — 2d. On exploring the aneurismal sound from its source towards the region of the heart, it is found to decrease progressively, until it either becomes totally inaudible, or is lost in the predominance of the ventricular sound. Now, if the sound emanated from the heart alone, instead of decreasing it would increase on approximating towards the præcordial region. — 3d. The *second* sound actually does sustain this progressive augmentation on advancing towards the heart; and as its nature and rhythm are found to be precisely similar to those of the ventricular diastole heard in the præcordial region, it is distinctly identified as the diastolic sound.* The second sound, therefore, corroborates rather than invalidates the evidence of aneurism afforded by the first; for, if both sounds proceeded from the heart, both would, on approximating towards it, or receding from, sustain the same progressive changes of intensity." (*Diseases of the Heart and Great Vessels*, p. 425.) Besides these views, with which I concur, the sound of the aneurismal pulsation is deep, hoarse, and of short duration, commencing and terminating abruptly, louder than the loudest bellows-murmurs of the heart, and of a rasping or grating character.

42. The sound of aortal aneurisms is generally audible in the back; and, when the descending aorta is the seat, it is louder in this situation than on the breast. If it presents the abrupt, rasping character, when heard on the back, the evidence of aneurism is complete; for, as Dr. HOPE observes, the loudest sounds of the heart, when heard in this situation, are so softened and subdued by the distance as totally to lose their harshness. This is in accordance with the opinion of M. BERTIN, who very correctly observes, that when the stethoscope is applied upon the sternum in aneurism of the substernal aorta, and on the back, near the pectoral spine in aneurism of the descending aorta, the disease may be recognised,

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* See art. AUSCULTATION, as to the sounds of this organ.

before any external tumour is seen, by a strong single sound, of greater intensity than that of the heart. The pulsations of aneurismal tumours of large arteries are indeed so intense, hoarse, sharp, and peculiar, as to be readily recognised by a person who has once examined them with the stethoscope, although the sounds they furnish cannot be readily described.

43. The *purring tremor*, already noticed as felt by the hand, may also be ascertained by the aid of the stethoscope. It is chiefly found above the clavicles, in cases of simple dilatation of the ascending aorta and arch and sacculated aneurism in the same situations. In old and large aneurisms, containing layers of coagula, it is generally absent, and is more intense the more unequal and rugged the interior of the diseased portion of vessel, particularly when it is studded with osseous or cretaceous deposits. Dr. ELLIOTSON states, that when the aneurism is large, a single, and more frequently a double, bellows-sound is often heard in the seat of aneurism, distinct from the beating of the heart: when the sound is double, the first is heard along with the pulse, the latter, often the louder of the two, afterwards. The bellows-sound in these cases may be ascribed to the passage of the blood from the dilated aneurism into the narrower commencement of the healthy vessel; and, when the sound is double, the second may proceed from the reaction of the dilated part of the vessel impelling a portion of the blood into the narrow and healthy vessel after the action of the left ventricle.

44. 2d. Aneurism of the *abdominal aorta* is more easily detected by auscultation than aneurism seated within the chest. A constant and powerful pulsation is felt by the hand, and still more remarkably by the ear resting on the stethoscope, accompanied with a brief, loud, and abrupt bellows-sound; but not so hoarse as that of aneurisms in the chest. The pulsation is *single*, unless the tumour comes in contact with the diaphragm and pericardium; and it is either inaudible or very indistinctly heard in the back. By pressing the instrument in various directions, so as to bring it as close as possible to the tumour, its seat and dimensions will be ascertained.

45. TREATMENT. — The method of cure first recommended by VALSALVA has been since very generally adopted, not only in aneurisms of the aorta, but also in similar diseases of arterial trunks. I believe, however, that it has been often carried to a very hurtful length. I have seen cases in which aneurismal tumours had existed for a long time without any increase, as long as the patient avoided any marked vascular excitement, and continued his wonted diet; but when repeated depletions and vegetable or low diet were adopted, great augmentation of the tumour and fatal results soon followed. In three cases which occurred in my own practice, and in which the method I am about to recommend was employed, a marked amendment was the consequence.

46. In order to devise a rational method of treating this formidable lesion we should consider, in the first place, the process adopted by nature to remedy it; and having correctly interpreted this process, we should endeavour to assist nature in accomplishing it. We have seen that aneurismal dilatation, &c. of arteries, particularly of the aorta, (§§ 14, 15.,) commences in slow inflammatory action, and that as the coats dilate or rupture, lymph is thrown out, which coagulates the blood, entangling its fibrine and red globules, and thus a fibrinous coagulum, attached to the inner surface of the vessel, is formed, and by its aid the inflamed and otherwise diseased coats of the vessel are strengthened, particularly as the fibrinous layer of coagulum becomes more and more consolidated or organised. Now, what are the circumstances proper to the circulation and state of the constitution calculated to promote this change on the one hand, or to counteract it on the other; for whatever advances it, or assists nature in its completion, will tend to remedy the disease; whilst whatever counteracts it, will lead to fatal results? I shall first consider the measures calculated to counteract the process which nature adopts to remedy the disease.

47. *a.* I believe that there is no position in pathology more firmly established, since it was insisted upon by JOHN HUNTER, than that whatever greatly lowers the vital energies will impede the formation of coagulable lymph and fibrinous coagula, especially in diseased vessels; and that increased rapidity of the circulation, throbbing of the arteries, abstraction of the fibrine and red globules of the blood, by repeated or large depletions, and the absorption of serous, watery, or unassimilated materials into the current of the circulation, in order to supply the place of the portion of blood abstracted, will, with other effects, inevitably tend to prevent those changes from taking place which we wish to bring about. That large depletions produce increased quickness of the pulse, reaction of the heart, throbbing of the arteries, and all the effects now instanced, must be evident to every thinking and experienced observer; and that these effects are actually those which counteract the changes which nature produces, in order to remedy disease of the circulating system, must be equally manifest. That these results will be still further promoted by undue, or too great abstinence, is no less obvious; and yet, how frequently do we find both inordinate depletion and unreasonable abstinence recommended, in the very teeth of their fatal consequences on numerous occasions, for the cure of aneurisms.

48. *b.* But what are the means which are calculated to advance the process which nature uniformly adopts in order to restore as nearly as possible the vessel to a healthy state? These may be stated, in a few words, to be whatever restrains or retards the action of the heart, without reducing the vital energies of the frame, and the preservative influence they exert, both on the coats of the vessel, and on the surrounding structures. Conformably with this view, *strict quietude of body and mind*, a light digestible diet, the careful avoidance of spirituous and malt liquors, and the adoption of moderate general or local depletions, only if the state of the circulation unequivocally requires them, are chiefly to be relied upon; and, as far as my own observation, and the careful study of the cases recorded by various writers have enabled me to judge, they are the only means which deserve any share of confidence. Whilst change of air is generally beneficial, exercise on foot, or on horseback, especially the latter, must be avoided, and the

utmost attention should be always directed to the digestive, secreting, and excreting functions.

49. When, in consequence of the energetic action of the heart, or the plethoric state of the circulation, or excessive action of the tumour, we determine on depletion, it ought to be performed in the recumbent posture; and the quantity as well as the manner of abstracting it should be such as to prevent any risk from too great depression, and its consequent reaction, whether of the heart or of the arteries. When the disease is attended with paroxysms of palpitation, depletion will be seldom of any use, and should therefore be cautiously employed in such cases. *Local depletions* may be resorted to when local pains are complained of; but, if the tumour has nearly reached any of the surfaces, they are seldom productive of benefit.

50. *Digitalis* has been generally recommended; it may be of some service when exhibited cautiously, and in moderate doses, but its full effects must be guarded against. The same remarks apply to *colchicum*. The *superacetate of lead*, combined with the acetic acid, and small doses of opium, is preferable to digitalis; and any hurtful effect that would arise from it will be prevented by an occasional dose of castor oil. In cases attended with palpitation of the heart, or inordinate pulsation of the tumour, I have prescribed the *sulphate of zinc*, and the sulphate of alumina, generally combined with small doses of *camphor* and *hyoscyamus*, with considerable benefit as palliatives. The acetate of lead may also be exhibited in a similar state of combination.

51. The application of *ice* to the tumour has been advised by Continental physicians; but it is often productive of much distress. A lotion, or repeated sponging, and occasionally the continued application of epithems may be employed; morally and physically, with careful prevention of plethora and sur-action of the heart, is indispensible; other means will be useful, chiefly in and either of those recommended in F. 157. 332. 336. may be adopted. Perfect repose, however, as far as they conduce to these states. By endeavouring in this manner to bring about the spontaneous cure of aortal aneurism, it may be supposed that we risk inducing the obliteration of the vessel: but I believe that this is not so likely to occur in the aorta as in smaller arteries; and even were it to occur, the result does not appear so hazardous as the continued increase of the aneurismal tumours; as sufficient evidence is on record of the possibility of a collateral circulation being established.

52. IV. Rupture of all the coats of the Aorta, without aneurismal dilatation of the vessel, is a very rare occurrence, and has been met with only after violent external injuries, such as falls, or leaping from a great height, and from mental excitement, when the vessel has been previously diseased. In the Ephemerides Physico-Medicæ Naturæ Curiosorum (*Dec.* iii. *Ann.* ii. *Obs.* 70.), a case is recorded, in which it was ruptured by a blow on the hypochondrium. Mr. James has recorded an instance of rupture and instant death in an active seaman, previously in good health, from jumping out of his hammock (*Lond. Med. and Phys. Journ.*, vol. xviii.); and Mr. Arnott has given a similar case, produced by a violent concussion of the body, from falling from a scaffold (*Ibid.*, vol. lviii. p. 19.). The most instructive case, however, of rupture of the aorta without aneurism has been minutely detailed by Mr. Rose (*Lond. Med. and Phys. Journ.*, vol. lviii. 4to. p. 15.). In this case, as in the others, the coats of the aorta were all ruptured. They were more readily lacerated than usual, and the inner coat had a thickened steatomatous appearance. A case is given by Dr. Hume (*Glasgow Med. Journ.*, vol. iv. p. 148.), in which rupture of the aorta took place in a strong man upon getting into bed, followed by death in a few hours. An aperture, the size of a quill, was found in the vessel about two inches above its bifurcation. No account is given of the state of its coats.

53. V. Constriction and Obliteration of the Aorta have been observed by several pathologists. Stoerck (*Annales Med. ii.* p. 262.), Meckel (*Mémoires de Berlin*, 1756), Sandifort (*Observat. Anatom. Path. iv.* No. 10.), and Dr. Graham (*Trans. Med. Chir. Soc.*, vol. v. p. 287.), with other recent authors, have recorded cases of extreme constriction of the aorta; whilst M. Desault (*Journ. de Chirurg.* 1792), M. Brasdor (*Recueil Périodique de la Soc. de Med. à Paris*, t. iii. No. 18.), Dr. A. Monro (*On Aneurisms of the Abd. Aorta*, p. 5.), Dr. Goodison (*Dub. Hosp. Rep.*, vol. ii. p. 193.), M. Velpeau, (*Révue Med.*, t. iii. 1825., p. 326.), and M. Reynaud (*Journ. Hebdom. de Med.*, t. i. p. 161.), have adduced cases wherein this vessel was entirely obliterated, the circulation having been preserved by the anastomosis and enlargement of the arteries sent off above and below the seat of obliteration.

54. With respect to the origin of this lesion, it may be referred primarily to inflammation of the vessel. But various intermediate changes will necessarily have taken place, from the more immediate effects of inflammation to the complete obliteration of the vessel. It is probable that, in some rare instances, as in large arterial trunks, the transverse rupture of the internal membrane of the vessel, with the consequent effusion of lymph, and formation of fibrinous coagula, may so obstruct its canal as to give rise to its partial or total obliteration, without any aneurismal tumour having formed; and it is not improbable that obliteration or constriction of the canal may have proceeded in other cases, from the advanced stages of the spontaneous cure of aneurism; the deposition of fibrinous coagula, and the subsequent changes which had taken place in them, and the diseased coats of the vessel, having ended in obliteration, and the establishment of a collateral circulation.

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APHONIA. See VOICE, *Morbid States of*.

APHTHÆ. See THRUSH.

APOPLEXY — DOCTRINE OF. DERIV. and SYNON. *Apoplexia*, from ἀποπλήσσω, percutio. *Aphonia*, Hip. *Nervorum Resolutio*, Cels. *Morbus Attonitus*, Lommius. *Sideratio*, *Percussio*, Molinar. *Schlagfluss*, Ger. *Apoplexie*, Fr. *Accidente*, *Colpo*, *Gocciola*, Ital. *Apoplexya*, Pol.

CLASSIF. 2. *Class*, Nervous Diseases; 1. *Order*, Comatose Affections (*Cullen*). 4. *Class*, Nervous Maladies; 4. *Order*, Affecting the sensorial Powers (*Good*). IV. CLASS, III. ORDER (*Author*, see *Preface*).

1. NOSOLOG. DEFIN. *A loss of consciousness, feeling, and voluntary motion; or, in other words, a suspension of the functions of the brain, respiration and circulation being more or less disturbed.*

PATH. DEFIN. *Consists of defective vital energy, with hæmorrhage, or derangement of the vascular system of the brain, and their consequences.*

2. DISTINCTIONS. There are few diseases which present a greater variety of modes of attack, or which depend upon a greater number of lesions of the organ affected, than that now under consideration. Its sources, modes of manifestation, and morbid relations are numerous, and many of them difficult of investigation. These circumstances have given rise to various attempts at arranging the phenomena of the disease in such a way as to indicate the relations which subsist between the changes within the head, on which it depends, and the mode and progress of attack. Apoplexy has long been described as consisting of certain forms, which have been distinguished by some authors as the *sanguine* and *serous*, with reference to the nature of the effusion; by others, as the *nervous* and *bilious*, according to their idea of the more immediate causes. By several writers it has been, with more justice, divided into *active* or *sthenic*, and *passive* or *asthenic*; or *entonic* and *atonic*, according to the state of the constitutional or vital powers and respiration, and the degree of vascular action accompanying it. All these arrangements are, however, only partially founded in truth: in many respects they are entirely erroneous. Wherein they are either the one or the other will appear in the sequel. M. CRUVILHIER, one of the most recent and best writers on the disease, confines the term Apoplexy to the occurrence of spontaneous hæmorrhage in the brain, and divides it into two species: — 1st, That consisting of a collection of blood in a torn part of the brain, or on its surface, from a ruptured vessel; and, 2d, That with sanguineous infiltration into the softened structure — or capillary exudation into, and combined with, its substance. The defects of this arrangement, as well as of this pathology, particularly in regard to practical purposes, must be apparent; for it will often be impossible to ascertain, during life, whether extravasation of blood has actually taken place, or merely great congestion of the vessels, with or without serous effusion; and many cases of true apoplexy occur occasioning death, as well as where complete recovery takes place, without either of the lesions to which he imputes the disease, having existed.

3. In the account which I will endeavour to give of the disease, its common form of approach and attack will be described; next, the different modes in which the attack is made, distinguishing the principal forms it assumes; and afterwards will be noticed several important states of the malady, arising from peculiar causes and antecedent affections. When detailing the different varieties and states of the disease, it will be made manifest that the distinctions heretofore offered, although occasionally obtaining, have no uniform or even general relation to the lesions existing within the head; that apoplexy, with the symptoms described as characteristic of *serous* effusion, has been frequently found to proceed from sanguineous extravasation; and that the *sanguineous* has sometimes only presented slight serous effusion: a similar objection being also applicable to all the other distinctions above enumerated.

4. OF THE APPROACH, OR PREMONITORY SIGNS, OF APOPLEXY. The importance of recognising the approach of this disease must be evident to the practical reader; for judicious measures, employed at this period, will often succeed in preventing an attack, or will render it less severe, even when they fail of averting it altogether. The most common precursory symptoms are, a tendency to sleep at unaccustomed periods; a heavier sleep than usual, particularly if accompanied with profound, laborious, or stertorous breathing; stridor of the teeth; nightmare; succussions of the frame, or cramps; a lethargic feeling and drowsiness even during the waking hours; more rarely, unusual wakefulness; pains in different parts of the head, or general headache or megrim; a sense of weight or fulness in the head, or of pulsation of the arteries; incoherent talking, resembling intoxication; a turgid appearance of the veins of the head, particularly of the forehead; lividity or redness of the countenance; slight or imperfect attacks of epistaxis; loss of recollection; irritability of temper, or unusual serenity or apathy of mind; a disposition to shed tears; suffusion of the conjunctiva; collapsed appearance of the alæ nasi; moats floating before the eyes, or dimness of vision (amaurosis); scintillations, or bright or shining coruscations before the eyes during darkness; inability to follow the line in reading; double vision, or a sharper sight than usual; difficulty in shutting or opening the eyes; noises in the ears; dulness of hearing; a sensation of an unusual fœtor; dryness of the nostrils; continued sneezing; frequent yawning; singultus; stammering, or indistinct articulation; the substitution of one word for another, or forgetfulness of words and names; difficulty of swallowing, or fits of coughing upon deglutition; leipothymia, vertigo, or a sensation approaching to faintness; difficulty of writing, or inability to spell the words, or to follow a straight line; torpor, or numbness, or pricking of the extremities; itching, or formication of the surface; pains of the joints or limbs; a feeling of fatigue upon slight exercise; partial or slight paralytic affections, chiefly of the muscles of the face, or

confined to a limb or part of a limb, occasioning drooping of the eyelids, imperfect utterance, slight distortion of the mouth; an unsteady or tremulous gait; tripping upon ascending or descending a stair, or in walking; difficulting in voiding the urine, &c.

5. THE CHARACTERISTIC SYMPTOMS, OR THOSE CONSTITUTING THE ATTACK. After one or more of the foregoing signs, or after the succession of two or more of them, and their continuance for a short or long period, the phenomena which constitute the disease supervene. Sometimes the premonitory signs are so slight, and of so short duration, as to escape notice, the attack being severe and sudden: at other times they are very remarkable, and several of them are grouped together, the attack advancing either gradually and severely, or suddenly, and disappearing rapidly; yet recurring after an indefinite time. The mode of approach and attack sometimes has a close relation to the state of internal lesion; but, occasionally, no such relation can be traced, as will be shown and explained hereafter. The premonitory signs, as well as the early part of the attack, generally present more or less either of *augmented* or *diminished* vascular action, particularly about the head, according to the state of the vital powers. The character of the symptoms, therefore, in respect of degree of vascular action and constitutional power, should receive the utmost attention, as being our best guide to a successful treatment.

6. *A.* In the most *severe and sudden* forms of attack, — the *apoplexia fulminans* of the older authors, and some of the Continental writers of the present day; the *fortissima* of Dr. COOKE and others; the *apoplexie foudroyante* of the French, — the patient is struck down instantly, sometimes froths at the mouth, has a livid countenance, complete relaxation and immobility of the voluntary muscles and limbs, and inconscious evacuation of the urine and fæces; and dies very shortly afterwards, either with or without stertor, or rattle of the respiration, with cold, livid extremities; cold perspiration, and sometimes a cadaverous cast of countenance.

7. *B.* In the more *active* or *sthenic* forms of attack, — the *Apoplexia fortis*; the *entonic* apoplexy of Dr. GOOD; *A. exquisita* of various authors, — the patient is more or less suddenly seized with profound sopor, the eyes being either open or closed; the breathing deep, slow, sonorous, or stertorous; and the pulse slow, full, hard, or strong: sometimes irregular or unequal. In this state of the disease, the above are often the chief symptoms, no signs of paralysis being observed. But frequently the mouth is drawn to one side, the eyes are distorted, and one eyelid immoveable, with relaxation, loss of sensation and of motion of a limb, or of one side of the body; the arm of the non-paralysed side being often closely applied either to the chest or to the genital organs. In this latter state of the disease, there is sometimes also some degree of paralysis of the urinary bladder, or of its sphincter, giving rise to ischuria, or eneuresis, or a combination of both. The patient generally lies on the paralysed side, which is relaxed, incapable of motion, and insensible to the application of irritants; whilst the limbs of the opposite side are sometimes subject to spastic contractions.

8. *C.* In the more gradual seizures, or those of a less complete character, — the *atonic* apoplexy of Dr. GOOD; the *Apoplexia imperfecta*, the *parapoplexia* of various writers, — the patient, after experiencing some of the premonitory symptoms, is seized with alarming vertigo, leipothymia, or feeling of faintness; sickness at stomach and vomiting; disturbance of the senses, particularly of the sense of sight; loss of memory; partial loss of sense, consciousness, speech, and voluntary motion; weak, irregular, and sometimes quick pulse, with more or less of sopor.

9. Besides the foregoing forms of apoplexy, — which differ merely in respect of the state of the constitutional powers, the severity of attack, and the grouping of the symptoms, and not as to the organic lesions which occasion them, — other distinctions offer themselves, which are still more deserving of attention, as generally having a more intimate relation to the changes which are going on within the head, than the degrees of severity of seizure merely. Viewing, therefore the premonitory symptoms as common to all its varieties, I shall divide the disease according to the form, manner, and complication of the attack, and consider, briefly, — 1st, The sudden form of apoplectic seizure, in its simple state, and unassociated with paralysis; 2d, The gradually increasing, or ingravescent attack; 3d, These states of seizure complicated with paralysis; and, 4th, that form which commences with paralysis, and after an indefinite period passes into complete apoplexy.

10. I. SIMPLE AND PRIMARY APOPLEXY. *A. Description.* In this variety of the disease the patient falls down deprived of sense, consciousness and voluntary motion, is like a person in a very deep sleep, with his face much flushed, tumid, and occasionally livid; his breathing slow, deep, and stertorous; his pulse full, natural in frequency, or slower than usual. Sometimes slight convulsions of the limbs, or contractions of the muscles occur, or contractions of the muscles of one side, and relaxation of those of the other. The attack, in rarer instances, is either ushered in or accompanied with general convulsions, passing into complete apoplexy, or profound coma. The patient may continue in this state of profound stupor for several days; or he may recover after some hours, or even minutes, when judicious assistance has been instantly procured.

11. *B.* This form of the disease *terminates*, 1st, in perfect recovery, — often in the course of a few hours, — but rarely when the attack has continued longer than one or two days. I have, however, seen cases of perfect recovery in comparatively young or robust subjects, after the apoplectic state had been of several days' duration. 2d, In death, which may take place in the course of a very few hours, or after some days, but most commonly from the first to the fourth day.

12. *C.* The *appearances* which this class of cases present on dissection may be arranged into — 1st, Those which are insufficient to account for the symptoms, or their termination in death; 2d, Those which proceed from intense injection and congestion of the membranes of the brain, and of the cerebral structures; 3d, Those which are accompanied with an effusion of serum, or engorgement

of the vessels of the head, or both; and, 4th, Those which are attended by extensive extravasation of blood.

13. 1st. Cases of apoplexy in which *no morbid appearance* could be detected after death, have been recorded by WILLIS, STARK, POWEL and ABERCROMBIE; and similar cases have occurred to MORGAGNI, TISSOT, QUARIN, OZANANAM, FODERÉ, and HILDENBRAND. It is to this variety of apoplexy that the term *nervous* has been applied by several eminent authors, particularly by KORTUM, ZULIANI, and HILDENBRAND. NICOLAI referred it to spasm of the meninges; LECAT and WEIKARD to spasm of the nerves and vessels of the brain. BORSIERI termed it *convulsive* apoplexy; and TISSOT and some other authors *hysteric* apoplexy. HILDENBRAND conceives that it is the cause of death in contagious typhus; patients dying after profound coma in this disease, without any effusion or appearance of congestion or compression, but apparently from a sudden collapse of the nervous energy of the brain. Apoplectic seizures, rapidly terminating in death, have been occasionally observed to occur in *epileptics* and maniacs, as recorded by FODERÉ, NACQUART, BELLOC, and GENDRIN, without any manifest lesion of the encephalon. This particular state of the brain seems also, in some instances, to obtain in the course of a few other diseases, and to be occasioned by certain external causes, particularly injuries producing concussion of the brain, lightning, extreme cold, and poisonous substances.

14. A case occurred to me of this description in a man aged about forty, who had complained of vertigo, leipothymia, and loss of recollection, suddenly followed by profound sopor. He had been blooded largely when I saw him. His breathing was not stertorous; his pulse was weak, small, and quick, and his countenance sunk. The brain, on a careful examination, presented no change in colour or consistence, and was even less vascular than usual. The pineal gland was, in my opinion, smaller and softer than natural, and contained scarcely any of the small gritty bodies which are generally found in it. The pituitary gland was not examined, the case having occurred to me a number of years ago, and before my attention had been directed to the nature and functions of this part.

15. 2d. In a large proportion, however, of this class of apoplectic cases, *excessive injection of the vessels* of the pia mater, and *engorgement of the whole vascular system* of the encephalon, are the chief lesions. The pressure to which the brain has been subjected from this cause, as well as the interrupted state of the circulation, whence the attack most probably proceeded, being sufficient to destroy life in a few minutes, or a very few hours at the furthest. This forms the simplest state of sanguineous apoplexy, and is of comparatively rare occurrence. It constitutes the *coup de sang* of the French, and is observed in those cases of *coup de soleil*, or sunstroke, which proves rapidly fatal. I have met with it in two cases of this description.

16. 3d. *Serous effusion* is one of the most frequent appearances found in this form of apoplexy, but it seldom occurs alone, being generally accompanied with engorgement of the veins and sinuses of the brain. It is often also observed in the symptomatic and complicated states of apoplexy which will come under consideration in the sequel. The very judicious observations which have been made by Dr. ABERCROMBIE and M. CRUVEILHEIR, particularly the former, as to the relation which this lesion presents to the apoplectic state, is well deserving of the attention of the pathologist. I perfectly agree with them in considering the distinction proposed between sanguineous and serous apoplexy as not supported by observation; for many of the cases which terminate by serous effusion, exhibit in their early stages all the symptoms usually assigned to sanguineous apoplexy, such as flushed countenance, strong pulse, vigour of constitution, &c.; whilst, on the other hand, many of those accompanied by paleness of the countenance and feebleness of the pulse will be found to be purely sanguineous; even the pre-existence of dropsical effusion, or the leuco-phlegmatic diathesis, or great age, &c. furnish no certain data, although a strong presumption, of the attack being that depending upon the effusion of serum.

17. The serous effusion in those cases in which it constitutes even the chief lesion, cannot be viewed in any other light than in that of a result of pre-existing disturbance of the circulation, depending, as will be more fully alluded to in the sequel, either upon imperfect vital tonicity or action of the vessels, or upon obstructed circulation, especially in the veins and sinuses of the organ, or even upon both. Another circumstance, well deserving of notice, and evincing that the serous effusion is of itself to be viewed as merely a part, and indeed no very important part, of the existing lesions, although the most demonstrable, is the fact also insisted on by Dr. ABERCROMBIE, that the quantity of fluid effused bears no proportion to the degree of the apoplectic symptoms: for we find it in large quantity when the symptoms have been slight; in small quantity when they have been both strongly marked and long continued; and, finally, we find most extensive effusion in the head, where there have been no apoplectic symptoms at all. The inference, therefore, clearly deducible from the most faithfully observed facts, is, that the effusion is not the cause of the apoplectic seizure, but the consequence of that state of circulation on which the disease more immediately depends. Indeed, I am even of opinion that a considerable portion of the effusion takes place either immediately before death, or soon after life is extinct; and that several cases referred to serous effusion have not arisen from this cause, the quantity of serum having evidently not been greater than we have reason to believe naturally exists in the head, as necessary to the regularity of its functions, under the varying states of circulation, and of atmospheric pressure on the surface of the body, from which the unyielding bones of the cranium protect it.

18. 4th. *Extensive extravasation of blood* is a rare occurrence in this form of apoplexy, being most commonly observed in other varieties of the disease. When, however, extravasation is met with, it is either found diffused about the base of the brain, and pressing upon the medulla oblongata, in the fourth ventricle, or in both the lateral ventricles, from rupture of some diseased vessel, or from extravasation of blood near to, with laceration of the cerebral structure at, the surface of

the brain. When extravasation of blood is found, the attack has generally been characterised by symptoms closely approaching those of the next variety, viz. an invading and slight attack, rapidly followed by a short interval of sensibility, which is as quickly followed by profound coma and death.

19. II. THE GRADUALLY INCREASING OR INGRAVESCENT APOPLEXY. — *A. Description.* In this form of the disease the patient is not at first seized with loss of sense and voluntary motion; or if he be so seized, the attack is momentary, and passes off without the use of any remedy. It more usually commences with a violent and sudden attack of headach, very frequently accompanied with paleness, sickness, and vomiting. Sometimes the patient sinks down from its severity, pale, faint, and exhausted; and experiences a slight convulsion, but recovers from this state in a short time. This invading and slighter attack generally soon abates, or some of the symptoms subside, and others continue in various degrees or differently modified. The pain is generally referred to one side of the head, and the vomiting sometimes returns. Coldness, paleness, and faintness are complained of, with all the other symptoms indicating a serious shock received by a vital organ. The pulse is weak and frequent, the countenance cadaverous and sunk, and the patient feels depressed, but sensible. After this state has endured from an hour, to two, three, or even more, the surface acquires some heat, and the pulse improves in strength. The face now becomes flushed, and the features expanded. The oppression increases rapidly; he answers questions slowly and heavily, and at last sinks into a state of profound stupor or coma. The period which elapses from the invading attack, to the continued and perfect coma, varies from less than an hour to three days. But Dr. ABERCROMBIE, who has illustrated this form of apoplexy in an able manner, has observed an interval of not more than twenty minutes, and has seen it prolonged to a fortnight.

20. *B.* This is the most fatal form of apoplexy, very few recovering from it. On *inspection after death*, extensive extravasation of blood is always met with. From the whole history of this class of cases, Dr. ABERCROMBIE thinks that they depend upon the rupture of a considerable vessel without any previous derangement of the circulation, the rupture probably arising from disease of the artery at the part which gives way. He conceives, that, at the moment when the rupture occurs, a temporary derangement of the functions of the brain takes place, but that this is soon recovered from; and the circulation then goes on without interruption, until a quantity of blood has been extravasated sufficient to produce coma. This may possibly be the case, particularly in those instances where the coma soon follows the first attack. I am more inclined to think that a depressed or deranged state of the vital energy and circulation of the brain, similar to that which occurs in the foregoing variety of the disease, takes place at the commencement of the seizure, and that the extravasation frequently accompanies the reaction, supervening on the oppression which precedes the perfect attack; or, if extravasation have taken place in the first instance, that it is only to a small amount, the state of energy of the circulation of the organ at the time preventing it from proceeding to any considerable extent, and that it is afterwards renewed in the same situation, or even in a different part, upon the reaction which takes place soon after the shock which the first seizure occasions. Dr. ABERCROMBIE is of opinion, that in some cases the extravasation commences with the early part of the attack, and that it goes on until such a quantity has been accumulated as is sufficient to produce fatal coma; and that in others, after the rupture has taken place, the hæmorrhage is stopped by the formation of a coagulum, and, after a considerable interval, bursts out afresh and is fatal. It is by no means improbable that some cases present the phenomena which this accomplished physician contends for, whilst others may proceed in the manner which I have suggested. A chief reason for my believing that this form of apoplexy frequently originates in the way I have stated, is, that I have met with cases in which the disease was gradual, or consisted of several attacks of either incomplete or complete loss of recollection and voluntary motion, from which the patients had recovered, but had at last been carried off by a more severe seizure; and yet, upon dissection, appearances of recent extravasation merely, or of congestion and engorgement, with or without serous effusion, but without the least extravasation of blood, were the only lesions which existed.

21. The rapidity with which the disease advances, will, of course, depend upon the nature of the lesion, and upon the size of the vessel or vessels from which the hæmorrhage proceeds, and the extent of the extravasation. The situation, also, will have some influence; inasmuch as a small extravasation, if it press upon the medulla oblongata or the annular protuberance, will be more certainly and rapidly fatal than a much larger effusion into the ventricles, or into the substance of the hemispheres.

22. *C.* The *Appearances on Dissection*, chiefly consist of extensive *extravasation of blood*, most commonly in some part of the brain in the vicinity of the ventricles, as the corpora striata, and thalami optici, or some other situation adjoining those cavities, and which frequently lacerates the cerebral structure, and passes into and fills the ventricles. In some instances the hæmorrhage takes place in a part of the brain nearer to its periphery than its internal surfaces: in such cases the blood ruptures the cerebral substance, and is effused on its surface. In the more suddenly fatal cases, this is observed to have occurred generally towards the base of the brain.

23. In cases of profound coma supervening after a considerable time from the first seizure, the parietes of the cavity formed in the substance of the brain by the effused blood, are softened, discoloured, and broken down, evidently indicating that in these cases softening and disorganisation had either preceded the seizure, or speedily followed the first extravasation, and that a recurrence of the hæmorrhage had produced a lacerated opening, communicating either with the ventricles or the exterior surface of the organ. In a considerable proportion of cases of this form of apoplexy, the arteries are either ossified or otherwise diseased. The veins and sinuses also sometimes present morbid appearances (§ 29).

24. In rarer instances the extravasation of blood takes place in the *cerebellum*. When the effusion is either in this situation or below it, the symptoms are more severe and rapid in their progress than when it is in the substance of the brain. This remark is also applicable when the blood flows from or into the substance of the annular protuberance, or accumulates around the medulla oblongata and foramen magnum. In some of those latter cases, which are much rarer than the foregoing, the fatal result is rapidly produced. In nearly all the cases of extravasation taking place, either within or near the surface of any part of the cerebral structures, it is extremely difficult, if not entirely impossible, to trace its exact source, or the vessel or vessels whence it has proceeded. It is very probable that the laceration produced by hæmorrhage separates several vessels, and thus a greater number are laid open than are concerned primarily in producing the extravasation. Besides, the softening of the surrounding cerebral structure may destroy additional vessels, and give rise to secondary extravasations of blood, either into the original cavity, thus forming a more recent portion or layer of coagulum, or into the surrounding structure in the state of capillary infiltration.

25. Besides the foregoing sources and seats of extravasation, others have been observed. M. Serres describes a case in which the hæmorrhage had occurred in the substance of the pons varolii, whence the blood had burst into the occipital fossa. It may also take place from the superficial vessels, forming the *meningeal apoplexy* of this writer. In cases of this description, the blood generally seems accumulated between the dura mater and arachnoid; but cases have been recorded, in which the blood appeared to have been discharged from the *retiform plexus* of vessels at the base of the brain, and confined beneath the pia mater. The hæmorrhage may also proceed from *ulceration and rupture of a considerable arterial vessel*. Dr. Mills met with a case in which it was traced to ulceration and rupture of the basilar artery; and Morgagni and Serres have found it proceed from a similar lesion of the internal carotid. Morgagni, De Haen, and Hufeland have traced the extravasation to the vessels of the *choroid plexus*. This is probably the source of the hæmorrhage when it is confined to the ventricles, without laceration of the surrounding substance of the brain. Rupture of one of the *lateral sinuses* has also been observed: a case of this description occurred to Dr. Douglas. (*Edin. Med. Essays and Observ.*, vol. vi.)

26. *Small aneurisms* in various parts of the cerebral vessels may have formed, and by their rupture occasion apoplexy. Serres relates cases in which aneurism occurred in the basilar artery, and in a small artery in the circle of Willis. (*Archives Gén. de Méd.*, t. x. p. 419.) Similar cases are also recorded by Blane and Hodgson. Numerous other instances of extravasation from disease of the cerebral vessels have been noticed by Morgagni, Lieutaud, De Haen, Baillie, Portal, Lallemand; and especially by Bouillaud, (*Mém. de la Soc. Méd. d'Emul.* t. ix.), and Dr. Bright (*Medical Reports*, vol. ii. p. 266, *et seq.*), who have adduced several proofs of this kind of lesion. In a case of apoplexy recorded by Bang, the extravasation had taken place between the occipital bone and dura mater. Dr. Watts, of New York, met with a case in which the hæmorrhage had proceeded from the erosion of a vessel in connection with caries of the inner surface of the parietal bone.

27. *Infiltration* of the blood into, with softening of, the cerebral structure, also seems to form one of the lesions which are sometimes met with in this form of apoplexy, although not nearly so frequently as in the seizures which supervene on, and are accompanied with, paralysis, where this state of softening forms the principal lesion; whereas, when it occurs in this variety, it is one of several other changes, or at least a subordinate one.

28. Perhaps the most common causes of hæmorrhage in this form of apoplexy, particularly when occurring in the substance of the brain, are ossification, earthy deposits in various places, and a peculiar friability, of the vessels of the organ. This state of the vessels, as disposing to aneurism and hæmorrhage, has been well illustrated by Scarpa, and is justly insisted upon as being connected with apoplexy by Abercrombie and Cruveilhier, and frequently met with in the brains of elderly persons. "There is much reason to believe," Dr. Abercrombie remarks, "that this diseased condition of the arteries of the brain may give rise to a variety of complaints in the head; and that, after going on for a considerable time in this manner, it may at length be fatal by rupture." The remarkable frequency of osseous or cretaceous deposits, &c. in the arteries of the brain in cases of apoplexy, had been noticed by Cortesius and Morgagni. There can be no doubt that changes of this description, in connection with alterations of calibre and of vital cohesion taking place in vessels, the coats of which are remarkably thin and fragile even in the healthy state, will readily dispose them to rupture; particularly when influenced by the varying actions of the heart, and the different emotions of the mind, or when congested by derangement of the vital energy bestowed on them by the ganglial system, or by disorder of the veins or sinuses, and interruption to the return of blood through those channels. Indeed, there is every reason to believe that the hæmorrhage may even proceed from the smaller *veins*, in many of the cases where congestion has been concerned in originating it, and especially when the return of blood from the head has been interrupted so as to produce the disease. It may therefore be inferred, that the laceration of the cerebral structure is occasioned by rupture of either an arterial or venous capillary vessel or vessels, and extravasation of blood; and that, in cases of this description at least, the morbid change commences in the vessels, and not in the cerebral tissue itself, the cerebral structure being only consecutively diseased.

29. Cases have also occurred, in which this species of apoplexy has arisen from disease of the *sinuses*, chiefly thickening, induration, and obstruction or obliteration of their canals. When this is the case, the veins running into the sinuses are generally enlarged, tortuous, engorged, and as if varicose. I have met with cases in which all the symptoms of this disease proceeded from the developement of tumours in the central parts of the brain, and similar instances have been recorded by several writers.

30. Besides disease of the *vessels* of the brain, lesions of the *membranes*, as ossific deposits, ossification of the falx (MORGAGNI), but particularly derangements of the circulation in them, especially in the pia mater, — as evinced by copious extravasation on the surface of the hemispheres, or at the base of the encephalon,— and inordinate injection and congestion, deserve to be enumerated among the sources of this variety of apoplexy; although they are, perhaps, more frequently productive of congestion and serous effusion, and consequently of the most common forms of the preceding species. But there can be no doubt that this form, as well as the foregoing, will also sometimes proceed, although much more rarely, from injection and engorgement of the vessels of the membranes and of the brain itself, without extravasation; and that in other instances the degree of congestion, and the accompanying serous effusion, when occurring without extravasation, are not of themselves sufficient to account for the fatal issue, without imputing something to the vital condition of the encephalon itself.

31. III. APOPLEXY COMPLICATED WITH, OR TERMINATING IN, PARALYSIS. — *A. Description.* This form of the disease may take place either suddenly or in the manner of the immediately preceding variety; but more frequently the latter, with the additional phenomenon of paralysis, which may be either coeval with the attack, or supervene as the apoplectic state passes off. In the majority of cases, the patient complains of symptoms referrible to the head, particularly of acute pain in one part of it; and is suddenly or gradually seized with stupor or profound coma, loss of speech and voluntary motion — with perfect apoplexy. The mouth is often distorted, and the patient moves the limbs of one side; whilst one or both limbs of the opposite side are found to be deprived of all motion upon their being pinched or tickled. The patient generally lies on the paralysed side, and one or both the opposite limbs are sometimes contracted or slightly convulsed.

32. In other cases, the seizure is less perfectly apoplectic in its character, varying in the degree of coma and disturbance of the respiration; and, as the seizure declines, the paralytic symptoms become the prominent disease. In some instances of this description, the comatose state is slight or of short duration; but the eyelid, or orbicularis of the eye, of one side is paralysed; or the eyes are distorted, the mouth twisted, and the tongue drawn aside upon its being held out. In the majority of these cases, the speech is either altogether lost or greatly impaired; but the patient appears sensible of his situation, and even attempts to express himself by words or signs: but he is frequently incoherent, unintelligible, and without recollection, even when the power of speech is partially retained. In many of this class of cases, complete hemiplegia exists, or gradually manifests itself as the seizure declines. Sometimes one limb only is affected, which is commonly the arm; although the leg is sometimes the only paralysed part. In rare cases the power of swallowing is lost, owing to paralysis of the muscles of the pharynx and the upper part of the œsophagus.

33. This form of apoplexy presents various modifications in its further progress, which may be arranged under the following heads: —

a. The apoplectic attack may, under judicious treatment, pass off entirely and quickly, and leave no-trace of its existence after a short time; the paralytic symptoms, particularly when slight, either disappearing with it, or soon afterwards.

b. The recovery from the apoplectic seizure may be more gradual, taking place only in the course of some days; whilst the paralytic symptoms require several or many months for their removal.

c. The apoplectic seizure may be either quickly or slowly removed; but the paralysis may be permanent, — may continue for years, either until the patient is carried off by a subsequent seizure, or by some other disease.

d. In other cases, the patient experiences a very partial recovery merely, or is subject to several exacerbations; is confined to bed or his room, speechless or paralytic, or the latter only, with his mental faculties either more or less impaired, or but little affected; and at last sinks gradually exhausted, after many weeks, or even months; sometimes having become comatose for a short time before death.

e. The apoplectic seizure may pass off in a shorter or longer time, leaving either hemiplegia, or paralysis of a single limb, or impaired speech and mental faculties; and may recur after a period of indefinite duration, and either carry off the patient, or leave his symptoms greatly aggravated. In this latter case, either another seizure again takes place after a time, or he sinks into the state characterising the immediately preceding modification.

34. *B. The morbid appearances* which this variety of apoplexy, in its different states, presents, are very diversified · — 1st, In some cases, *no lesion* is detected sufficient to account either for the symptoms or the termination; 2d, In other cases, *serous effusion* merely to a slight extent, or little beyond what we have reason to suppose usually exists within the cranium, is found, sometimes conjoined with more or less congestion of the vessels; 3d, In some instances, *congestion* is the most remarkable and only morbid appearanee; and, occasionally, this state is connected with disease of the arteries, generally of the kind already described (§ 28.).

35. 4th. *Extravasation of blood* into a defined cavity is amongst the most frequent lesions met with in this form of apoplexy. We have already seen, that, when the hæmorrhage is very considerable, or bursts its way into the ventricles, or to the surface of the brain, the apoplectic seizure is complete; and, owing to the quantity of blood effused, and the pressure thereby occasioned on the whole encephalic mass, the patient is either suddenly carried off before any paralytic symptoms become evident, or rendered comatose, and incapable of sensation and voluntary motion in every limb. In the majority of cases in which extravasation takes place in this form of apoplexy, there is every reason to believe, from its small extent, that it is merely a consequence of the simple apoplectic state occasioned by congestion or interruption to the circulation, — these states of the circulation being followed by the extravasation, on which the paralytic symptoms chiefly depend.

36. 5th. The extravasated blood presents various *appearances*, according to the period which has elapsed from its effusion; and the surrounding

portion of the brain, and parietes of the cavity formed by the coagulum, likewise undergo *changes* — in some cases extremely slight, in others very extensive — which generally have an intimate relation to the various states the patient has presented in the progress of the disease. When the cerebral substance surrounding the extravasated blood continues but little changed, coagula of considerable size are gradually and often completely absorbed. About fifteen or twenty days after the attack, the more fluid part of the effused blood disappears, and the coagulum is firm and of a dark brownish colour. At a remoter period it assumes more of a firm and fibrous texture, and the dark red or brown tint is lost. At last the coagulum is nearly or altogether absorbed; and a small quantity of fibrinous matter, of a slightly reddish colour, which after a time passes into a loose cellular-looking substance, only remains. These changes generally take place at the end of four or five months; but exceptions not infrequently occur. **Riobé** found blood in the apoplectic cavity after twenty months; **Moulin** met with a small coagulum at the end of a year; and **Serres** has observed firm coagula at the termination of two and three years.

37. The *parietes of the cavity* also experience an important change. They frequently consist of a firm yellowish membrane; and, when the coagulum is altogether absorbed, this membrane forms a more or less complete cyst and well-defined cavity, which is either empty or contains a little very loose cellular substance connecting its opposite sides in all directions; sometimes with yellowish bands of a denser consistence running through it. Dr. **Abercrombie** has never found the cavity entirely obliterated; while Dr. **Bright**, M. **Cruveilhier**, and some other French pathologists, have seen it in some instances, after a remote period, reduced to a dense nucleus; and, in others, to a linear induration resembling a cicatrix (§ 53.). In some cases the cyst has been found distinctly organised, and with blood-vessels ramified in it.

38. The firm membrane constituting the *apoplectic cyst*, or covering the sides of the cavity, seems to form soon after the extravasation has taken place, and apparently arises from the lymph thrown out upon the torn surface of brain. It may generally be detected as early as a fortnight or three weeks after the attack, or even earlier. At a remoter period, when the coagulum is removed, it is either empty, or it contains a serous fluid, usually tinged with blood or the remains of the coagulum. **Riobé** and other French writers suppose that the serous fluid is exhaled from the membrane covering the cavity, and absorbed after dissolving a portion of the coagulum. When blood is extravasated into the ventricles in cases of this description, although extravasation in this situation much more rarely occurs in this than in the preceding form of the disease, there seems no doubt of the possibility of its absorption. In this case, the membrane lining the ventricle containing the effused blood becomes thickened, and of a yellowish colour. M. **Riobé** records a case of apoplexy, with palsy of the left side, which was completely removed. The patient died of diseased lungs after eighteen months; and the *right* lateral ventricle contained a small quantity of coagulated blood, and its membrane was changed as now described. Absorption of the coagulum, with the formation of a cyst similar to those formed in the cerebral structure, also takes place when the blood is effused on the surface of the brain, or in the cellular structure of the arachnoid and pia-mater.

39. As the coagulum disappears, the paralytic symptoms in some cases subside; but more frequently the improvement is only partial, and the patient continues paralytic, although the coagulum is either altogether or in a great measure absorbed, and all unusual pressure or interruption to the circulation is removed from the adjoining parts of the brain. It would seem that the fibres of cerebral structure being once ruptured, and not being susceptible of a direct reunion, remain ever afterwards incapable of conveying volition to the paralysed limbs, which are always on the side opposite to the seat of lesion in the encephalon.

40. In some cases of apoplexy complicated with paralysis, the apoplectic symptoms pass away speedily; and the paralysis also disappears, either with the apoplectic attack or very soon afterwards. In these, sufficient time for the absorption of extravasated blood has not elapsed: are we therefore to infer that it has been effused, and recovery taken place notwithstanding? I am more inclined to think that no effusion has occurred in these cases; but that either congestion of vessels in a part of the brain, sufficient to interrupt the functions depending on it, or retardation of the circulation through it, owing to deficient vital energy of the part, occasioning a temporary abolition of its functions, particularly the power of voluntary motion, or both these states, have merely existed. In many cases, one or more coagula, in distinct parts of the brain, or cavities or cysts in older attacks, are found, and generally their number has a relation to the number of seizures. But it occasionally happens that extravasation takes place in two parts of the encephalon, either at the same time or during the same attack; and thus the number of lesions will be greater than of the seizures: and in other cases, particularly in the next form of the disease, the second or even third extravasation takes place in the same situation as the first; forming either an external layer with appearances distinct from the centre coagulum, or a separate portion with the characters of more recently effused blood.

41. 6th. The *substance of the brain* surrounding the extravasated blood often presents important lesions; chiefly consisting of change of consistence and colour. This portion of brain is sometimes very much softened, and is either colourless, or of a yellowish or greenish yellow tint; or presents the usual appearances proceeding from capillary injection or sanguineous infiltration. This change of structure seems to commence from five to ten days after the sanguineous extravasation, and to arise from inflammatory action having taken place in the part surrounding the effused blood. We have already seen that the formation of a membrane around the coagulum, upon the lacerated surface of brain, is necessary to the reparation of the apoplectic effusion; and that the membrane seems formed from lymph thrown out upon this surface. If the local action necessary to the production of

this membrane and to the process of reparation pass the healthy standard, inflammation is the result; occasioning either a considerable effusion of serum or a second hæmorrhage, as already stated, or softening of the surrounding cerebral structure. This consecutive inflammatory action may also give rise to exhalation of serum into the ventricles or into the sub-arachnoid cellular tissue, according to the situation of the primary extravasation; or even, though much more rarely, to a secretion of puriform matter. It sometimes happens, when the consecutive inflammatory action has been slight and of long duration, *induration* of the surrounding cerebral texture takes place, the intellectual faculties having been generally much impaired in these cases; which, however, are much less frequently met with than those of consecutive softening.

42. There is no part of the brain exempt from the lesions described under this form of apoplexy, although they are most frequently observed in the corpora striata, the thalami, and the substance of the hemispheres. They likewise occur, though less frequently, in the cerebellum, annular protuberance, &c. In all these situations the paralytic symptoms affect the side opposite to that in which the lesions of the encephalon are seated. Some exceptions, however, to this have been recorded; but either the various circumstances connected with the cases, in which they have been said to have occurred, have been insufficiently investigated, or they admit of explanation without invalidating the accuracy of the general inference. Of *forty-one* cases in which extravasation of blood was found in the brain on dissection, by M. ROCHOUX, eighteen were in the left side, seventeen in the right, and six in both sides. Of these forty-one, there were twenty-four in the corpora striata; two in the thalami; one in both these situations; and one under the corpus striatum: making altogether twenty-eight cases in the corpora striata and vicinity. Of the remaining cases, five were in the middle of the hemispheres; two in the posterior part of the ventricles; two in the anterior and interior part of the hemisphere; three in the posterior and interior part; and one in the middle lobe. (See art. BRAIN, *Alterations in Substance — Hæmorrhage.*)

43. IV. APOPLEXY, COMMENCING WITH PARALYSIS, WHICH, AFTER AN INDEFINITE PERIOD, TERMINATES IN A COMPLETE APOPLECTIC ATTACK. — *A. Description.* The commencement of this form of disease is various. The patient often complains of pain, vertigo, and other symptoms referrible to the head; with want of recollection, loss of memory of words, cramps, pains, or with numbness, pricking, tingling, or weakness of a limb or limbs on one side, generally beginning in the hand. The speech is sometimes at first affected, or the mouth and eyes distorted; the limbs being subsequently paralysed. In many instances, the local symptoms continue in a state short of paralysis for a considerable time previously to this state being fully developed. In this case, inflammatory action seated in a part of the brain has often existed, although the symptoms have been so obscure as not to have been detected. After a period of indefinite duration, the paralytic symptoms are followed by a complete apoplectic seizure, occasionally preceded or accompanied with spasms or convulsions of the unparalysed limbs; or the attack supervenes on repeated aggravations, or after a gradual increase and extension, of these symptoms. In some cases, the patient sinks gradually into a comatose state; from which he may at first be partiallyr oused, and give rational answers, the state of complete loss of sensation and voluntary motion having gradually advanced. From this state the patient seldom or ever recovers. In certain cases the apoplectic seizure is more sudden, but is not so profound, or it passes away more quickly than in others. The apoplectic attack having occurred, the patient is either carried off by it, or he recovers after a time the state in which he was previous to it, or he is left by it in a still worse condition: either gradually sinking, and at last dying in a state of exhaustion or coma; or experiencing a recurrence of the apoplexy, which terminates his existence. This forms a variety of M. CRUVEILHIER's second species of apoplexy. It is often a result of previous acute disease, proceeding from a feeble capillary exudation.

44. As soon as the patient suffers the first complete apoplectic seizure, the *progress* and *termination* of the disease very closely agrees with the description given of the immediately preceding form; but the appearances observed on dissection are frequently somewhat different, and are altogether much more diversified.

45. *B. Appearances on Dissection.*—Many of the changes observed after this form of the disease are entirely similar to those described under the foregoing head (§ 41.); whilst others fall under a different article, where they are fully described (see article PARALYSIS). There are some lesions, however, which seem more strictly related to the present variety of complicated apoplexy, than either to the other varieties of the disease on the one hand, or to simple paralysis on the other. The most frequent morbid appearance which I have met with in this form of apoplexy, or seen described in the works of BAYLE, RECAMIER, CAYOL, ROSTAN, RIOBÉ, SERRES, CRUVEILHEIR, LALLEMAND, BOUILLAUD, ABERCROMBIE, and GENDRIN, who have paid great attention to its pathology, consists of softening, with a reddish tint, of a portion of the brain. In cases which I have examined, the softening was accompanied with *infiltration* of blood into the cerebral structure. In some cases the softening and infiltration increased from the circumference to the centre, whilst in others the change from the healthy state to this took place abruptly; the diseased part presenting the appearance of a cavity containing a softened and reddish pultaceous mass, which could be removed without evincing any connection with the surrounding brain. In some instances the softened part is of a yellowish green tint, and the surrounding portion of brain more vascular than natural. The parts most commonly affected with this lesion are nearly those which are most frequently the seat of hæmorrhage; the chief difference being, that the grey substance of the hemispheres is oftener the seat of the former than of the latter.

46. As to *the origin* of this particular form of softening of the cerebral structure, I must refer the reader to what I have adduced respecting it in the *article* on the *Alterations in the substance* of the BRAIN. As, however, the origin of this

species of softening has a very intimate relation to the treatment of this class of cases, it becomes a matter of importance to trace its origin. The French pathologists, with very few exceptions, ascribe it to inflammation of the cerebral structure. There can be no doubt that it sometimes proceeds from this source. But as soon as the inflammatory action has given rise to this change, the vessels no longer enjoy their requisite tone, — their vitality has evidently become exhausted, and they allow the red particles of blood to escape from them, and to be infiltrated into the cerebral structure; as we observe sanguineous infiltrations into the parenchymatous structures to occur in scurvy or in purpura hæmorrhagica. When the softening arises from this cause, the paralytic and apoplectic seizure more frequently is met with in patients not far beyond the middle age, and whose constitutions are not much injured; and the attack is more commonly preceded by acute or febrile symptoms, than when it proceeds from the cause about to be adduced.

47. Dr. Abercrombie considers that it also depends upon disease of the arteries, chiefly ossification, thickening, contraction, or separation of their inner coat, occasioning a failure of the circulation, and gangrene of the part of the brain which is supplied by the diseased vessels as is observed to take place in the toes of aged persons. This may possibly occur; but still we have no satisfactory proof that it does so. This far I may concede,— that the disease proceeds from a change of a state of the capillaries of the part, and of the cerebral structure in which they ramify, otherwise, we should not observe infiltration of blood, and great softening of structure; but which of the two is the primary lesion is very difficult to determine. Most probably, both are dependent upon the state of that part of the ganglial system which supplies the encephalon, particularly its blood vessels.

48. The other appearances with which this lesion is associated in this form of the disease, consist of the morbid states of the arteries of the brain already noticed; of aneurisms (Blane records a case which arose from rupture of aneurism of the internal carotid); congestion of the vessels, veins, and sinuses; more rarely extravasations of blood in some one of the situations and states already noticed, or the remains or marks of antecedent hæmorrhage; empty cysts from which coagula have been absorbed; portions of the brain in various degrees of induration; purulent collections in different forms; encysted and ther tumours of various descriptions; a large proportion of the lesions described in the articles on the *Alterations in the substance* of the Brain; thickening, injection, or ossifications of the membranes; and, occasionally, accumulations of serum in the sub-arachnoid cellular tissue, and in the ventricles. The further exposition of this form of the disease, especially in relation to the *paralytic* symptoms, falls more appropriately under the head of Paralysis, where they are fully discussed.*

49. Of the Phenomena of the Disease which have no particular dependence upon its separate Forms. — *A.* There are *certain symptoms* occasionally met with in all the states of apoplexy, to which I shall briefly refer. The *pulse* is frequently full, strong, and slow, or of natural frequency, particularly in the *first*, *third*, and occasionally in the *fourth* varieties into which I have divided the disease. In other cases, especially in those which are extreme, and particularly in the *second* and *fourth* varieties, it is often small, feeble, and unequal or irregular. The *respiration*, both as to strength and frequency, generally presents similar characters with the pulse: when the latter is slow and strong, the former is deep, slow, and stertorous; and when the pulse is weak and frequent, respiration is quick, less laboured, and much less sonorous. *Deep sighs* are occasionally observed in all the forms of the disease. The *state of the pupils* is very various: sometimes they contract and dilate independently of the influence of light; but in the *first* and *third* varieties they are generally dilated; and they are often contracted, or one is contracted and the other dilated, in the *second*, *third*, and *fourth* varieties. Contraction of the pupils has been remarked as a not infrequent attendant on the worst forms of apoplexy, and particularly on those characterised by a tendency to spastic action, by Aretæus, and recently by Cheyne, Cooke, and various other pathologists. The *features* are usually large, bloated, relaxed, and flushed; but they are sometimes pale, and even collapsed, particularly in the ingravescent and consecutive forms of the malady. The *fæcal* and *urinary evacuations* sometimes take place involuntarily, in all the varieties of the disease.

50. The *muscles* most frequently paralysed, either antecedently, consecutively, or at the same time, with apoplexy, are those of the superior and inferior extremities, particularly those of the superior; next those of the tongue and face; and lastly, the muscles of respiration. In general, the power of feeling is more or less deficient, as well as of voluntary motion of the affected

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* I may subjoin the following classification of apoplexies, according to a different principle to that adopted above. It is based upon the chief pathological states from which the attack proceeds, and approaches nearer the arrangements adopted by the German pathologists, particularly Harless (*Der Speciellen Nosologie*, &c., p. 131. Cobl. 1824), than that usually followed by our own writers. In some respects it may be preferable to that which has been now fully described, particularly as I have here placed those forms of the disease which depend upon the nervous or vital energy of the encephalon in a more prominent point of view, than they can hold in a classification framed according to the symptoms and mode of seizure, in connection with the internal lesions.

I. Sanguineous Apoplexy, — with extravasation of blood in some part within the cranium.

II. Congestive and Serous Apoplexy, — from obstructed return of blood from the head, and frequently from the metastasis of gout, rheumatism, or eruptive diseases.

III. Asthenic Apoplexy, — *Nervous Apoplexy of Authors*, — from depression, exhaustion, or abolition, of the vital influence bestowed on the encephalic organs, and occasionally giving rise to extravasation of blood, or of serum, and to congestion of the cerebral vessels.

A. From *intoxication*. *B.* From *narcotic poisons*, and *mephitic gases*. *C.* From a *stroke of lightning*. *D.* From the *influence of great or continued cold*. *E.* From *exhaustion* of the mental and bodily powers, and from convulsive affections. *F.* From violent *mental emotions*.

IV. Apoplexy from Pre-existing Chronic Lesions within the Cranium, — from tumours, inflammations, abscesses, &c. &c.

V. Traumatic Apoplexy, — From external injuries. *Concussion*, or shock of the vital powers of the organ; — *pressure* from depression of bone or extravasation of blood.

VI. Complicated Apoplexy, — supervening at the invasion, or advanced stages of febrile diseases of an adynamic or asthenic type.

limb or side; but sometimes voluntary motion is lost, whilst sensation remains. There are also very rare cases recorded, where the feeling only was lost, and sensation has been observed paralysed on one side, and motion on the other. These phenomena will be more particularly considered and explained in the article on Paralysis. As the patient convalesces, sensation returns in the paralysed limb before the power of voluntary motion; and generally the lower extremity recovers its functions before the upper, unless disease of the spinal chord, producing more or less of paraplegia, coexist with, or is consequent upon, the apoplectic disease, — an occurrence which is sometimes met with.

51. *B. The duration of the apoplectic* state is extremely various. The attack may terminate fatally in a few minutes, particularly the *first* variety; or it may pass away in as short a time, and the patient recover, especially in *this* and the *third* form of the disease. Dr. Cooke thinks that death seldom or ever occurs in less time than one or two hours, in genuine apoplexy; and, I believe, as respects those apoplexies which consist of cerebral hæmorrhage, this is generally the case; but when large hæmorrhage takes place into the ventricles, and about the base of the brain, death is very quickly produced. An attack often, however, continues for a much longer time, generally from several hours to as many days. If no remission of the symptoms be observed after twenty-four hours, the disease generally terminates unfavourably. The progressive or ingravescent variety sometimes continues for several days; the apoplectic state becoming more and more profound; and at last usually ending fatally.

52. *C. The termination of apoplexy* has already been noticed, when describing the different forms of the disease. I may, however, remark generally that the attack may end as now stated, or it may go off completely, leaving no further ill effects than a tendency to recur upon the action of the remote causes. This favourable termination, however, is entirely owing to the nature of the causes; a larger proportion of cases either terminates in, or is accompanied with, paralysis. When the speech and mental faculties are affected in a marked manner from a first attack, they return but slowly; the memory, the strength of mind, and force of character, are more or less impaired; the patient becomes weak, puerile, easily excited, and timid; and a disposition to a subsequent attack is produced, which either carries him off, or weakens still further his mental and motive powers, until perfect imbecility of mind and body is occasioned. Sometimes, after repeated attacks, with marked injury of the mental faculties, a considerable diminution of the volume of the cerebral convolutions is observed upon dissection, — they no longer fill the cranial vault; but the space is occupied by a greater or less quantity of serum infiltrated in the subarachnoid cellular tissue, and not only on the exterior surface of the convolutions, but also between their anfractuosities. In some cases this change is more remarkably developed in certain convolutions than in others, or in those of one lobe or hemisphere than in the rest.

53. *D. The changes* which the seat of hæmorrhage undergoes have already been described at length (§§ 37—40.). The most remote changes which have been observed in the ruptured part of the brain, from which the coagulum has been absorbed, are, in some cases, a complete cyst, either empty or enclosing a little reddish serum, or a loose cellular substance; in a few instances, a firm nucleus, seemingly consisting of the fibrinous remains of the coagulum, and in others, according to Cruveilhier, merely a linear induration from the cicatrisation of the lacerated cerebral structure. In whatever form the remains of the coagulum and laceration may present themselves, at periods remote from the seizure which these lesions occasioned, no *direct* union of the divided fibres of the brain is observed to have taken place. Even when an *apparent* union of the divided cerebral structure is noticed, it will be found to have been brought about indirectly, and through the medium of the cellular or fibrinous substance left after the absorption of the coagulum; the cavity having gradually closed, owing to the atrophy of the ruptured fibres, and the hypertrophy of those surrounding them from having had to perform additional offices.

54. *E. Of the supposed relations subsisting between the seat of hæmorrhage, or lesion of the brain, and the symptoms accompanying and following the attack.* — M. Cruveilhier states that those parts of the brain most subject to hæmorrhage, or laceration from the external injuries occasioning counter-stroke of the cranium, most commonly present extravasation of blood in apoplexy. This seems to some extent correct, as far as relates to corresponding frequency; but there are parts of the encephalon, occasionally the seat of apoplectic hæmorrhage, which are seldom or never so affected from this species of external injury.

55. *a.* It has been supposed by MM. Serres, Foville, and Pinel-Grandchamp, that lesions of the *corpora striata* are followed by paralysis of the lower extremities, and those of the *thalami* by palsy of the upper. This inference is, however, neither supported by anatomy, nor borne out by facts: a mere coincidence of internal lesion with external signs cannot always warrant the inference that the disordered function has its origin in the part diseased, especially when we are ignorant of the offices of such part. The upper and lower extremities are most frequently paralysed from apoplexy; and the corpora striata and thalami are the parts in which the apoplectic hæmorrhage most frequently occurs. Hence the coincidence of these lesions of structure and functions must be frequent. But these parts of the brain are sometimes diseased without the correspondent affection of the limbs contended for; whilst, on the other hand, the extremities are often paralysed without any lesion of those parts.

56. *b.* The disciples of Gall consider the *anterior lobes* of the brain as presiding over the organ of speech, and as the seat of the memory of words, &c., and that therefore lesions of this part affect this organ, as well as this particular state of recollection. M. Bouillaud has supported this opinion by the history of several cases; and M. Cruveilhier has controverted it, by adducing the details of others (*Nouv. Biblioth. Méd.* 1826.). Several other French pathologists have also espoused opposite sides, and adduced cases supporting their views. The inference deducible

from the facts already accumulated is, that a coincidence of lesion of these functions, and of these parts of the brain, is sometimes observed; but the relation between them is neither so uniform nor so precise as to warrant the opinion that there exists any necessary dependence of these particular functions upon the parts of the brain to which they have been ascribed. Without reference, however, to the part of the brain on which the memory of words depends, it has been remarked by M. ITARD, that aged persons struck by apoplexy frequently lose the recollection of them in the following order: — First, want of recollection of proper names, next of substances, afterwards of verbs and adjectives; which last are often the only words which can be recollected.

57. *c.* It was contended by MM. DELAYE, FOVILLE, and PINEL-GRANDCHAMP (*Nouv. Journ. de Méd.* 1821.), that disturbance of intelligence depends upon lesion of the *grey substance* of the brain, whilst disorder of locomotion proceeds from change of the white or *medullary structure*. But this doctrine seems no better founded than the preceding, being open to the same objections which have been urged against them. Lesion of the cineritious substance is, perhaps, more frequently accompanied with spasms and convulsions at the commencement of the attack, than when it is seated in the medullary structure.

58. *d. The cerebellum.* MORGAGNI has recorded that VALSALVA once stated to him, that a case of apoplexy to which he was called was seated in the *cerebellum*. Dissection verified the *diagnosis*; but he does not mention the symptoms on which VALSALVA founded his judgment. M. SERRES, adopting the doctrine of GALL, says, that erections, or seminal emissions, in men, and discharges, sometimes of a sanguineous appearance, from the female organs, are the distinguishing signs of apoplexy of the cerebellum. M. CRUVEILHEIR states, that he has seen apoplexy of this part, but that these symptoms were not present. Some cases have certainly occurred to countenance the opinion of SERRES, and others to overthrow it. It seems more probable that the effusion in the cerebellum affects the *medulla oblongata*, and occasions a partial asphyxia and stasis of the blood, from the influence of this part upon the respiratory class of nerves, and thus induces a state favourable to erection. CRUVEILHIER states that he failed to produce this symptom by irritating the cerebellum of dogs. I may, moreover, add, that the symptoms contended for by SERRES, and the followers of GALL, as distinctive of cerebellic apoplexy, have occurred in cases wherein the cerebellum has been found sound on dissection.

59. Apoplexy of the *cerebellum* occasions, *cæteris paribus*, a more serious lesion of the functions of circulation and respiration, and is more dangerous than apoplexy of the cerebrum. The symptoms are evinced on the side opposite to the seat of lesion, in this as in other apoplexies. The opinions that the cerebellum is the regulator of all the voluntary movements, and the source of all sensibility, according to certain Continental physiologists, particularly MM. FLOURENS, FODERA, FOVILLE, and PINEL-GRANDCHAMP, have not been confirmed by the history of apoplexy seated in it. The hypothesis of ROLANDO, professor at Turin, that the cerebellum performs a function analogous to the Voltaic pile, in generating a fluid or principle requisite to the functions of voluntary muscular action; and that it transmits this fluid, under the influence of the brain, and through the channel of the spinal chord and nerves, to the muscles; seems much more accordant with comparative physiology, and the pathology of the nervous system.

60. *e. The annular protuberance* — the point of junction of the spinal chord, brain, and cerebellum — the centre of the cerebro-spinal system, is sometimes the seat of apoplexy, notwithstanding its density. When the extravasation of blood in this part is to any considerable extent, immediate and complete paralysis of the trunk, and of both the superior and inferior extremities, is produced, with the most profound lesion of respiration, quickly followed by death. When the effusion is to a small extent, and in one side of the protuberance, the paralysis which results seems on the opposite side of the body, as may, indeed, be inferred from anatomy. The extravasation must be to a small extent, to admit of recovery. Sometimes the effused blood is observed to have been disposed in layers between the lamina of white matter entering into the structure of the protuberance. The reparation of the apoplectic lesion of this part takes place in a similar manner to that which I have already described (§§ 37—40.). It would seem that the smallest division of the fibres of this part is followed by permanent affection of feeling and motion.

61. Connected with this subject, M. FLOURENS concludes, from his experiments and observations, that the cerebral lobes, the cerebellum, and the tubercula quadrigemina, may lose a considerable but limited portion of their substance, without losing the exercise of their functions; and they may re-acquire them after being totally deprived of them: that the spinal marrow and the medulla oblongata are the only parts which directly affect the same side of the body with that in which they themselves are affected; whilst the tubercula quadrigemina, the cerebral lobes, and the cerebellum, alone produce these effects upon the opposite sides to that in which they are diseased, — the former acting in a direct course, the latter in a cross direction. These inferences, however, want confirmation in several particulars.

62. DIAGNOSIS. — Apoplexy is, in general, readily recognised: but it may occur in such a way and under circumstances which will render its diagnosis a matter of difficulty. Thus we may be called to a patient, of whom nothing is known, with the following symptoms: — Coma, laborious or stertorous breathing, relaxation or rigidity of the limbs, complete loss of consciousness; he may or may not have had convulsions, or a blow upon the head; there may be hemiplegia or not. In this case, is the patient in a state of dead drunkenness, asphyxied, poisoned by narcotics, or affected with the profound coma consequent upon epileptic or hysteric convulsions? Is it concussion of the brain; the advanced effects of organic disease within the head — as of cysts, abscess, or of inflammation terminating in effusion; or fever, either at its commencement or close, with apoplectic symptoms? It is true that those states differ but little from apoplexy;

the difference consisting chiefly in grade, unless hæmorrhage has taken place; when paralysis generally manifests itself. But it should be at the same time recollected, that there is sometimes hæmorrhage without local palsy, and even palsy without sanguineous extravasation. The diagnosis of such cases is very important; but without information of the circumstances connected with the history of the case, its difficulty is extremely great. I once treated a case of adynamic fever, originating in infection, and commencing with sudden loss of sense and voluntary motion, as a case of apoplexy, and gave an opinion accordingly. The history of the case, and its subsequent course, showed the error. When paralysis is present, the nature of the case is then manifest, although the particular cause of the palsy may be a matter of doubt. We should, therefore, enquire after this symptom, by observing the attitude and motions of the patient, by pinching the extremities, tickling the soles of the feet, &c. The existence also of stertorous, laborious, or snoring respiration, will confirm the diagnosis.

63. It should be kept in mind that, whilst the comatose state consequent on *epilepsy* or *hysteria* may closely resemble apoplexy, the convulsive stages of these diseases may give rise to the true apoplectic state. But, in the usual consecutive coma of epilepsy there is no stertorous breathing, and the limbs are not so relaxed as in apoplexy. The *coma*, which supervenes to inflammation of the membranes of the brain, is chiefly to be distinguished from apoplexy by the antecedent symptoms, and by the loss of sense and cerebral function being greater than the loss of motion; independently of the association of paralysis so frequently characterising the apoplectic seizure.

64. The symptoms consequent upon *injuries of the head*, whether simple concussion, or compression from depressed bone, or extravasation of blood, are in all respects identical with certain of the varieties of apoplexy described above, and are not to be distinguished from them, but in respect of the exciting cause. A similar remark is applicable to cysts, tubercles, and other tumours slowly developed in the encephalon, which sometimes produce no very marked external sign of disease, until apoplexy and still more frequently hemiplegia suddenly take place. In such cases there is no actual difference in the proximate cause of the abolition of function, but only in the compressing body whereby abolition of function is occasioned.

65. In cases of loss of sense and voluntary motion from the action of *narcotic poisons*, or breathing *deleterious gases*, there is also little actual difference from several of the apoplectic states described above (§ 10.), excepting that the functions of the lungs have, in the case of breathing deleterious gases, been primarily affected; for the chief lesion is to be referred to the state of *nervous energy* and *vascular action* in the brain, its circulation being retarded, and its vessels congested with dark blood. Indeed, in many such cases, the true apoplectic condition, either with or without hemiplegia, is produced; although, in the majority, the state of profound but simple coma is the result.

66. In *asphyxia* the lesion of function commences in the lungs, the pulse being either diminished in strength or entirely abolished; whilst in apoplexy the lesion is in the head, and the pulse is generally fuller and stronger than natural; but the exceptions to this state of pulse are numerous. In *syncope*, the marked diminution, or almost entire absence, of the pulse, paleness of the countenance, and the very gentle or scarcely apparent respiration, are sufficient to distinguish it from apoplexy, even in its weakest forms; excepting at the commencement of, or early in, the apoplectic attack, when the states of vital energy of the brain, in both affections, are not materially different.

67. Complete *intoxication* may readily be mistaken for apoplexy; and, in some cases, may terminate in this disease. This state of intoxication is evidently attended with congestion of the vessels of the encephalon. The smell of the breath, and the appearance and smell of the matters thrown up by the retching that frequently accompanies intoxication, will readily distinguish this state. The greater frequency, also, of the pulse, and absence generally of stertorous breathing, in drunkenness, will also assist the diagnosis. But these symptoms are occasionally observed in apoplexy; and, on the other hand, the pulse may be slow or natural, and the breathing stertorous in the former: but this is very rare, particularly slowness of the pulse.

68. In *concussion* of the brain, the state of its circulation, and the influence of that portion of the ganglial system which supplies it, are as remarkably depressed as in the weakest form of apoplexy, — in concussion from the shock received, in apoplexy from internal causes; in many cases no difference existing. In some instances, however, even of this form of apoplexy, the respiration is much more laborious, the countenance somewhat more tumid or distorted, and the pulse fuller and more developed than in concussion. In the stronger states of apoplexy there can be no risk of mistake, the characteristic symptoms of each being very different.

69. Prognosis. — An attack of apoplexy is always dangerous: — 1st, It may be fatal immediately; 2d, It may also be fatal within two or three days, and previous to reaction having commenced; and, 3d, It may occasion death during reaction, — *a*. by a recurrence of the attack; *b*. by inflammatory softening and infiltration of the cerebral tissue surrounding the extravasated blood; *c*. by the exhalation of serum; *d*. by inflammatory action of the membranes of the brain and subjacent cellular tissue, and of the membrane lining the ventricles. Even in more favourable circumstances, it leaves behind it debility of feeling, motion, and of the mental faculties; and a first attack is generally followed by a second or even a third.

70. *A*. The *unfavourable* symptoms are frequency or intermittence of the pulse; continuance of the symptoms for twenty-four hours, or for little more than half of this time in the *strong* apoplexy, after a judicious treatment; very profound coma, and obtuseness of the senses; involuntary discharges of the urine and fæces; contraction of the pupils, or contraction of one or both pupils accompanied with spastic actions of muscles; very laborious stertorous breathing, particularly if attended with foam about the mouth, and a weak pulse; cold and profuse sweats; the occurrence of convulsions; the association of

hemiplegic symptoms with the apoplectic, and complete loss of vision. Frequent yawning or continued somnolency indicate effusion, or increasing effusion. Quarin observes very justly, that when the patient frequently applies the hand to a determinate part of the head, or when delirium supervenes, or if partial perspirations occur early in the attack without benefit, the result is generally fatal. Complete hemiplegia, without coma, but with integrity of the mental faculties, and perfect motion and sensation of the non-affected side, is less dangerous than a more partial paralysis, with stupor or coma. When one pupil is contracted and the other dilated, the existence of unequal pressure may be inferred. It has generally been stated that complete loss of feeling and motion, accompanied with coma or stupor, is extremely dangerous. Cruveilhier remarks that he has seen recovery in such a case. I have met with it in two cases, one of which was seen by Dr. Hooper.

71. Delirium is an unfavourable complication; and indicates either the escape of blood from the seat of extravasation upon the membranes which it irritates, or the occurrence of inflammation of the cerebral structure or meninges. Acceleration of the respiration, and vomiting supervening spontaneously, unless from matters occasioning the attack, are very dangerous symptoms. A similar remark is applicable to loquacity, or complete loss of speech, particularly when attended with a frequent pulse.

72. When the disease occurs in the course of insanity, or in epileptics, an unfavourable result may be generally anticipated; a nearly similar conclusion may be drawn if it seize aged persons, and broken constitutions, upon the disappearance of gout from the extremities. In the majority of cases of apoplexy proceeding from efficient causes originating in the brain, a perfect recovery is not to be expected. On this, M. Portal has insisted strongly; and although it is just as a general rule, many exceptions will present themselves. If the pulse sink, or intermit, or become remarkably quick; and coldness of the extremities, or cold clammy sweats come on; or the power of respiration be greatly diminished; inevitable or fast approaching dissolution may be predicted.

73. *B.* The *favourable* signs of the disease are, a moderate attack; a decline of the symptoms after treatment, and particularly if a warm, general, and gentle perspiration take place; the occurrence of discharges of blood from the nose, hæmorrhoidal vessels, or uterus; and a free state of the bowels, with consciousness of all the evacuations. The accession of the menses, of the piles, or of ptyalism, have been justly viewed as the most favourable signs by Hippocrates, Schadt, Dolæus, and many subsequent writers. Goavarts considers hæmorrhage from any part, particularly epistaxis, ptyalism, a copious and general perspiration, with free alvine and urinary discharges, the most favourable signs. The accession of fever has been considered favourable by Hippocrates and Portal; but many experienced authors do not agree with them. I believe that, although some may recover from this state, it indicates the accession of inflammatory action of the portion of brain or membranes adjoining the seat of hæmorrhage; which will be dangerous in respect of the extent to which it may proceed, and the effects it may produce on the part, particularly in causing a renewal of the hæmorrhage. In all cases, the practitioner, even under favourable appearances, should give a cautious prognosis until the tenth day; the eighth being that on which an unfavourable change is apt to occur, and the extravasation to be renewed.

74. Causes.—The causes of apoplexy, both predisposing and exciting, have generally a direct or indirect influence upon the state of the vital energy and circulation of the brain. The manner, however, in which causes may individually influence either the vital condition or circulation varies extremely; and the action of several of them is even peculiar. Those causes, which in some cases are merely predisposing, may in others be exciting; and changes previously induced in the organisation of the brain, or in the state of its vessels, even from causes which lead to other maladies, may, either directly or indirectly, occasion apoplexy.

75. *A. The predisposing causes of apoplexy.*—This disease occurs most frequently in persons of the *male* sex, owing to their habits, and greater exposure to the exciting causes; and in the *far advanced stages of life.* The majority of authors state the period intervening between forty and seventy as that in which it is most common; but it is not infrequent at both earlier and later epochs, particularly the latter. M. Rochoux found, in 63 cases attended with extravasation of blood, that 2 were between 20 and 30 years of age, 8 from 30 to 40, 7 from 40 to 50, 10 from 50 to 60, 23 from 60 to 70, 12 from 70 to 80, and 1 from 80 to 90 years. I have met with the true hæmorrhagic apoplexy at the early age of eighteen. The *hereditary* tendency of the disease, as shown in several instances by Forestus, Wepfer, Portal, Blane, Frank, and others, cannot be doubted.

76. *The form and habit of body* may also predispose to the attack; but, I believe, much less frequently than is usually supposed. A large head, short neck, full chest, sanguine and plethoric constitution, and corpulency, are generally considered signs of disposition to it; but the state of the heart's action, and of the circulation through its cavities, with a plethoric state of the vascular system, has a more marked influence, as will appear in the sequel. In the 63 cases which have been minutely analysed by M. Rochoux, only 10 were fat and plethoric persons, 23 were thin, and 30 were of the ordinary habit of body. He therefore maintains that there is no external appearance of habit and temperament whereby the disposition to apoplexy is indicated.

77. Long and intense thought; disappointments; depressed and anxious states of mind; the habitual indulgence of the temper, passions, and appetites; the irritable and sanguine temperaments; sedentary and luxurious living; too great sexual indulgence, particularly when accompanied with full living; habits of intoxication, or the too free or constant use of wine and malt liquors; laborious employments, especially when they require the stooping posture; the suppression of accustomed hæmorrhages, discharges, or habitual diseases, particularly those which are accompanied with evacuations; and the neglect of vascular depletion after their suppression; the influence of other diseases, particularly those of

the heart, liver, lungs, kidneys, and digestive organs; a gouty diathesis; extremes of temperature, particularly when conjoined with moisture; sudden vicissitudes of temperature; frequent indulgence in sleep after a full meal; the use of neckcloths worn too closely around the neck; sleeping with too low a pillow, particularly after a meal; and lying too long in bed; are among the most common predisposing causes of apoplexy.

78. ALBERTI and SEIZ have insisted on the greater frequency of this disease amongst the *studious* than in other classes. FRANK says that the greater proportion of his apoplectic patients had been previously subject to hæmorrhoids. The use of *tobacco*, particularly in the form of snuff, has also been considered to favour the occurrence of apoplexy. As to the influence of *weather and seasons*, it may be stated, that MORGAGNI and LANCISI observed this disease most frequently in hot weather suddenly following cold and rainy seasons. KAISER says that he met with the greatest number of cases in the months of October and November; and HIPPOCRATES, GALEN, FORESTUS, KELLIE, and others, have noticed the influence of cold in producing it. I believe that very *cold weather*, or cold conjoined with moisture, favours its occurrence in very old subjects; and that very hot and moist seasons occasion it in robust and plethoric persons. The influence of hot weather in its production has been insisted on by MORGAGNI and CHEYNE. The FRANKS found apoplexy most prevalent at Petersburgh and Wilna during the height of summer (J. FRANK, *Prax. Med. Univ. Præcep.* t. ii. p. 308.).

79. Apoplexy seems to be as frequent in the *poorest* as in the *richest* classes; but in the former it is more commonly attended with paralysis, and oftener assumes an asthenic or *weak* character, the attack chiefly proceeding from frequent exposures to the vicissitudes of season and temperature, to severe and long-protracted exertion, and a less nutritious diet. In the latter it more generally assumes the *strong* or active form, arising most frequently from ease, luxury, and various indulgences.

80. It will be observed that nearly all these causes act by habitually favouring determination of blood to the head, or by impeding its return, and by diminishing the vital energy of the brain at the same time that they favour a plethoric state of its capillary vessels. These derangements of vital manifestation and of circulation, when frequently produced, will occasion further changes, and sometimes will, upon the occurrence even of the slightest exciting causes, terminate in those lesions which constitute the disease itself.

81. *B. The exciting causes* frequently act in a similar manner to the foregoing; but generally in a more sudden manner and intense degree. These are, immoderate perturbations of mind, as consternation, terror, fear, despondency, anger, disappointments, anxiety, distress of mind from losses, sorrow, violent chagrin, great joy, immoderate fits of laughter, and all painful, depressing, or exciting mental emotions and exertions. Numerous illustrations of the immediate influence of the above passions in producing the disease are to be found in the writings of ARETÆUS, FORESTUS, ZULIANI, PORTAL, BOUCHER, CHEYNE, COOKE, ABERCROMBIE, &c.

82. *Intemperance* in eating and drinking is amongst the most common exciting causes of the disease; and numerous instances of its immediate ill effects are adduced by the above writers, and by BONET, MORGAGNI, MEAD, FOTHERGILL, and others. Oppletion and distension of the stomach prevent the descent of the diaphragm, impede the dilatation of the cavities of the heart, obstruct the circulation through the lungs and the return of blood from the head, whilst the vital energy is abstracted from the brain, and determined to the digestive organs, in order to dispose of the load by which they are oppressed. Owing to this procession of phenomena the vessels of the encephalon are engorged at a time when their vital energies are diminished; while the rapid influx of fluid matters into the circulation as the process of digestion advances, tends to heighten the vascular fulness and disposition to effusion. Besides, habitual intemperance of this description generates a plethoric state of the system, with congestions of internal viscera. Spirituous liquors are seldom productive of apoplexy until after a continued addiction to them, unless they are taken in excessive quantities; and perhaps the habit of drinking much malt liquors or wine is still more frequently a cause of the disease, than indulging in spirits, which, when they occasion apoplexy, act more upon the vital endowments of the brain, than in causing extravasation of blood; the chief changes produced by them, being serous effusion with injection of the vessels. Sir A. CARLISLE has adduced a case of apoplexy, arising from drinking an immense quantity of gin. Upon dissection, the odour of the spirits was detected in the serum effused in the ventricles of the brain.

83. Connected with the use of spirituous or fermented liquors, I may here allude to the influence of the class of *narcotics*, particularly opium, stramonium, hyoscyamus, tobacco, &c., the excessive use of which sometimes occasions all the symptoms of congestive apoplexy, and even extravasation. Of all the narcotics, the different species of monkshood most readily occasion apoplexy, when taken by mistake. I was lately consulted in the case of a young man who had incautiously chewed some seeds of this plant; he was shortly afterwards seized with a sense of numbness of the face, soon followed by complete apoplexy, as described under the third variety of the disease, from which he recovered with great difficulty, and with palsy of one side, with which he is still affected, now upwards of a twelvemonth from the time of attack.

84. Nearly allied to the operation of narcotics is that of the fumes of charcoal, and various *mephitic gases*, which, whilst they diminish, or altogether arrest the changes affected by respiration on the blood, thus occasioning asphyxia, and carus without stertorous breathing, sometimes produce all the symptoms of complete apoplexy, owing to their effects upon the vital endowment of, and circulation in, the brain. In respect of the *modus operandi* of narcotics and deleterious gases on the system, somewhat different opinions have been entertained by CULLEN, GOODWYN, CURRIE, ORFILA, BRODIE, and others who have investigated the subject. There can, however, be no doubt that they act chiefly upon the ganglial system, particularly on that part

which actuates the brain, when they produce apoplexy, destroying the influence of this system on the vessels of the encephalon, and thereby retarding the circulation in, and favouring congestion of, its capillaries, and interrupting the functions of the organ.

85. Violent straining in lifting heavy weights, or *muscular exertions;* straining at stool; the venereal act, particularly under unfavourable circumstances, or too frequently repeated; the metastasis of other diseases, especially of gout and rheumatism; whatever impedes the return of blood from the head, as a dependent posture of the head, or holding it long in an averted position, or looking backwards without turning the body, particularly when the neck is short; sleeping upon too full a meal, especially with a neckcloth or other ligatures around the neck; violent fits of coughing or sneezing; pregnancy and child-birth; exertion of body, with an anxious mind; stumbling; the use of the warm bath; and the sudden exposure to heat or cold; are among the most frequent exciting causes of apoplexy.

86. The effect of the *sun's rays* in producing what is commonly called *coup de soleil,* is well known. Many of the seizures thus occasioned amount to complete apoplexy, in some one of its forms, particularly the first and third. But other conditions of *heat* will also sometimes occasion an attack, as heat combined with moisture, and the exhalations from a number of persons crowded together in ill-ventilated apartments. The influence of crowded rooms and assemblies in causing apoplexy is well known, and in occasioning headach, and sense of fulness in the vessels of the encephalon, even in persons not predisposed to an apoplectic attack.

87. *Cold* also, particularly when applied suddenly to the surface of the body and lungs, excites the disease in aged persons, whose vital energies are already greatly impaired. The vessels of the brain in this class of subjects are weak, fragile, and liable to rupture, or to permit a portion of their serous contents to escape. Besides, cold depresses still lower the vital powers of the frame, and tends to retard the circulation, whilst it drives the blood from the surfaces into the large viscera, and particularly into the encephalon, which, from its unyielding case and exemption from atmospheric pressure externally, is more obnoxious to congestion, retarded or interrupted circulation, and compression from vascular fulness, than any other organ; occasioning lethargy in the robust or young, and apoplexy in the old or predisposed. Cases illustrative of apoplexy produced by long exposure to great cold, particularly when the disposition to sleep which it induces is yielded to; by the incautious use of the cold bath, and of ice applied to the head; and by the practice in Russia and Poland, of using a snow bath after the warm bath; have been recorded by WEPFER, WALTHER, PENADA, MACARD, BRANDIS, KELLIE, PORTAL, and FRANK. Of about fifty perfect cases of the disease, the *causes* were analysed by Dr. CHEYNE, and ranked as follows: — 1st, Drunkenness and habitual indulgence in exciting liquors; 2d, The form of the body; 3d, Temperament, sanguine, sanguineo-choleric, choleric; 4th, Gluttony; 5th, Indolence; 6th, Mental anxiety; 7th, Fits of passion; 8th, Externa heat; 9th, The use of tobacco. (*On Apoplexy and Lethargy,* p. 149.)

88. C. *Modus operandi of the above causes.* — If we endeavour to trace the relation subsisting between these causes, and what we know of their uniform effects, either upon the brain or on other parts of the body, we shall find that they tend first to excite, and afterwards to exhaust, the vital energy, and to distend the capillaries of the part. Now, as the brain is enclosed in an unyielding case, it must follow that, when the capillaries are excessively distended, the veins, which are the most yielding, will be proportionately compressed, whilst the force of the circulation in the arteries will tend to perpetuate this distension, and consequently the compression of the veins. Thus the circulation will be retarded; the portion of the ganglial system supplying the brain be likewise, to a certain extent, benumbed by the increased pressure to which it is subjected, and the functions of the organ abolished, even without extravasation having occurred. Upon dissection after death, the blood, which had distended excessively the capillaries, will be found to have passed into the veins, giving the appearances of venous congestion merely, as is uniformly observed in other parts of the frame, which have been the seat of congestion, without inflammation, — venous congestion, at least to any considerable extent, being incompatible with the physical condition of the encephalon during the life of the patient, unless it be occasioned by impeded return of blood through the sinuses and large veins, although congestion of its capillaries undoubtedly frequently exists.

89. When *hæmorrhage* takes place, the effused fluid will occasion more or less pressure, according to its extent; but, from the condition of the encephalon, the pressure will almost equally affect all parts of it; the blood being thereby prevented, to a certain extent, from returning by the veins, whilst the capillaries and arteries will be unnaturally distended. This state, however, will pass off after death; and venous congestion only, with extravasation, present itself. When, however, the extravasation is large, the pressure will prevent both the veins and the capillaries from receiving their due proportion of blood; whilst the ganglial system of the encephalon will be analogously, or injuriously, affected. But this topic will be pursued hereafter.

90. D. *Consecutive and complicated Apoplexy.* — An attack of apoplexy may be caused by other diseases, in various stages and states of their progress. It may occur after the pre-existing disease has disappeared, and in consequence of its disappearance, as in the case of suppressed hæmorrhages, particularly epistaxis and hæmorrhoids; or suppressed evacuations and eruptions, as those from the uterus, bowels, &c.; or it may supervene in such a way as will lead us to infer that its occurrence has been the cause of the disappearance of the pre-existing malady, as in cases of misplaced or metastatic gout, rheumatism, &c.; or it may likewise appear in the course of other diseases which it cannot thus displace, and assume the character of a most serious or fatal complication. The importance of these morbid relations of apoplexy requires for them a more particular notice than they have generally obtained.

91. *a. Consecutive.* — The supervention of apoplexy after suppressed hæmorrhages, evacuations, and eruptions, has been satisfactorily noticed by many writers; and seems to proceed from unusual fulness of the vascular system, owing to the suppression, and the accidental co-operation of causes which determine the blood to the head, and favour its extravasation. Besides the suppressed evacuations, noticed above (§ 90.) as being influential in causing an attack, I may mention the sudden healing up of chronic ulcers; the arrest of habitual perspiration from the feet; unusual continence; and suppression of the lochia or of leucorrhœa. It is not infrequently observed after suppressed ottorrhea; and from inflammation of the ear having extended to the membranes and substance of the brain, and produced abscess. I have met with several cases of this description in which the apoplectic state was complete, and attended with hemiplegia. Numerous instances are also recorded by LALLEMAND, GENDRIN, ITARD, and other writers. (See BRAIN, *Abscess in.*)

92. *b. Metastatic.* — The occurrence of the disease, from *misplaced* or *metastatic gout*, has been noticed by MORGAGNI, WEICKARD, MUSGRAVE, JUNCKEN, TODE, HAGENDORN, CONRADI, and CHEYNE. The last named author thinks that the symptoms differ, when occurring from this cause, from those which constitute true apoplexy. I believe, however, that they differ in no respect, in general, from those which characterise congestive apoplexy; and that, as hæmorrhage within the head does not commonly constitute the attack of apoplexy from this cause, hemiplegia or paralytic symptoms seldom accompany it.[*]

93. Nearly similar seizures to the foregoing will occur from attacks, or metastases, of *rheumatism* to the membranes of the brain. The apoplectic symptoms are, however, seldom so fully developed as in other cases, a comatose state being the more usual result. On dissections of fatal cases of this description, MORGAGNI, HOFFMANN, PLENCIZ, RANOE, WEICKARD, and STOLL, found the membranes injected, thickened, and with serum interposed. Very nearly similar symptoms and appearances within the head result from *erysipelas* extending to the membranes of the encephalon. Here, as well as in the rheumatic disease of the same structures, the apoplectic state is not so strongly marked as in its more idiopathic forms; and paralysis rarely occurs, excepting in the advanced progress of the cerebral disease.

94. *c. Complications.* — Apoplexy occasionally supervenes in the course of many diseases, even at the commencement of some of them, and becomes *associated* with them. It is sometimes an attendant upon the *cold stage*, or the period of invasion, *in fevers*, particularly those which proceed from concentrated marsh effluvia, and from the infection of animal miasms. The epidemic prevalence of apoplexy, noticed by BAGLIVI, LANCISI, MORGAGNI, FORMEY, and STOLL, may be explained by a reference to this connection; although the observations of the FRANKS and CHEYNE, which are conclusive of the great frequency of the disease in hot and moist seasons, seem to countenance the opinion of these authors. When apoplectic seizures usher in fevers, whether paludal or infectious, the attack is seldom accompanied or followed by paralysis. In a case, however, of perfectly formed apoplexy ushering in a case of endemic fever of a warm climate, which occurred in my practice, paralysis supervened upon the seizure. An attack of true apoplexy may also occur in the stages of depression and collapse of adynamic and typhoid fevers, particularly in the former stage: in the latter, coma is generally present, but it very rarely amounts to the true apoplectic state; and when it does, hemiplegia generally attends it.

95. The occurrence of apoplexy after *epileptic* convulsions, the convulsions and eclampsia of the puerperal state, and, more rarely, during the hysteric fit, is well known. It may even take place during the pains of labour, without previous convulsion, and in the latter months of pregnancy. In these cases the attack offers nothing to distinguish it from the first, second, or third varieties described above. It is a not infrequent termination of *inflammation* of the brain, or of its membranes. Indeed, there seems every reason to suppose that acute inflammation of that part of the cerebral structure in which hæmorrhage takes place, not infrequently precedes the extravasation. It also occasionally supervenes upon *mania*, and the various states of *insanity*, particularly in its fourth or last noticed form (§. 43.). It also occasionally arises from interrupted circulation through the *lungs*, — a fact well demonstrated by BONET, BANG, HUXHAM, J. FRANK, and CHEYNE. Its occurrence during the advanced stages of both acute and chronic diseases of the *air-passages* and *lungs*, particularly those characterised by violent attacks of cough, has also been observed by myself, most frequently in hooping-cough, bronchitis, asthma, and emphysema of the lungs.

96. The connection which sometimes subsists between apoplexy and *organic disease* of the *heart*, especially hypertrophy of the left ventricle, has been remarked by VALSALVA, MORGAGNI, LIEUTAUD, TESTA, PORTAL, CHEYNE, RICHERAND, BERTIN, and HOPE; and has been viewed by them in the light of cause and effect, the apoplectic seizure arising from the cardiac disease. CORVISART and ROCHOUX, physicians of large experience, have thrown doubts upon the nature of this connection; have likewise denied the frequency of its occurrence; and have viewed these diseases as sometimes consecutive in their origin, although co-existent in their advanced state, but without the relation of cause and effect: thus considering the occurrence of apoplexy or paralysis in the advanced stages of disease of the heart as entirely an accidental coincidence. But when such a complication of morbid states is frequent, prominent, and observes the same

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[*] Some years since I was called to a medical friend in Westminster, who, after complaining of symptoms of indigestion, was suddenly seized with complete apoplexy, with stertorous breathing, but with no signs of paralysis, for which the usual means were promptly and decidedly employed. On the following day a complete attack of gout in both feet took place, with disappearance of the cerebral disease. Warmth to the feet, and aperients, were prescribed; but from his eagerness to rid himself of the pain, and to visit his patients, he took, contrary to the advice given him, a large dose of colchicum. A few minutes afterwards the gout left his feet, and seized his stomach; whence it was with difficulty recalled to the extremities. This was the first time he had ever been seized with gout, and the first part it attacked was the brain, in as complete a form of apoplexy as can be conceived. Metastasis of gout to the head may also occasion inflammation of the brain, with coma, or lethargy.

succession, a more intimate connection than mere sequence or coincidence ought not to be entirely rejected, particularly when admitting of a rational explanation. The frequency of apoplexy or paralysis, and the general presence of the latter when the former occurs in the advanced progress of cardiac disease, especially hypertrophy of the left side of the heart, have led me to believe that more than mere coincidence actually exists. It is, however, by no means improbable that the disposition to organic change throughout the whole vascular system, sometimes associated with disease of the heart, may so far exist in the delicate vessels of the brain, as to favour the occurrence of hæmorrhage from them when the action or impulse of the heart is increased by disease or the influence of passion or emotion; or when the return of blood from the head is impeded by congestion, or interrupted circulation through the lungs or right side of the heart.

97. The association of apoplexy and *hepatic disorder* has been noticed by STOLL, BALDINGER, MOLL, CHEYNE, and others. The circumstance of icteric patients frequently being cut off by apoplexy marks the connection. I have met with several cases in which both apoplexy and paralysis have supervened to, and become complicated with, hepatitis, both acute and chronic, particularly the latter. The liver is seldom diseased without disordering the functions of the brain; and I believe that accumulations of vitiated bile in the gall-bladder and hepatic ducts, independently of any actual disease of the liver, will predispose to the apoplectic seizure. I am the more confirmed in these opinions by having observed disease of the biliary apparatus in a very large proportion of those who had died of apoplexy or paralysis; and, in many of those who have recovered, the active use of purgatives had produced morbid evacuations, containing a large quantity of blackish green, greenish, or yellowish brown bile, before much amendment had taken place. It may, however, be conceded that serious disturbance of the brain equally induces disorder of the liver; and that the latter may have been occasioned by the former. But this merely proves the frequency and intimacy of the association. It should also be kept in recollection that the apoplectic seizure generally masks the hepatic affection; the practitioner should, therefore, examine the region of the liver, where, as well as at the epigastrium, fulness, and, in some cases, the existence of tenderness, may be detected: and, as the consciousness of the patient returns, the hepatic disorder will occasionally become more manifest. This complication is so important and frequent, that it ought always to be looked for in practice; for many of the causes which occasion hepatic disorder also give rise to cerebral disease: and the production of either the one or the other singly, often favours the appearance of the other subsequently. I have no doubt, however, that an inflamed or actively congested state of the substance of the liver has a very marked effect in exciting that state of the capillary circulation of the brain on which the apoplectic seizure has been shown to depend (§ 88.).

98. The influence of *gastric disorder* in producing apoplexy, not merely as evinced by intoxication, a surfeit, &c., but also by some one or more of the several ailments which characterise impeded or otherwise disordered function of the stomach and intestines, has been noticed by SCHENCK, SCHROEDER, WEICKARD, MEZLER, FOTHERGILL, SCHÆFFER, THILENIUS, HUFELAND, LOUYER VILLERMAY, and CHOMEL; and more strongly insisted on by BROUSSAIS and his followers. Although the general dependence of the latter on the former has been too absolutely contended for by BROUSSAIS, the occasional connection cannot be doubted. Indeed, in several of those cases wherein the association with hepatic disorder is observed, gastric and intestinal disturbance is also evinced. But however complicated, whether with either gastric or hepatic disorders only, or with both conjoined, apoplexy is, perhaps, as often the concurrent result of the same causes that produced these disorders, as a disease springing from and dependent upon them. The fact ought not to be overlooked, that the vital manifestations of the stomach, liver, and brain, although different, are yet actuated by the same system of nerves — the ganglial; and that, notwithstanding the individual parts of this system seem to perform modified offices, yet the healthy condition of the one is necessary to the perfect functions of the rest: and, consequently, a morbid state of one considerable portion of the series will necessarily, sooner or later, be followed by derangement throughout, — causes which operate upon one part of the circle, thus having their effects extended to other parts remote from the seat of primary impression. It should not, however, be overlooked, that a large number of instances of gastric affection, retching, &c. accompanying the apoplectic seizure, proceeds from the sympathetic effect produced upon the stomach by the severe injury or shock sustained by the brain.

99. The occurrence of apoplexy either after, or during attacks of *colica pictonum*, has been noticed by HAGENDORN and CHEYNE. Although palsy is the common consequence and state of complication, yet apoplexy, with or without paralysis, particularly the former, is sometimes met with. An instance occurred to me some time since of a patient having died of apoplexy during an attack of this disease. The *constipated* state of the bowels to which persons affected with cerebral disease are liable, when neglected, or not readily yielding to medicine, will sometimes favour the occurrence of the apoplectic attack.

100. The association of apoplexy with *disease of the kidneys* has been noticed by several writers, particularly BONET, LITTRE, MORGAGNI, and BRIGHT. The occurrence of apoplexy, particularly serous apoplexy, after suppression of urine, is not uncommon. By some writers, however, the suppression has been imputed to pre-existing disease of the brain. But this is a supposition merely: for, in the great majority of cases, the kidneys and ureters offer evidence of having been the parts primarily affected. The experience of BONET and MORGAGNI, and of numerous later writers, fully support this conclusion. Besides, the cerebral nervous system can only indirectly influence the urinary secretion. That apoplexy, coma, or lethargy, should occur when the urinary secretion is suppressed, and the vascular system overloaded, may be readily imagined. The occurrence of the disease, as a consequence of organic change in the secreting structure of the kidneys, whereby their functions are more or less ob-

structed, has been illustrated by the cases recorded by Dr. BRIGHT.

101. The sudden or more gradual supervention of apoplexy after the slow developement of many of the organic changes which are described in the article on the Pathology of the BRAIN, — in some cases even when little cerebral disorder had previously been complained of; in others when more violent and even paralytic symptoms had occurred, has already been noticed (§ 45—48.), and has also received due attention in the article on PALSY.

102. THE PATHOLOGICAL STATES CONSTITUTING APOPLEXY have been in part comprised in the observations offered on the principal kinds of apoplectic seizure, and on the *modus operandi* of the remote causes (§ 88.). There can be no doubt that much misapprehension has existed on this subject, and consequently that the treatment adopted has been frequently either nugatory or injurious. The opinion, that the disease depends upon compression solely, has been too generally adopted, without considering the relation in which such compression, granting its existence, stands in to the causes which occasioned it, and the symptoms it produces. The idea that compression is indispensable to the existence of the disease has thus been empirically assumed, and acted upon in practice. A careful consideration, however, of the morbid appearances on dissection, in relation to the symptoms, and to analogous changes and their phenomena, have led me to infer that compression of the brain never can take place; that *pressure* exists in the great majority of cases, but even that it is not indispensable to the apoplectic state; and that, although *retarded* circulation, whether caused by pressure or by any other state, seems very frequently to obtain, it does not constitute the only morbid condition of the brain in apoplexy, — or, in other words, that apoplexy is not merely a disease of the vessels of the brain, although these vessels are either consecutively or coetaneously affected. It should not, however, be overlooked, that even those who argue for compression being the cause, do not thereby imply, as their opponents would make it appear, that the tissue of the brain is actually compressible, but contend for the effects which pressure undoubtedly produces upon living and sensible parts. Therefore, although the brain is not compressible, it does not follow that it may not be affected by *pressure*, even independently of the obvious effects which pressure must produce on its vessels and the circulation through them.

103. Before entering further on this subject, it will be necessary to premise, that the circulation of the brain, like that of other important organs, is chiefly under the dominion of that portion of the ganglial system of nerves which is ramified on its blood-vessels, and is distributed otherwise to the organ itself; and that an exhausted or morbidly depressed state of the influence those nerves exert on the circulation and manifestations of the brain, with the consequent effect this state has upon the capillaries, particularly in dilating or congesting them, and disposing to their rupture, is the principal cause of, and often constitutes, the apoplectic seizure, — whether this influence emanate from their chief centres, or from the local sources provided for the peculiar offices of the organ, as the pineal and pituitary glands.

104. From this it may be inferred, that the proximate cause of a large proportion of the cases of apoplexy, not omitting even those which are attended with retarded circulation and hæmorrhage, is here imputed primarily to the condition of that part of the ganglial system which supplies the blood-vessels of the brain and the brain itself. That this actually is the case, is shown by the nature and mode of operation of the remote causes of the disease; by the frequent affection of the functions of the brain previous to an attack; by the nature of the principal part of the phenomena accompanying the attack; by the disorders observed subsequently, when partial recovery takes place; by the tendency to relapse; and by the morbid appearances which present themselves on the dissection of fatal cases.

105. It is obvious, that the appearances in these cases are merely ultimate lesions, as in all fatal cases of *organic disease*, and some of them even post mortem changes; and yet, although the most advanced in the procession of morbid phenomena, they are often of themselves obviously insufficient to occasion death. Leaving out of question those cases which are unattended with extravasation, the venous congestions, even admitting their existence, or the serous effusion, formed in the other cases, are seldom such as to account of themselves for the event: inasmuch as they are frequently observed to an equal, or even greater, extent in cases where neither apoplectic nor comatose symptoms had preceded death; and are, as I have already shown (§ 88.), the result of the accumulation in the veins, after death, of the blood which had distended the arterial capillaries during life, and thus had been instrumental in abolishing the cerebral functions.

106. The circumstance of the morbid changes being insufficient to account for the result, had induced various writers, particularly KORTUM, ZULIANI, SCHELLER, SCHÆFFER, and HUFELAND, to consider apoplexy frequently to proceed from the state of the nervous power, which they considered defective; and led WEICKARD to contend that it seldom depends upon compression. Dr. ABERCROMBIE, evidently influenced by the above considerations, refers the disease to *interrupted* circulation in the vessels of the brain, owing to pressure from the effused blood, or to other causes. It is extremely probable that a *retarded*, if not an interrupted, state of the circulation very generally obtains; and that, partly in consequence, the sensific and motific powers are not generated. This, however, is only a matter of inference; for we have no evidence that complete interruption of the circulation of an organ or part can exist for any time, and its functions be so rapidly restored, as is sometimes observed in apoplectic seizures, or without gangrenous disorganisation being sometimes the result; and even if we admit this state of the circulation, we must still refer it to some antecedent and more general morbid condition.

107. That a congested state of the vessels and retarded circulation of the brain should, however, exist, owing to the diminished, or exhausted, or suppressed state of that influence which undoubtedly actuates the vessels, may readily be conceded; but that, even in the brain, the effusion of a small portion of blood should occasion pressure sufficient to *interrupt* the circulation through it, requires

further proof. It seems more probable, and consonant with facts observed in other parts of the body, that, in cases where the extent of effusion or external injury warrant the admission of pressure, this state gives rise to the apoplectic seizure, as much from the effects it produces upon the ganglial apparatus of the encephalon as from *interrupted* circulation through its vessels.

108. THE PATHOLOGICAL CONDITION OF THE BRAIN, therefore, in apoplexies, may be stated to be *as follows*: — *a*. That the tissue of the brain is not sensibly *compressible*; but, being lodged in an unyielding case, it may be injuriously affected by *pressure*, chiefly by displacing the contents of its blood vessels, altering the healthy relative proportion of their contents in each of the series of vessels, and impeding the circulation through a part or the whole of the organ: and that pressure exerted in one part, whether from distended vessels, extravasated blood, or the developement of tumours, when reaching a certain pitch, will almost equally affect the whole of the organ, particularly when the pressure is great: the yielding nature of the cerebral structure, as well as the unyielding case in which it is placed, must necessarily give rise to this result.

109. *b*. The various states of vascular impulse and action, impeded circulation in the veins and sinuses of the brain, and distension of its capillaries, whether arising from the influence of the organic nerves on the blood vessels, or from morbidly increased action, or from obstruction in the large veins, the lungs, or the right side of the heart, will, either individually or in partial conjunction, occasion the above effects, owing chiefly to the unyielding walls of the encephalon.

110. *c*. Owing also to this physical condition of the brain, the pressure of the atmosphere, which influences the venous circulation of all other parts of the body, cannot modify, in a direct or sensible manner, that of the brain: and hence the cranial cavity must always contain nearly the same quantity of blood during life, the differences which occur being chiefly those of rapidity of circulation, and of relative proportion in each part of the series of vessels; an increased quantity in the capillaries thus causing a proportionate diminution in the veins. Owing likewise to this condition, the forcible injection and distension of one set of vessels will necessarily diminish the capacity of, and obstruct the circulation through, the other; and that part of the series which is nearest to the propelling power — the first to receive the impulse of the heart, and the nearest capable of being much distended by it — will, from relative situation, overcome the distension, and diminish the capacity of that beyond it. Thus the arterial capillaries of the brain will be the first distended from increased action of the heart and large arteries, and, by their distension, will soon overcome that of the veins, if it have previously existed; and hence, by compressing them, impede the circulation through them.

111. The frequent *inflammatory character* of apoplexy, or the common occurrence of *reaction*, will be readily accounted for from what has now been stated; for, whether the attack commences with dilatation or increased action of the arterial capillaries, or with exhaustion or deficiency of their vital power, or with retardation of the circulation through the veins and venous capillaries, the result will generally be augmented action of the arteries going to the brain, extending itself in some measure to the heart, and this state will continue until the abolition of the cerebral functions shall have impaired, or altogether destroyed, the heart's action.

112. *d*. Upon tracing the relation subsisting between the various causes of the disease, the symptoms, and the appearances on dissection — upon remarking, as far as my own observation has gone, the frequency of change in the pineal and pituitary glands of apoplectic patients, I am induced to infer that functional lesion, or organic change, often commences in that portion of the ganglial system which supplies the encephalon and its blood vessels; and that, owing to exhaustion of its influence, the capillaries lose their vital tone, have their circulating functions impaired, become more or less dilated, and are disposed to rupture.

113. *e*. When apoplexy proceeds from causes of an obviously *exciting nature*, or from *sur-action* of the heart and arteries, it seldom occurs until a certain degree of exhaustion of the vital tone of the capillaries has taken place, whereby they become dilated and congested, so as either to press the encephalon against its unyielding case, and, owing to the pressure, impede the return of blood by the veins (§ 109, 110.), or to give rise to extravasation, which, when considerable, has a similar effect; injection of the arteries of the brain and its membranes resulting equally from both, owing to the obstructed circulation through the veins.

114. *f*. Where pressure unequivocally exists, it may also benumb or suppress the vital influence of that part of the ganglial system which supplies the encephalon, thereby heightening the effect produced both on the organ itself and on its circulation.

115. *g*. There are cases of apoplexy generally presenting the phenomena, which have given rise to the appellation of *weak apoplexy*, which, occurring from *depressing causes*, operating upon exhausted states of the encephalon and frame generally, directly suppress or abolish the vital influence of the organic or ganglial nerves of the brain, and consequently the cerebral functions, without producing further change of its vascular system, than retarded circulation to so slight a degree, as not to amount to great distension and compression, and without occasioning extravasation of blood, although extravasation often does supervene to this state, giving rise to pressure and its consequences, so as to heighten or prolong the primary lesion, and to occasion paralysis.

116. *h*. In cases proceeding from *depressing causes*, acting on a plethoric habit of body, the effect is also more or less directly produced on the organic nerves of the brain, whereby the capillaries lose their tone, are congested and dilated, or ultimately ruptured, and the return of blood by the veins retarded, whilst the smaller arteries and capillaries are more and more engorged by the impetus of the blood in the large arteries, the pressure thereby occasioned suppressing the cerebral functions as in the other cases.

117. *i*. When the disease proceeds primarily from *impeded return* of the blood from the head, the congestion only commences in the veins; but, as the action of the heart and arteries con-

tinues, the capillaries are soon afterwards injected and dilated; and, in proportion as they enlarge from the distending power to which they are more immediately subject, the veins are compressed, owing to the physical condition of the brain, more or less emptied, and admit of the greater dilatation of the capillaries, some one or more of which may be even ruptured from the increased action and distension.

118. *k.* In cases accompanied with *hæmorrhage*, and consequent laceration of the cerebral structure, the deprivation of function may be as much an effect of suppression of the vital influence of the organ, owing to the shock produced by the injury, as of pressure upon the veins, and consequent injection of the arterial capillaries. In cases of this description, the state described above (§ 112. *d.*) may exist, and be followed by hæmorrhage and laceration of the part in which it occurs, producing the abolition of the cerebral function, great vital depression, sickness, and other signs of dangerous injury sustained by a vital organ. The pressure occasioned by the hæmorrhage will be followed by obstructed circulation, and, under favourable circumstances, by increased action of the arteries and heart to overcome it.

119. *l.* In apoplexy presenting on dissection *congestion* and serous effusion, these states may be often considered rather in the light of *post mortem* changes than the pathological states which had existed previously to death: it may even be presumed that the distension and congestion of the capillaries, chiefly the arterial capillaries of the organ, had overpowered its functions; and that, as in other parts, when the injection of the blood into them no longer is continued, and the distending cause has ceased to exist, they have gradually discharged their contents into the veins, which now had space given them for dilatation, owing to the emptying of the capillaries; and thus the blood has passed into the veins soon after death.

120. *m.* Hæmorrhage in the brain may result from the following states:—*α.* Exhausted vital energy of the ganglial organic nerves supplying the vessels and organ favouring their distension and rupture: *β.* Diseased state of the coats of the vessels themselves: *γ.* Organic change of the cerebral structure, extending to, or influencing the state of, the vessels ramified in it: *δ.* Increased impetus of blood from augmented action of the heart and larger arteries, combined with either of the other states: *ε.* Impeded return of the blood from the head, similarly associated.

121. *n.* The vital energy of the organ, resulting chiefly from the mutual influence of the ganglial and vascular systems, may be so far affected as to occasion the attack with all the organic changes observed in fatal cases; and sometimes in such a manner as to constitute the disease, even without these changes having taken place; although they are most frequently produced, thereby heightening the primary lesion.

122. *o.* As corollaries from the foregoing, I infer that apoplexy often originates in exhausted or suppressed influence of the ganglial apparatus of the encephalon, with a congested state of its arterial capillaries, or impaired condition of their circulating functions, and still more frequently in extravasation of blood, either or all of which changes must necessarily exist to the extent of suppressing the functions of the organ; and that, as apoplexy does not uniformly depend upon the same pathological state of the nervous influence and circulation of the brain, particularly in respect of the kind or degree of vital depression and vascular reaction, a due regard ought therefore to be had to the nature of the change in each case, as far as it may be ascertained, and a treatment strictly appropriated to it adopted.

123. Treatment.—The treatment of apoplexy has long furnished subjects for discussion, not only as respects the more subordinate means of cure, but also as regards the most energetic measures, and the intentions with which they should be employed. This is evidently owing to the difference which has been long acknowledged to exist in the pathological states constituting the disease, but which has recently been questioned. Without recurring to the changes so fully described above, I may remark, that a person is seized with apoplexy, and, instead of being blooded, is treated with stimulants and restoratives, and yet he recovers without paralysis having supervened. Another person is blooded largely, and he recovers. A third is treated in a similar manner, and he becomes hemiplegic in the course of the attack; and a fourth is also blooded, and he dies. Now these are very common occurrences, and point to very important considerations, which I will pursue a little further. A thin, spare, and debilitated man staggers as he walks, and falls down in the street, with pale countenance, feeble pulse, and laborious or slightly stertorous breathing. He is blooded by the nearest medical man almost immediately, and recovers. A large man, of a full habit and lax fibre, suddenly becomes apoplectic, and is instantly treated with stimulants, and volatile substances held to the nostrils, and his consciousness and voluntary motion are restored in a few minutes. One practitioner of large experience states, that he never draws blood from a patient in apoplexy, excepting under peculiar circumstances, and avers that he is more successful in his treatment than those who do. Another considers that when one full blood-letting fails of giving relief, no benefit will be derived from pushing it further, but much risk of giving rise to paralysis. A third physician, equally eminent and experienced, confides in blood-letting almost solely, and carries it often to a great amount; and a fourth, whilst he discards depletion, trusts to stimulants chiefly.

124. But if we examine into their success, we shall find, perhaps, that some difference as to degree may exist; and that, whilst many patients seem benefited, others experience no relief, if they be not even actually injured, by the kind of practice thus exclusively adopted. There is, however, one part of the treatment which is more or less adopted by all: this is the use of purgatives; which, when judiciously administered, are the most generally applicable and beneficial of all the means usually advised. Were it possible to ascertain during life the exact pathological condition obtaining in the various cases of apoplexy, and to convey a correct description of the signs by which each may be known, then the basis for a rational method of cure could be firmly laid: but the skilful practitioner is guided in the treatment he adopts by considerations, circumstances, and appearances, which scarcely admit of de-

scription; and all attempts to impart his knowledge comes far short of his wishes.

125. The method of cure in apoplexy necessarily divides itself into: — 1st, That which is required when an attack is threatened, in order to prevent it, — or the prophylactic treatment; 2d, The means which are to be adopted when the disease is developed; and, 3d, The plan which should be subsequently pursued, with the view of perfecting recovery, and preventing a return of the disease, — or the consecutive treatment.

126. *A.* The Treatment which may be employed to prevent an Attack when it is threatened. — It is difficult to state the means which may be resorted to with this view, as they ought to be directed with strict reference to the circumstances of the case; which are almost always different, and, not infrequently, even opposite. A strict regard must necessarily be had to the habits, age, and constitution of the patient; the predisposing and exciting causes; and the evidences of previous ailment or existing disorder in remote but related organs. The character of the countenance; the pulse, particularly in the carotids; the temperature of the head; the state of the abdominal functions, secretions, and discharges, must be our chief guides. It should not be overlooked in this stage, any more than when the disease is fully formed, that it may result from nearly opposite states of the vascular action of the brain, and of the circulating system generally; that, although the majority of cases are attended with that appearance of countenance, and action of the arteries, which warrant the inference of existing congestion, retarded circulation, or even increased vascular action in the brain, — there are others, in which the external characters of the head, the face, and action of the carotids, would lead us to infer, either that the vital energy of the organ is so far depressed as to give rise of itself to abolition of the cerebral functions, or that the extravasation of blood and laceration of the structure of the organ has occasioned such a shock to its vitality as to be followed by the same effect on its functions; vascular reaction sometimes supervening in either case, and thus imparting to the attack similar characters to those possessed by seizures which originate in, or are, from their commencement, attended with, vascular turgescence or increased action.

127. In the premonitory state of the disease, it scarcely can be admitted that extravasation or its consequences has occurred, unless in those cases preceded by paralysis; but the signs of incipient congestion, or increased action, are frequently present; whilst also, in many other cases, the symptoms of exhausted or depressed vital power are manifest; this latter state being more frequently antecedent to congestion of the capillaries than is generally supposed, although the fully formed disease may evince inordinate action, with all its usual consequences. Even in the early stage of an attack, this state of the vital power of the organ will often constitute so important a part of the disease, and will yet be attended only by simple congestion and retardation of the circulation, that the use of stimulants may then be beneficially resorted to; whilst soon afterwards, when reaction has supervened, they would no longer be admissible, large depletions, &c. being then required.

128. We should, therefore, endeavour to interpret correctly the origin of the premonitory symptoms, and prescribe accordingly. If the countenance is full or flushed, the eyes prominent or suffused, the pulse of the carotids full or strong; or even if, with this state of the countenance, they are natural; *blood-letting*, general or local, but preferably cupping on the nape of the neck, should be prescribed. If these symptoms have come on after the disappearance of hæmorrhages and discharges, this treatment is still more imperatively required, and should be directed to the restoration of the pre-existing disorder, assisted by other means, such as irritating purgatives, *revulsants*, and external derivatives.

129. When, on the other hand, the action of the carotids is weaker than natural, the countenance sunk, and the head cool, &c., opposite measures are called for: *restoratives*, antispasmodics, and stimulants are here of service, but their use requires caution; for if the pulse in the carotids is full, or strong, or at all above the natural standard, although the countenance be sunk or pale, and if the attack threatens to commence with paralysis, stimulants given internally, or even the outward use of them, as volatile substances held to the nostrils, would be hurtful. In such cases, blood-letting must be resorted to; and a *purgative* of quick operation, assisted by enemata, exhibited.

130. There are few cases, presenting even the premonitory signs of an attack, that will not be benefited by a judicious use of *purgatives*, particularly such as are suited to existing disorder of the digestive and biliary organs. In those cases which evince a disposition to vascular excitement of the brain, — where the premonitory signs are accompanied with plethora, heat of the head, injection of the conjunctiva, and flushed countenance, — after depletions and purgatives have been resorted to, the tartrate of antimony, or *James's powder*, given in moderate doses, and combined with saline medicines, so as to act gently upon the skin or the bowels, and continued for some time, has always appeared to me productive of advantage: but it is only in such cases that antimony is useful as a prophylactic; where, also, *digitalis* may be given with the view of lowering the action; but its use in these cases requires great caution.

131. When the incipient symptoms present much of the character of vital exhaustion of the brain, the combination of purgatives with gentle *stimuli* and *vegetable tonics* and stomachics has proved the most successful in my practice. If the symptoms appear after the suppression of hæmorrhoids, *aloetic* cathartics, or the extract of *colocynth*, combined with *calomel*, are amongst the best that can be employed; as they tend to induce, by their action on the rectum, a return of the hæmorrhoidal affection.

132. In threatened apoplexy from congestion and impeded circulation through the lungs, heart, or liver, local blood-lettings and purgatives are necessary. In cases characterised by a combination of either of these states with exhaustion or debility, the abstraction of a small quantity of blood by cupping, and afterwards dry-cupping, issues, or blisters, are sometimes very serviceable.

133. The insertion of setons or issues in the

nape of the neck, or the use of the tartar emetic ointment; and, in very urgent cases, large issues in the scalp of the occiput, particularly when the precursory symptoms evince a paralytic character; cold-sponging the head night and morning, or the shower-bath, with a free state of the alvine secretions and excretions, especially where there is a disposition to congestion, or increased action in the brain, and after blood-letting has been employed; stimulating or irritating pediluvia, or a blister applied to the nape of the neck, and kept open for some time, in similar cases and preceded by the same measures, constitute important items of the preservative treatment.

134. The patient ought carefully to avoid all the predisposing and exciting causes of the disease (§ 77—87.), particularly crowded apartments, the application of cold to the feet, and violent mental emotions. He ought to sleep with his head and shoulders somewhat elevated; and rise early in the morning. The *diet* should receive particular attention: it ought to be spare in all cases accompanied with plethora; but not too low, when this state of the vascular system does not exist, and when the vital energies of the brain are already depressed or exhausted. It should, in these latter, be of moderate quantity, and digestible. In all cases, tranquillity of mind and body ought to be carefully preserved; and stimulating beverages avoided, with very few exceptions, which are to be made in favour of those only who present great cerebral and constitutional exhaustion. The beverages for these should be gently strengthening, but not heating, and used in moderation.

135. *B.* THE TREATMENT OF THE APOPLECTIC ATTACK. — The patient should be carried into a well-ventilated and spacious apartment, and placed with his head and shoulders very considerably raised, or in a sitting or semi-recumbent posture, with every thing removed from his neck. Directions should also be given to have hot water in readiness. His countenance, state of the eyes and pupils, the degree of fulness, flushing, or pallor of his face, the temperature of his head, state of the pulse in the carotids, and condition of his limbs in respect of sensibility, capability of motion upon their being pinched, &c. ought to be carefully examined; and, according to the evidence thus obtained as to the state of internal lesion, the propriety of depletion, and the extent to which it is to be carried, should be promptly decided on.

136. *a. Treatment of apoplexy unattended by depression of vascular action, or by marked exhaustion of vital power.* — If the pulse be strong, or full, and especially if the countenance be flushed, livid, and tumid, *general blood-letting* to a large extent, or according to its effect, is to be instantly employed. Much discussion has taken place as to the propriety of opening a vein of the paralysed or non-paralysed side, when paralysis accompanies the attack. ARETÆUS, VALSALVA, MORGAGNI, and CULLEN advise it to be performed in the sound side, whilst BAGLIVI prefers the other: this is, however, a matter of little importance.

137. The next points are the *extent* to which blood-letting may be carried, and how far certain states of the frame and pulse warrant the practice. In robust, plethoric, and full-living persons, particularly when the attack has proceeded from exciting causes, and paralysis is not present, thirty or forty ounces may be abstracted at once; and the operation may be performed a second or even third time to a somewhat less extent. When, however, the habit of body is spare, the person far advanced in life, the pulse not full or strong, or little fuller than natural, the heat of the head not increased, and the countenance neither full nor flushed, we must be cautious not to carry it too far. In cases of this kind, *local depletions*, particularly *cupping* between the shoulders, or on the occiput, and leeches to the neck and behind the ears, seem preferable. *Age* is no reason against venesection, if the symptoms indicate its propriety; but very old age, even when the operation is otherwise indicated, is a strong reason for great caution in its performance. In aged persons, local depletions are more serviceable; but even these, employed either indiscriminately or too largely, may occasion a very dangerous, or even fatal, collapse.

138. An *intermitting* or *irregular* pulse has very justly led practitioners to hesitate as to the employment of blood-letting. But a single symptom is not to guide us in the use of this, or any other remedy. If, conjoined to either of these states, there be slowness or fulness of pulse, stertorous or strong breathing, constitutional vigour and fulness of habit, tumid, flushed, or livid countenance, blood-letting, even to a very considerable extent — either general or local, or both — may be practised; but when, with irregularity and intermission, the pulse is also small, weak, or quick, the countenance pale, the temperature of the head either not increased, or somewhat depressed, and the respiration weak rather than strong, blood-letting would be highly injurious: a very opposite treatment is then called for.

139. In cases where it is a matter of doubt whether or not general blood-letting should be carried further, or be adopted at all, *local blood-letting*, to an extent which circumstances will point out, may generally be still employed, and often with great advantage. Vascular depletion being indicated in one form or other, the *situation* in which it should be performed next remains to be considered. The temporal artery has been recommended to be opened by some: others advise the jugular vein. When the disease arises from congestion, and when the face is livid, the attack strong, and the operator expert, the jugular vein may be opened, as sanctioned by VALSALVA, MORGAGNI, HIESTER, FRIEND, LANCISI, STOLL, BURSERI, and PORTAL. But undue pressure of the vein, either before or after the operation, must be avoided. Bleeding from the feet, they being plunged in warm water, has been very generally prescribed by Continental physicians; and, in those cases which have occurred after the disappearance or retention of hæmorrhages and periodical discharges, or from metastasis, the practice is very judicious.

140. *Local depletions* in this disease are usually directed on the temples, nape of the neck, or between the shoulders. I prefer the latter situation, as well as cupping, to the use of leeches, — the former being much quicker and more decided in its operation. HIPPOCRATES, ARETÆUS, and MORGAGNI advised cupping to be performed on the occiput: and I unequivocally agree in the

practice. If leeches are applied, the neck, occiput, and behind the ears, are the best situations. LANCISI and CRUVEILHIER advise them to the inside of the nostrils, after general blood-letting, particularly in apoplexy preceded by epistaxis; and WALTHER (*De Apop.*, p. 88.), to the veins near the canthus of the eye. In cases of suppressed hæmorrhoids or menses, the application of leeches to the anus, the anterior part of the insides of the thighs, particularly after blood-letting from the feet, certainly is frequently productive of advantage, even although it very often fails of restoring the suppressed evacuation.

141. Some physicians rely almost entirely on blood-letting, whilst others too frequently discard it. Others more rationally view it as a most important, and a frequently, but not an universally required remedy. It is by not attending to the pathological states, which I have endeavoured to point out (§ 108—122.)., and to the changes of vascular action which take place during the attack, that such difference of opinion exists, and the indiscriminating practitioner is led to the injurious adoption of one mode of practice only. Among those who prescribe blood-letting almost unreservedly, and to a great extent, I may adduce the respected authorities of CULLEN, CHEYNE, PITCAIRN, COOKE, and ABERCROMBIE; whilst the injurious effects of the practice in many cases, and its applicability to certain states of the disease only, have been ably argued for by KIRKLAND, FOTHERGILL, HEBERDEN, BARBETTE, and DARWIN. There can, however, be no doubt of the propriety of having recourse to vascular depletion in the states of apoplexy now under consideration, — the general character of the symptoms, circumstances of the case, and the effects produced by the first bleedings, being our chief guides as to the extent to which it should be practised. But in the forms of apoplexy characterised by marked deficiency of vital power and action, or sometimes at the commencement of the seizure, when the symptoms, owing to the severe shock sustained by the brain, very closely resemble those of concussion, and before the powers of life recover themselves, and react (§111.), blood-letting would generally be attended either with fatal sinking, or with effusion, giving rise to hemiplegia where effusion had, as yet, not taken place, and with a fatal increase of it, in some where it had already existed.

142. Next to blood-letting, *active purgatives* are most deserving of notice, as being very generally applicable and beneficial. In many of the most severe and sudden attacks it is often difficult, and sometimes impossible, to administer purgatives in the usual form by the mouth. But we may always succeed by mixing from 10 to15 grains of calomel in sweet butter, and placing it upon the root of the tongue. In some cases, two or three grains of powdered camboge may be added to it.

143. Whilst we are waiting the operation of the purgative, it will frequently be advisable, particularly when there is much heat of head, and action of the carotids, to plunge the feet and legs in warm water, and apply *cold to the head*, either in the form of *affusion* of cold water, or of epithem. Great care is necessary not to continue affusion too long, nor to depress the temperature too low, as the risk of inducing hemiplegia will be increased by the practice, particularly when vascular action is not considerable. After the affusion has depressed the temperature to about the natural standard, cold lotions or epithems, or even frequent cold-sponging, will be sufficient; but increased heat generally returns, and then the affusion should be again resorted to. In general, as soon as the temperature of the head becomes natural, and continues so for some time, and the fulness of the features entirely subsides, cold applications may be omitted. As thus used, they have received the sanction of THILENIUS, CRELL, WEICKARD, CARRETTE, WEBER, and ABERCROMBIE; but QUARIN very judiciously cautions against the indiscriminate and too long continued use of them. CRUVEILHIER, and other French physicians, advise the application of *ice* for an hour or two, twice or thrice a day, to the head; but, excepting in the more inflammatory states of the disease, it is not required, and may even be attended with risk.

144. If the purgative already exhibited does not operate in about four hours, one or two drops of *croton oil* should be placed upon the tongue, mixed with a few drops of castor oil, or in a little sweet butter, as advised above; and, about an hour afterwards, the action on the bowels ought to be promoted by the following enema: —

No. 20. ℞ Olei Ricini, Ol. Terebinth., āā ℥j. — ℥jss.; Decoct. Avenæ, ℥xij. M. Fiat Enema.

This will generally succeed; but if it come away without feculent or copious evacuations, it should be repeated in from one to six hours, according to the extent of its effect. In obstinate cases, one part of croton oil added to about eight or ten of castor oil may be assiduously rubbed over the abdomen. This, however, will seldom be requisite, as a repetition of the enema will rarely fail, and will act more beneficially on the disease than the introduction of so irritating a substance as croton oil into the circulation. In some cases it may be advisable to render the enemata more irritating by the addition of compound extract of colocynth. Irritating injections are enjoined by ARETÆUS, FORESTUS, and many modern authors, particularly THILENIUS. In cases following hæmorrhoids, they are more especially indicated, after leeches have been applied to the vicinity of the anus.

145. After the bowels have been fully evacuated, we must still endeavour to excite the alvine secretions, particularly those of the liver. The region of the liver and epigastrium should be examined: and, if there be fulness there, cupping may be performed in this situation. The calomel may be repeated in smaller doses, oftener than once, and combined with some *preparation of antimony*, or James's powder. In all cases where the apoplectic seizure is attended with increased vascular action, antimony may be given; but sickness or retching should be guarded against. It will be frequently observed that a repetition of the calomel, particularly after full depletions, will be soon followed by a flabby state of the tongue, indicating its incipient action on the mouth, and the propriety of omitting it, and of continuing the purgatives. It is frequently not till now, particularly where the apoplectic seizure has been preceded by much torpor of the liver, and accumulations of viscid bile in the gall-bladder and hepatic ducts, that the purgatives succeed in bringing away, dark, greenish black, of-

fensive motions, the discharge of which is generally followed, in robust subjects, by rapid amendment.

146. When the disease is attended with *hemiplegia*, or when the paralysis appears in the course of the attack, we may generally presume that extravasation has taken place. In these cases very large or repeated depletions will not much accelerate the removal of the effusion; this is a work of time. The object rather is to arrest the hæmorrhage by the operation; but even this will not be so readily accomplished, owing to the physical condition of the organ. Indeed, if the depletion be carried beyond a certain extent, in relation to the peculiarities of the case, the risk of renewing the hæmorrhage will even be increased; for, as we cannot, as already stated, materially diminish the quantity of blood in the brain, we only accelerate its circulation by large depletions, and thereby risk an increase of the mischief. On this account, therefore, the intentions with which blood-letting is to be employed, are, 1st, to arrest the hæmorrhage, and 2d, to diminish or keep down the action of the heart and arteries: but, although essentially requisite in the majority of cases, full blood-letting will be of itself insufficient to accomplish these purposes; and we have therefore to bring to its aid the application of cold to the head, active purgatives, derivatives, and a judicious combination of antimonials and cooling saline medicines, which ought always to be exhibited at short intervals, and continued for some time during convalescence; two or three grains of blue pill being also taken at bed-time, and an aperient draught the following morning. Any of the following saline medicines may be employed when we wish to lower the action of the heart or arteries of the brain: —

No. 21. ℞ Vini Antimonii Tart. ♏ xvj. — ʒ ss.; Liq. Ammon. Acet. ʒ ijss.; Potassæ Nitratis gr. v.—x.; Aquæ Puræ ʒ x.; Syrup. Croci ʒ ss. M. Fiat Haustus, tertiâ vel quartâ quâque horâ sumendus.

No. 22. ℞ Potassæ Sub-carbon. ʒ j.; Succi Limon. recent. ℥ jss. vel q. s.; Aq. Fœniculi ℥ iij.; Vini Antimonii Tart. ʒ ij.—ʒ iij.; Syrup. Tolutan. ʒ ij. M. Fiat Mist. cujus sumantur cochlearia duo larga secundâ vel tertiâ quâque horâ.

No. 23. ℞ Potassæ Nitratis gr. x.; Aq. Cinnamomi ℥ j.; Liq. Ammon. Acet. ʒ ijss.; Spirit. Æther. Nit. ʒ ss.; Syrup. Limonis ʒ ss. M. Fiat Haustus, tertiis horis capiendus.

147. When the measures stated above leave considerable exhaustion, and particularly if accompanied with sopor, weak action of the carotids, a cool state of the head, and unperspirable surface, it will generally be necessary to venture upon the use of very gently restorative and diaphoretic medicines. These ought, however, to be cautiously commenced with; and, when we have reason to infer that the attack has proceeded from extravasation, which is most frequently the case, we should carefully watch their effect, or delay them until after the twelfth or fourteenth day from the seizure. Inflammatory action in the surrounding portion of brain, consequent upon the extravasation, usually supervenes from the fifth to the fourteenth day. During this time, therefore, perfect quietude of body, stillness, and silence, and disengagement of the senses and mental faculties, should be enjoined, and febrifuge medicines prescribed, in order to suppress local action, and the consequent fever which often manifests itself at this period. The patient should be either kept in bed, or on a couch, with his head and shoulders well elevated; and visiters ought not to be admitted to him. The eighth day is generally the most dangerous, as respects either a renewal of the hæmorrhage, in the immediate vicinity or surface of the parietes of the hæmorrhagic cavity, or in a different part of the brain, or the occurrence of serous effusion between the membranes or in the ventricles. During the first days, therefore, of the attack, we should only venture on the more gentle febrifuge diaphoretics; and after the second or third week, somewhat more restorative means may be employed, if the state of the vital energies requires them. The following may be resorted to in the order in which they are placed: —

No. 24. ℞ Potassæ Nitratis gr. v.—vij.; Mist. Camphoræ, Aq. Fœniculi, āā ʒ ivss.; Liq. Ammon. Acet. ʒ ij.—ʒ iij.; Spirit. Æther. Nit. ʒ ss.; Syrup. Limonis ʒ ss. M. Fiat Haustus, quartâ quâque horâ sumendus.

No. 25. R Vini Antimonii ♏ xii.—xx.; Mist. Camphoræ ʒ iij.; Aq. Cinnamomi ℥ ss.; Liq. Ammon. Acet. ʒ iij.; Syrup. Aurantii ʒ j. M. Fiat Haustus, quartâ vel quintâ quâque horâ capiendus.

No. 26. ℞ Mist. Camphoræ ℥ j.; Liq. Ammon. Acet. ʒ ijss.; Spirit. Ammon. Arom. ♏ xx.—ʒ ss.; Syrup. Tolutan. ʒ j. M. Fiat Haustus.

No. 27. ℞ Infus. Calumbæ (vel. Infus. Valerianæ), Mist. Camphoræ, āā ʒ v.; Sodæ Sub-carbon. gr. x.; Spirit. Æther. Sulphur. Comp. ʒ j. M. Fiat Haustus, bis terve in die sumendus.

Before I proceed further, in noticing the other remedies which may be resorted to, or have been recommended, I will state the means which are most appropriate to the weaker states of the disease, and when the system is greatly depressed by the shock of the local lesion, or before increased action has taken place.

148. *b. Treatment of the depressed states of apoplectic seizures.* — It will be apparent from the particular details I have given of the symptoms, causes, and pathological states of the disease — 1st, That much depression or exhaustion of the vital powers of the brain exists in some cases throughout the attack, even rapidly terminating in death without any effort at vascular reaction, particularly when this state is mistaken, and treated by depressing remedies; and, 2d, That this depression is often analogous to concussion of the brain, owing to the extent of the local lesion; and, like this result of external injury, is frequently followed by reaction of the heart and arteries (§111—118.), when the lesion constituting the seizure is not so great as to overwhelm the powers of life.

149. It is owing, in my opinion, either to the employment of too large blood-lettings in such cases, to the having recourse to them at all in others, or to practising them without sufficient regard to this period of the seizure, and before the occurrence of reaction, — the time when they are imperatively called for, — has supervened, that the practice has disappointed many who have adopted it, and led others to employ an opposite mode of treatment in an equally exclusive, and hence dangerous, manner. The judicious use of *gentle stimuli* during this state of depression will have the effect in some cases of bringing about a moderate reaction, when death would be the result of other means; and, by diminishing and shortening the stage of depression in others, and thereby lessening the congestion of the capillaries of the brain, that inordinate degree of arterial action consequent upon the obstruction, and indirectly produced by it, will be prevented. In some more doubtful cases, as when the pallor of the countenance is connected with a natural, or

not very depressed state of the pulse, and temperature of the head, and when there are vomiting and other symptoms, indicating that hæmorrhage and laceration of a portion of the cerebral structure have occurred, blood-letting may be advantageously conjoined with cordial remedies, calculated to restore the tonic contractility of the vessels of the brain.

150. It will appear from what has been stated, that those who deny the efficacy of blood-letting are in some respects justified by the frequent deficient vital energy of the brain, and by the injurious effects of the remedy in some cases, whilst they err in a too general recommendation of opposite means. Both parties, however, place great dependence upon active purgatives, and I believe that much of the success obtained by the abettors of both modes of practice is to be ascribed to them.

151. In apoplectic cases, therefore, with signs of deficient vital energy of the brain and constitution, — and, when we refer to our experience, or consider the nature of many of the exciting causes, as well as the very far advanced ages of the great majority of apoplectic patients, the number of such cases will appear by no means small, — and at the commencement of some seizures, before reaction has supervened, when the countenance is pallid or sunk, the pulse of the carotids weak or small, the temperature of the head not increased, and profound sopor, rather than very stertorous or strong breathing, is present, gentle restoratives, administered either internally or externally, are the most serviceable.* The propriety, then, of attending to the fact, that apoplexy often is *originally* dependent upon the state of the sensorium — upon the depressed vital energy of the encephalon, as well as upon extravasation, or primary or consecutive vascular turgescence, and increased action — is manifest. And hence will appear the reason that restorative measures are required in some cases and not in others, or at one stage of an attack and not at another; physicians being led, by the success obtained from one method of cure on some occasions, to employ it too generally, and hence in many instances in which it is inappropriate.

152. The restorative means that may be resorted to, scarcely admit of particular notice. The practitioner must be guided in his choice of them by the circumstances of the case. Where there is sopor, or coma, or lethargy, without much stertor of breathing, and when hemiplegia or paralysis is not present, *camphor* in moderate doses, either alone, or combined with *ammonia* or the *spir. æth. sulph. comp.*, the *spir. lavand. comp.*, and various others, may be adopted. It is only in such cases, and when the action of the carotids is weak, the head cool, and the countenance sunk, that the *infusions of arnica* or of *serpentaria*, which have been recommended by QUARIN, AASKOW, WERNER and THOMANN, are admissible. In more doubtful cases, the preparations of *ammonia*, the *spiritus ætheris nitrici*, the infusion of *valerian*, may be cautiously exhibited. In some, particularly at the commencement of the seizure, *volatile substances*, such as the preparations of ammonia, and aromatic vinegar, held to the nostrils occasionally, will be of much service. Where the attack is either preceded or accompanied by hemiplegia or paralysis, (§ 31—43.), stimulants, whether exhibited internally, or held to the nostrils, may be more hurtful than beneficial. In these, even the use of cold applications to the head, excepting there be marked increase of temperature, is seldom productive of much advantage. *Purgatives* are, however, required, but the choice and repetition of them should entirely depend upon the state of the secretions, the torpor of the bowels, and the character of the stools.

153. *c. Remedies which have been recommended, and are admissible in certain states of either the sthenic or asthenic forms of attack.*—*Emetics* are amongst the remedies, the admissibility of which has been most questioned. The young practitioner will, if he have recourse to written authority, be quite bewildered by the diversity of opinions respecting them in this disease. He will find SYDENHAM, PITCAIRN, KIRKLAND, SELLE, FOTHERGILL, COLOMBIER, CONRADI and FABER, in favour of them; and HAGENDORN, BORSERI, QUARIN, WALTHER, CULLEN, TUESSINK, RICHTER, PORTAL, and CHEYNE, opposed to them. But, when the attack has been brought on by an overloaded state of stomach, by intoxication, narcotic poisons, or other hurtful ingesta, and more especially when hemiplegia is not present, or if the attack be of the active kind, and full depletion has been performed, emetics may be both safely and advantageously administered. This opinion seems agreeable to the recommendations of HIPPOCRATES, MORGAGNI, STOLL, BLANE, and the late Professor GREGORY.

154. The propriety of having recourse to *blisters* has likewise been questioned. The great majority, however, of authorities are favourable to the practice in some state or other of the disease, the situation, the period, and form of attack, being the chief points of dispute. BARTHOLINUS, CANDLER, CULLEN, and many others, recommend them to be applied to the head. Whilst TODE, BAGLIVI, STOLL, PORTAL, and PICQUE consider them injurious in this situation. In the active states of the disease, in those forms which are complicated with hemiplegia, or are preceded by it, blisters on the head seem hazardous reme-

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* Travelling in the summer, in one of the short stages, I sat opposite an aged and corpulent man, who, very soon after our leaving town, suddenly lost his consciousness and power of motion. His countenance became first pale, then bloated and inexpressive, his breathing slow and slightly stertorous, all his muscles completely relaxed, and he fell, in a few seconds, upon those sitting around him. We were only a few doors from a chemist's shop; the coach was stopped, and he was carried thither. He was now profoundly apoplectic; a copious perspiration flowed from his face and forehead, the veins of which were distended, and all his senses were completely abolished. There was no sign of hemiplegia, — but there was general and complete loss of motion and sensation. His neckcloth having been removed, the pulsation of the carotids was found to be slow, and of natural strength and fulness. Whilst he was held in a sitting posture in a chair, cold water was poured gently over his head from a sponge, and his head frequently sponged with it; volatile salts also were held for a short time, and at intervals, to his nostrils. The power of deglutition was at this time abolished, so that it was impossible to administer a draught, chiefly consisting of a small quantity of spiritus ammoniæ aromaticus and camphor mixture, which was prescribed. In a very few minutes his consciousness returned, he took the draught, and, in a short time afterwards, he walked to a coach, in which I accompanied him home. He now complained only of very slight confusion of ideas, with scarcely any headach, but his carotids beat more firmly. One full blood-letting, and an active purgative, were now directed. The next day he was perfectly well, and has continued so. What would have been the result if he had been largely blooded previously to the reaction?

dies, and are, moreover, in the way of more appropriate means; but in the weakest forms of the disease, when, from the depressed state of vital energy of the brain and lowered action of the carotids, the sensorium requires to be excited, they may be of service. Where, however, there is any doubt respecting the propriety of applying them in this situation, it will be better to omit them, or to direct them to another part. When stupor or coma exists, and the symptoms are not of the strong character, they may be applied to the nape of the neck, between the shoulders, or insides of the thighs or legs, after general or local blood-letting has been practised.

155. *Sinapisms*, or *stimulating frictions*, and *liniments*, applied to the lower extremities, are very generally applicable, particularly after resorting to pediluvia, care being afterwards taken to preserve a continuance of the increased flux of blood to these parts, when thus procured, either by warm applications, or by a frequent renewal of the above means. *Sternutatories* have been considered injurious by Baillou, Morgagni, Buchner, and others, and I conceive with great justice. A nearly similar opinion may be given respecting *electricity* and *galvanism*, which have been recommended to be tried by some authors.

156. The exhibition of *mercury*, chiefly in the form of calomel or blue pill, in large doses, so as to act upon the biliary secretion and bowels, and subsequently to excite *salivation*, has been recommended by Dolæus, Schurig, Ghisi, and Horn. My experience of the practice has led me to think favourably of it in most of the apoplectic states, when the powers of the constitution are not far reduced, and the patient is not very old. *Antimonial preparations* have already been prescribed, and are of much service in the more active or strong forms of the disease, whether accompanied with hemiplegia, or without it. They are not so admissible, however, in the very depressed states of vascular action, and in the forms of attack which commence slowly, or are preceded by, or attended with, paralysis, indicating softening and infiltration of the cerebral substance. *James's powder*, and the *tartarized antimony*, are the best preparations: the former of which may be advantageously combined with calomel; the latter with saline medicines. (See ℞. 21, 22, and F.854.)

157. *Setons*, *issues*, and *moxas* have also been advised, particularly when stupor continues after the more urgent symptoms have been mitigated. I concur with Lancisi and La Motte in considering them very deserving of adoption in such cases. *Moxas* applied on the occiput produce a more rapid effect, and are therefore preferable during the period of attack; setons are more suitable in the prophylactic and consecutive treatment. The *actual cautery* and *moxas* have been strongly recommended by Albucasis, who directed them in the course of the coronal suture; by Marcellus Donatus, who prescribed them to the occiput; by Schelhammer, to the vertex; by Schreiber, to both the vertex and soles of feet; by Mistichelli, to the feet; and by Thilenius and Severinus. These means are very generally applicable, and may be resorted to in the worst cases of apoplexy, particularly those complicated with hemiplegia, and when brought in aid of appropriate means.

158. In cases characterised by a full, tumid, flushed, and livid countenance, full or strong pulse in the carotids, heat of head, with or without hemiplegia, I prefer, after copious general depletion, *scarifications* of the scalp, more or less deep and extensive, to be made over the occiput, so as to allow of a free sanguineous discharge. The practice has been recommended by Hippocrates and Morgagni. Cupping glasses may be also applied over the scarifications, when we desire to procure a more copious discharge. In the low or weak states of the disease, dry-cupping on the nape of the neck may be tried, as advised by Aretæus.

159. After the attack has been so far mitigated that the patient has recovered the faculty of deglutition, I have often seen decided advantage derived from a draught consisting of equal quantities of the *oleum terebinthinæ* and *oleum ricini*, particularly when the bowels required to be fully acted upon. If the attack possess the sthenic character, and signs of fulness of blood about the head still continue, about half an ounce of each may be exhibited on the surface of mint water; and, if necessary, repeated a second or third time, from twelve to twenty-four hours intervening between each dose. This will promote a more complete revulsion from the head than any other means that can be employed, particularly when preceded by calomel, or other cathartics, or followed by the enema prescribed above. (§ 144.). In the weaker states of attack, when we wish the medicine to act partially, by being absorbed into the circulation; and in cases where, from the mode of seizure and progression of the disease, we suspect hæmorrhage or infiltration of blood in the brain, the following draught may be exhibited: I have found it serviceable in such cases, even in some attended with the most unfavourable symptoms; as very frequent, small, and intermitting pulse, and unconscious discharges, &c.: —

No. 28. ℞ Olei Ricini, Ol. Terebinth., āā ℥ss.—℥ij.; Tinct. Capsici Annui ♏ x.—xvj.; Olei Cajeputi ♏ iv.—vj.; Aq. Menth. Virid. ℥iss. Fiat Haustus, omne bihorio sumendus ad secundum, tertium, vel quartum vicem.

In some instances, where the lethargy has been profound, and the constitutional powers far depressed, I have derived much advantage from *camphor*, *ammonia*, and *æther*, given in suitable doses in the intervals, and continued after the above medicine had been carried as far as was considered either necessary or prudent.

160. It is generally requisite to have the hair of the patient cut very close, or shaved off, as soon after the seizure as possible; and to attend to the injunction of Morgagni, never to omit enquiring after the state of the urinary discharge, and examining the hypogastrium, lest accumulations of urine take place, which should be immediately removed by the catheter, to prevent their injurious effects on the disease, and on the bladder.

161. *d. Of the treatment of the consecutive and complicated states of apoplectic seizures.*— A great majority of such cases requires but very slight modifications of the measures already stated. The importance of directing our means so as restore *suppressed discharges*, &c. when the attack arises from this cause, has already been pointed out. When it proceeds from the extension of

inflammatory action to the brain, and its termination in abscess, effusion, &c., the principles stated above are still applicable. If the disease possess either a *gouty* or a *rheumatic character* (§ 92, 93.), bleeding from the feet, local depletions, sinapisms, or other rubefacient applications, &c. to the lower extremities, or to the joints or parts antecedently affected by gout or rheumatism, active purgatives, and the preparations of colchicum combined with soda, and moderate doses of camphor, are the most advisable remedies. In most cases of this description great accumulations of morbid sordes have formed on the digestive mucous surfaces, and thick or viscid dark bile in the gall-bladder and hepatic ducts; therefore, after cupping on the nape of the neck, active calomel purges, promoted by enemata, are to be given, previously to having recourse to *colchicum*, which ought to be combined with alkalies, — with *ammonia* or other restorative medicines, if the attack presents the asthenic character, and with aperients; active *revulsants* being simultaneously employed.

162. When the apoplectic state arises from *erysipelas* of the head and face, incisions made into the scalp of the occiput, so as to allow a free discharge; cupping on the nape of the neck; active purgatives, consisting first of calomel combined with the tartrite of antimony or with James's powder, and compound extract of colocynth, followed by the draught of turpentine and castor oil advised above (§ 159.); and saline medicines, with the vinum antimonii; are the means most to be depended upon. In cases of this description the most active purgatives are required, and must be frequently repeated. The croton oil may be here exhibited, as already advised (§ 144.), and enemata should be administered from time to time. These already prescribed (§ 144.), or F. 141. 151. are most to be depended upon in this state of disease. Revulsants, and rubefacient pediluvia, are also serviceable aids.

163. When the apoplectic attack occurs on the invasion, or in the advanced stages of *fevers* (§ 94.), the general principles of treatment already laid down cannot be departed from. When it comes on at the commencement of fever, general or local depletions are required, with cold affusion to the head, purgatives, saline medicines, and counter-irritation. But even here, the probable state of the circulation within the head should be enquired into previously to the adoption of the means of cure; for, if the head be cool, the action of the carotids natural or below the healthy standard, and the attack be unattended by paralysis, restorative measures are called for, although the subsequent occurrence of reaction will afterwards require active antiphlogistic measures. When the attack occurs in the last stages of continued or eruptive fevers, it most frequently presents the asthenic character, and is often an aggravated state, or a modification merely, of coma, unless hemiplegia accompany it. In these cases, local depletions from the occiput, the neck, and behind the ears; active purgatives; revulsants and counter-irritants, as blisters or sinapisms to the lower extremities, nape of the neck, or epigastrium; camphor, combined with ammonia, æther, and liquor ammoniæ acetatis, particularly when the head is cool, and the pulsation or the carotids is neither full nor strong; and, in the most asthenic cases, camphor in larger doses, the infusions of arnica, or of serpentaria (F. 222. 262.), are chiefly to be depended upon. After local depletions and revulsants have been prescribed, and one or more doses of calomel and rhubarb premised, the draughts directed above (℞ 23. 26, 27, 28.), or F. 270. 863., followed by enemata (F. 138. 149.), may be exhibited.

164. The association of apoplectic seizures with disorders of the *digestive organs*, particularly those of the liver (§ 97, 98.), requires local depletions from the right hypochondrium and epigastrium, followed by blisters in this situation, and a strenuous use of purgatives and mercurial preparations, until the secretions assume a healthy appearance. When the attack proceeds from impeded circulation through the lungs and right side of the heart (§ 95, 96.), local depletions, counter-irritation, and diaphoretics, are chiefly to be depended upon. But in these cases care must be taken not to deplete too much, as the circulation may be still more impeded by the loss of power thereby produced. In some instances of this kind, it will even be necessary to support the vital energies by suitable means, and to deplete the vascular system at the same time. When the attack is occasioned by hypertrophy of the left ventricle, general and local depletions are better borne than in the foregoing cases, and may be carried to a considerable extent. In both descriptions of cases, revulsants and counter-irritants, particularly by issues, and the tartar emetic ointment, are beneficial.

165. When the attack is occasioned by *narcotics or spirits* taken in immoderate quantities, the stomach should be emptied by the stomach-pump, or by an emetic, a moderate blood-letting having been premised; and afterwards, the cold affusion to the head; internal stimuli, as camphor, ammonia, and ether; warm, strong coffee; and purgative enemata, should be prescribed. The occurrence of the seizure, also, during *child-labour*, or after *epileptic or hysteric* convulsions, requires large blood-lettings, preferably from the feet, the cold affusion to the head, cathartic injections, &c.[*]

166. Attacks consequent upon *colica-pictonum* (§ 99.), two instances of which have occurred to me, generally require local depletion, full doses of calomel, followed by active purgatives and enemata (§ 142.). The draught of castor oil and turpentine (§ 144.), or the croton oil, followed by injections, are here chiefly to be confided in. If purgatives given by the mouth are thrown off the stomach, — a circumstance which not infrequently occurs in these cases, — a large dose of

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[*] I was lately called to a case of puerperal convulsions which had terminated in the apoplectic state. When I saw the patient, the labour had not proceeded so far as to admit of delivery by means of instruments. The pulse was slow and full; the breathing slow, laborious, and stertorous; the lips puffing and frothy, the countenance tumid and livid; all the limbs flaccid, insensible, and incapable of motion. She had been blooded largely before I was called. The feet and legs were directed to be placed in a pan of hot water, and the saphenæ veins to be opened. Whilst the blood flowed, the cold affusion on the head was employed. These means were evidently beneficial, though insufficient. A cathartic enema (F. 149.) was thrown up immediately, and with great difficulty: consciousness slowly returned; when the decoction of the secale cornutum, with as much boras sodæ as it could dissolve, was administered. Uterine action afterwards came on, and the patient recovered.

calomel will generally be retained; and will allay the irritability of the stomach: other medicines may be afterwards exhibited, or a mixture of croton and castor oils rubbed over the abdomen, and cathartic injections thrown up. The other states and complications of the disease must be treated according to the views and principles already explained, and with due reference to the nature of the pre-existing disorder, when it appears to be a consecutive affection, or a principal part of a complicated state of disease.

167. C. Treatment subsequently to the attack, or the Consecutive Treatment. — The symptoms consecutive of apoplexy have a strict relation to the changes which take place in the seat of lesion. The absorption of the blood, and the process of cicatrization, require several months for their completion. During this time great care should be observed to prevent inflammatory action from taking place around the extravasated blood, and a return of the hæmorrhage. This object is best obtained by adopting very nearly the same measures as have been recommended to prevent the accession of the attack (§ 126. *et seq.*). A too sedentary or studious mode of life, watchfulness, much indulgence of sleep, frequent stooping, and all the remote causes of the disease, must be carefully shunned. The strictest temperance and moderation, in respect both of eating and drinking; moderate exercise in the open air; tranquillity of mind, sedulously avoiding the least approach to bodily or mental fatigue, and excitement of the feelings or passions; the preservation of a free state of the alvine secretions and excretions, by means of mild and deobstruent purgatives and catharthic enemata; general or topical blood-letting, particularly every spring and autumn, with low living or a vegetable diet, when there is a tendency to vascular plethora; caustic issues, or setons in the nape of the neck, or in the course of the cervical spine; the use of the tartar emetic ointment, so as to keep out for a considerable time a pustular eruption on the part to which it is applied; sleeping on a hair-mattress, with the head and shoulders slightly elevated, and early rising; are amongst the most efficacious means that can be adopted.

168. For persons who are prone to plethora, in addition to periodical depletions and low diet, the following pills and electuary may be taken on alternate nights: —

No. 29. ℞ Pilul. Hydrarg. Submur. Comp. gr. iij.; Pulv. Jacobi Veri gr. ij.; Saponis Castil. gr. iv. M. Fiant Pilulæ ij. h. s. s.

No. 30. ℞ Potassæ Supertart. ʒj.; Sodæ Sub-boratis gr. x. (vel Magnesiæ ℈j.); Confectionis Sennæ, Syrup. Zingiberis, āā ʒj. M. Fiat Electuarium, pro dose, horâ somni, alternis noctibus sumendum.

169. When the disease is connected with the gouty diathesis, vegetable diet, the sub-carbonates of the fixed alkalies, with the extract of taraxacum or the preparations of aloes, the occasional use of an active cathartic, and the other prophylactic measures recommended in the article on Gout, are requisite. In all cases, as much benefit will now accrue from a strict attention to regimen and diet, as from medicine. The food should be light and digestible, of very moderate quantity, chiefly farinaceous, and taken at regular hours. Suppers should be avoided, or be extremely light, and taken a considerable time before the usual hour of repose. Fish, and ripe fruits, may be partaken of in moderation; and the waters of Cheltenham occasionally tried, or the following used as a substitute: —

No. 31. ℞ Magnes. Sulph. ℥ss.; Potassæ Sulph. ʒij.; Infus. Rosar. Co. et Mist. Camphoræ āā ℥iijss. M. Capiat Coch. iij. ampla primo mane quotidiè.

170. After attacks of the more asthenic states of apoplexy, a more tonic regimen than that directed above may be adopted; but it should be conjoined with the same attention to the digestive, secreting, and excreting functions. Attacks of this description most commonly proceed from depressing or exhausting causes, which ought either to be avoided or counteracted; and when they are not characterised by plethora, or disposition to increased action, gentle tonics, combined with aperients, a light strengthening diet, the occasional use of the preparations of *strychnine*, or *iodine*, as recommended in the article on Palsy, and the mineral waters of Bath, Leamington, or Buxton. The following may also be occasionally taken: —

No. 32. ℞ Potassæ Sulphatis ʒij.—ʒiij.; Infus. Rosar. Co. ℥vijss.; Acidi Sulphur. Arom. ʒj.; Tinct. Aurantii Co. ℥ss. M. Capiat Coch. iij. ampla primo mane.

171. In all cases of the consecutive treatment, the progress of the paralytic or hemiplegic affection towards removal should receive attention. In the more favourable cases, as the period of attack recedes, first sensation, and afterwards motion, return in the paralysed limbs; and generally the lower extremity experiences the amendment before the upper. As recovery proceeds, the patient should always wear his hair cut short, and sponge his head with spring water night and morning. In summer he may use the shower bath daily, if he be not far advanced in life, or much debilitated. As much of the treatment described in the article Palsy, as may suit the circumstances of the case may also be adopted, for the removal of this common sequela of the attack. (See also Asphyxy, and Poisons.)

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1. **APOPLEXY of New-born Infants** — Generally proceeds from a protracted or difficult parturition, particularly when the infant is large and plethoric, or when the chord has passed around the neck, occasioning both interrupted circulation in the chord, and obstructed return of blood from the brain. The apoplectic state in new-born infants is accompanied with tumefaction of the face, head, and neck, which, with the whole surface of the body, is generally of a bluish or violet colour. The muscles are flaccid, the limbs flexible, and the body warm. The pulsations of the heart and of the chord are generally obscure, or not to be felt; respiration is suppressed; and death soon takes place, in extreme cases, if judicious means of restoration be not resorted to.

2. Upon examination of fatal cases, the vessels of the encephalon are engorged with blood; and occasionally blood is extravasated in the substance of the brain, or between the membranes. The lungs are also generally congested. It is evident that the pressure of the turgescent vessels and extravasated blood upon the brain, and origin of the respiratory nerves prevents the respiratory actions from taking place, and that all attempts to excite respiration will be ineffectual until the pressure is removed. The umbilical chord should therefore be immediately divided, and allowed to bleed to the extent of two or three spoonsful, according to the size and strength of the infant. When the apoplectic state is occasioned by congestion of the vessels merely, respiration will take place as soon as the vessels are unloaded, if no mechanical obstacles to the entrance of air into the lungs exist. Mucosities should be carefully removed from the throat, mouth, and nostrils; and, if the respiration does not spontaneously take place, insufflation of the lungs, as recommended in the article on Asphyxy *of New-born Infants* should be performed.

3. When the circulation is so torpid that the blood will not flow from the portion of umbilical chord attached to the infant, the little patient should be placed in a warm bath, rendered more stimulating by some salt, or by a little mustard; the portion of chord attached to the abdomen, or the abdomen itself, may be pressed momentarily, at several times, and in the direction of the division. If these means fail of procuring blood, one leech may be placed behind each ear. In some cases the apoplectic symptoms return after respiration has been established. This is generally owing to some interruption to the circulation through the lungs. In these cases of secondary attack, the application of one, or generally two leeches, placing the body or the lower part of it in a warm bath, and, if requisite, inflation of the lungs, and the other measures advised in the article on Asphyxy, must be resorted to; and they will be successful if the case admit of recovery.

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APPETITE, MORBID.

Classif. 5. *Class*, Local Diseases; 2. *Order*, Depraved Appetites (*Cullen*). 1. *Class*, Diseases of the Digestive Functions; 1. *Order*, Affecting the Alimentary Canal (*Good*). II. Class, I. Order (*Author*).

1. Defin. — *Excessive craving for food, or desire for improper substances.*

2. In this genus may be included *two* species, viz. 1st, Excessive or insatiable craving for food; and, 2d, A desire for improper substances, or what is not food. These states of function occur in practice variously associated and, although apparently different in themselves, yet they are often individually connected with similar states of the constitutional energies, and dependent upon nearly the same state of lesion, whether functional or organic. It would seem that manifestations of function often differ most essentially, in different persons, or under different circumstances, owing to causes which are so slightly dissimilar as not to admit of distinction, or even, in some cases, to appear very nearly the same. In all, or the great majority of cases belonging to these forms of morbid function, the general pathological states of the system are nearly the same; the difference, even when it is most marked, being chiefly referrible to variations in grade, and to states of the stomach, in respect of its sensibility, its secretions, tonic contractions, and states of its villous membrane, which can only be matters of inference, but seldom of demonstration. As regards their nature, these affections are much more frequently *symptomatic* of lesion of function or structure in some other organ, than *idiopathic*, or constituting primary disease of the stomach itself.

3. Spec. I. Insatiable Appetite. — Syn. *Bulimia* (from βοῦ, the augmentative particle, and λιμὸς, hunger), *Fames Canina*, *Limosis avens*, Good. *Bulimus*, *Polyphagia*, *Lycorexia*, *Cynorexia*, Auct. Lat. *Faim Canine*, Fr. *Der Heisshunger*, Ger. *Dyspepsia Bulimia*, Young. *Gluttony*, *Canine Appetite*.

4. Defin. *A craving for food beyond the natural wants of the system, sometimes most excessive in degree.*

5. I. VARIETIES. An inordinate appetite is sometimes observed in the course of fevers and other acute diseases, particularly in convalescence from them; and in the progress of a number of chronic diseases. It is not infrequent in cases of extreme exhaustion, from whatever cause; and it may depend upon an acquired habit. But in order to consider it with some degree of precision, I will offer some remarks, 1st, upon habitual indulgence in an excessive quantity of food, or gluttony; 2d, an insatiable appetite from exhaustion; 3d, on the excessive appetite, which, from the extreme voracity of the patient, has been called canine; and, 4th, on the voracity which is followed by vomiting. These constitute varieties of nearly the same disease.

6. *A. Habitually excessive appetite, the Bulimia Helliconum of* CULLEN. — In some cases, the excessive indulgence of food has been of so long duration, and seemingly attended with so good a state of the general health, as not to appear in the light of a disease; but the results ultimately are, the production of so great vascular plethora, and disorder of the secreting functions, that, as soon as the vital energies begin to languish, apoplectic, paralytic, or other maladies supervene. This variety of morbid function may be hereditary, but it is oftener acquired. It is not infrequently observed in persons, originally of a strong constitution, who have indulged in large and frequent meals from having little else to engage their minds, and thus the vital energy has become concentrated towards the stomach and the rest of the digestive organs, exalting all their functions. Persons of this description usually become large, bulky, or corpulent; and if they take much exercise, the great indulgence of their appetite may not materially shorten their lives: but when sedentary habits and indolence are conjoined with it, apoplexy and organic disease of the liver, stomach, bowels, &c. are the common results.

7. *B. Inordinate appetite from exhaustion.* — This is often a symptom of other diseases, and is chiefly dependent upon altered sensibility of the nerves of the stomach, proceeding from weakened vital power. In many cases, however, it appears as the chief ailment, as after great fatigue of body and mind; after excessive venereal indulgences; in cases of great emaciation, sometimes without any evident cause; and during convalescence from fevers and other acute diseases. It is very often observed as an attendant upon organic diseases of the stomach, pylorus, mesenteric glands, liver, uterus, &c. It has also been remarked in cases where due nourishment could not be conveyed into the system, owing to disease of the absorbent system; and it is frequent in the last stages of chronic maladies, when about to terminate fatally. In many of such cases the craving for food is attended with a distressing feeling of inanition, sinking, and faintness. Some of the cases of excessive appetite that occur in pregnancy, or from the presence of worms, may also be referred to the debility and altered sensibility of the nerves of the stomach. And those which accompany inanition from a defective supply of chyle to the blood, may be attributed partly to the same cause, and partly to the instinctive wants of the system.

8. *C. Voracious or canine appetite, the Bulimia Syncopalis of* CULLEN. — This extreme form of the disease is generally dependent upon some organic change of the stomach; but this is more a matter of inference than of observation. The chief seat of disease may even be some other organ. The quantities of food, particularly animal food, cooked or raw, taken by some persons afflicted by this disease, are truly surprising.[*] One of the most remarkable cases in record is that published by M. PERCY (*Dict. des Sciences Méd.*, art. CAS. RARES). Both CULLEN and GOOD are incorrect in stating that this form of Bulimia is attended with faintness. This is only an occasional symptom, which was absent in both the cases that occurred to me, as well as in that recorded by Dr. CRANE. (*Lond. Med. Repos.*, vol. xvii. p. 293.)

9. *D. Voracious appetite followed by vomiting, the Bulimia Emetica of* CULLEN. — This variety of bulimia frequently proceeds from inflammatory irritation about the pylorus, but more commonly of the mucous surface of the stomach itself. The quantity of food devoured in this description of cases is often as large as in the last variety; but, shortly after having been taken, it is either altogether, or in part, thrown up, very little altered, and thus the patient continues alternately to crave for and to reject his food. This form of the disease has generally been imputed to a scirrhous state of the pylorus; but the case of Dr. CRANE, already alluded to, was evidently independent of such a cause.

10. II. CAUSES. — *a.* The *remote causes* of bulimia are chiefly hereditary predisposition; the habit of eating largely, voraciously, and without due mastification; chronic debility arising from obstruction of the mesenteric glands, liver, &c.; the suppression or disappearance of chronic eruptions, the healing of old ulcers, or the suddenly arresting habitual discharges, and the pathological conditions noticed in the foregoing remarks.

11. *b.* The *immediate cause*, or state of the organ on which it depends, seems to be somewhat different in the different varieties, even whilst the state of the constitutional or vital power may be considered to be, in the great majority of cases, very nearly the same. I believe that in many instances the voracious appetite is owing to an irregular distribution of the vital energy, and its concentration in the stomach, the nerves of this

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[*] I have met with two very remarkable instances of this affection in children, — the one of seven years of age, the other of nine. In both these, but in the younger especially, the quantity of food devoured was astonishing. Every thing that could be laid hold of, even in its raw state, was seized upon most greedily. Besides other articles, an uncooked rabbit, half a pound of candles, and some butter, were taken at one time. The mother stated, that this little girl, who was apparently in good health otherwise, took more food, if she could possibly obtain it, than the rest of her family, consisting of six besides herself. In both this and the other case, the digestion seemed to be good. Three or four large feculent motions were passed daily, and a nauseous smell emanated from their bodies. These children, who were both very intelligent, complained of no other uneasiness than a constant gnawing or craving at the pit of the stomach, which was never altogether allayed, but which, shortly after a meal, impelled them irresistibly to devour every thing that came in their way, in the shape of food, however disgusting. Nearly twenty years ago I saw, for a short time, a case of this description, which occurred in a child of about the same age, and occasioned alarm, owing to the circumstance of a large quantity of raw fish having been devoured by it. The result in this case did not come to my knowledge, but the former cases, which occurred at the Infirmary for Children, recovered by means of the treatment which will presently be noticed.

viscus being morbidly sensible, the muscular coats more irritable, particularly in the fourth variety of the disease; and the mucous coat in a state of erythism, or vascular excitement, and yielding a much larger quantity of its proper fluids than in health. The excited state of the nerves of the organ, will necessarily be followed by increase of its secretions, greater vascularity of its inner coat, and a disposition of the muscular tunics to react upon the enormous quantity of food which distends them; and thus there will result the craving of extreme hunger, a rapid solution of the food, and a quick transfer of it into the duodenum; or, if the reaction takes place suddenly, either vomiting or simple regurgitation of it, as in cases of *rumination*, which is sometimes *complicated* with bulimia. The more remote *effects* of this state of the organ are, torpor, debility, and a sense of faintness arising from the concentration of the vital energy, and determination of the circulation and secreting function towards the stomach and associated viscera, and the proportionate abstraction of vital influence from the brain and heart; imperfect assimilation; irritation of the digestive mucous surface, from unwholesome and unchanged food; an impure state of the blood, disorder of the secreting organs and morbid secretions,—all tending to disorganisation, and to the destruction of life.

12. *c.* The *morbid appearances* found on dissection consist chiefly of inordinate distension of the stomach and duodenum; a vascular and corrugated state of their mucous surface, constituting complete hypertrophy of these viscera; a flabby, softened, and sometimes thickened appearance of all these tunics (HAGSTROEM); displacement of the right extremity or the greater part of the stomach low in the abdomen (FRENCH); induration and thickening of its coats (GOUDRET); the insertion of the common bile-duct into its pyloric extremity (VESALIUS and BONET); dilatation of the œsophagus (SCHURIG); tænia in the bowels; lumbrici in the stomach and duodenum; enlargement and other organic lesions of the liver; scirrhus, thickening, and even dilatation (RUYSCH), of the pylorus; thickening of all the coats of the duodenum, forming hypertrophy of this part; and various organic changes in the mesentery, its glands, the pancreas, spleen, and very generally in the mucous surface of the small and large intestines. M. BECLARD observed, in a case of bulimia, the valvulæ conniventes as large as in carnivorous animals. And M. LANDRE-BEAUVAIS found, in a case complicated with pulmonary consumption, an unusually large size of the small intestines, and the gall-bladder wanting.

13. *d. Symptomatic bulimia.*—Inordinate appetite has sometimes been observed in cases of chronic disease of the brain, particularly in slow inflammation of its substance, threatening, or terminating in, insanity. A very marked case of this description, and two or three slighter instances, have come before me in the course of practice. I have also met with it at the commencement of hydrocephalus, and in epilepsy. When thus dependent upon disease of the brain, the inordinate indulgence of the appetite is often followed by vomiting. In the case of epilepsy, however, in which I met with it, vomiting never took place, although the quantity of food sometimes taken was most excessive. The first, or slighter variety of the malady, is not uncommon in epilepsy, particularly in the hereditary epilepsy of adults; the second variety sometimes occurs in hysteria, chlorosis, and pulmonary consumption; and the fourth, occasionally, in chronic encephalitis.

14. Bulimia is more frequently met with, particularly in its slighter forms, in pregnancy and in verminous affections, and is then very generally attended with an urgent feeling of inanition and faintness. When it occurs in pregnancy, there is usually a fanciful longing for particular articles of food, of which an enormous quantity is devoured. A remarkable excitement of the nerves of the stomach may be inferred to exist in these cases, greatly augmenting the secretion of gastric juice. When the affection proceeds from worms, it may be imputed to the irritation of the nerves and mucous surface of the stomach and duodenum, whereby the circulation of, and secretions poured into, these viscera, are much increased, whilst the vital actions of the rest of the frame languish more or less.

15. III. TREATMENT.—The means of cure should have strict reference to the immediate cause to which we attribute the disorder. *A.* In the *first variety* of the disorder, it is generally in vain to state any means of cure. They entirely rest with the patient, by whom medical advice will seldom be followed. I have great doubt of a single glutton having been deterred from the habit he has acquired, by the injunctions of his medical adviser, until an attack of illness occasioned him alarm. The cure is sufficiently simple, and may be comprised in the single recommendation of employing his mind and body more, that he may abuse his stomach less.

16. *B.* In the *second variety*, great attention is required to adapt the treatment to the circumstances in which it presents itself. The nature of the malady of which it is most commonly a symptom, must necessarily be our guide; and as the means should be strictly appropriated to the peculiarities of the case, no general rules can be stated with propriety, further than that the effects of whatever is employed should be carefully watched, and that more mischief will result from indulging the craving complained of, than from opposing it, and allowing no more nourishment than the nature of the case, or the system, may seem to require. In the bulimia that occurs in convalescence from acute diseases, the wants of the economy are generally greater than in other cases, and here more may be allowed: if fever or disorder follow the indulgence, a purgative will generally remove it.

17. *C.* The preceding observations apply likewise to the *third and fourth varieties* of this disease. The cases which occurred in my practice were cured by an active course of nauseating purgatives, consisting chiefly of the oil of turpentine with castor oil. In one of the cases, where the voracity was almost incredible, the first dose of the turpentine was followed by the sudden appearance, over the whole trunk of the body, of a most copious and thick eruption, more nearly resembling porrigo favosa than any other, and by the equally sudden relief of the symptoms. This treatment was left off; when, after a few days, the eruption disappeared, and the voracious appetite returned. It was ultimately removed permanently by the hydrarg. cum cretâ, combined

with soda, taken at bed-time, and a turpentine draught in the morning of each third or fourth day. Leeches were applied over the epigastric region; and either the tartar emetic ointment, or liniment, was rubbed upon the same situation till a copious eruption of pimples was produced. The strictest regulation of the diet was enjoined.

18. *D.* In the *variety* attended with *partial or general regurgitation*, or vomiting of the food taken in excessive quantity, the best effects will result from obliging the patient to abstain almost altogether from food, or to take a small portion of nourishment in the least possible bulk. Great distress from hunger will be felt for a few days, but this will gradually subside. In the instructive case published by Dr. Crane, this plan was persisted in; and portable soup, made into pills, was given, as the only nourishment, for several weeks: the patient recovered perfectly. A nearly similar treatment had been previously employed by Mr. Wastell with success. (*Mem. of Med. Soc. of Lond.*, vol. iii. No. 2.) Where, however, the stomach is not so irritable as to throw off any portion of the ingesta, and has become distended and enlarged from habitual ingurgitation, a gradual diminution of the food will be better borne, and perhaps be more efficacious, than its sudden reduction. The propriety of employing deobstruents, small doses of the blue pill, combined with ipecacuanha, active cathartics, either by the mouth or in the form of enema, and external irritants and revulsants, in cases of this description, cannot be questioned. Exercise, where it can be taken; and employment for both body and mind, as far as circumstances will permit; are also most useful adjuncts.

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Spec. II. Vitiated or Depraved Appetite. —Syn. Pica, *Citta*, *Malacia*, *Pseudorexia*, *Limoxis Pica*, Good. *Dyspepsia Pica*, Young. *Der Sonderbare Appetit*, Ger.

1. Defin. *An appetite for substances which are not food.*

2. Causes.—This state of the appetite sometimes occurs in children, from an early acquired habit; and it is frequently observed in idiots, from want of ability to discriminate what is or is not food, or from perversion of taste. Various substances also, which are abhorred in one climate, constitute the chief articles of diet in another. Thus, the Californians live on snakes, rats, lizards, &c., and numerous tribes of Africans on monkeys, dogs, snakes, &c. It is very frequently observed in pregnant, hysterical, and chlorotic females, and it is sometimes connected with certain kinds of mental emotion. I have met with several instances of it in females at the age of commencing puberty, when neither hysteria, in any of its forms, nor chlorosis, existed. In these, and perhaps in the great majority of cases, it is altogether a symptomatic affection, arising from altered sensibility of the nerves, and modified state of the secretions of the stomach, occasioned by imperfect function, or changed condition, of a related organ, particularly of the uterus, ovaries, large bowels, and brain.

3. When it is observed as the primary disorder, it has generally been owing to a habit, commenced at first with the view of improving the shape and complexion. Females early in life sometimes have recourse to acids, particularly vinegar, and chalk, for this purpose. The form of the disease, which has been described by Dr. John Hunter as dirt-eating, by the negroes in the West Indies, and which has even assumed an epidemic character, is, perhaps, more than other forms of it, deserving of being considered as idiopathic. The earth they devour chiefly consists of a loam or clay, and may possibly be taken by them from the circumstance of their having found it assuage the painful sensations produced in the stomach by acidity. This affection is much more frequently met with in the female than in the male sex; but instances of its occurrence in the latter are not rare. I have seen several instances of it in males; and in females it is often practised in so concealed a way, as not to come to the knowledge of the medical attendant.

4. The substances which occasionally become the objects of desire are sufficiently numerous. Medical records abound with them. Cinders, spiders, lice, flies, insects, toads, serpents, wood, hair, paper, earth, clay, chalk, vinegar and other acids, and even ordure, have all been devoured in cases of this disease. Various other substances have been swallowed, more as singular exploits than from actual longing for them. Thus we have accounts of persons taking into their stomachs clasp-knives, musket bullets, billiard balls, gold watches, and Louis-d'ors; and, what is still more singular, generally discharging them by stool a few days afterwards. Knife-eating seems to have been no uncommon feat, as we have instances recorded of London, Prussian, Bohemian, North American, and Brazilian knife-eaters. Our friends of the United States seem to have surpassed all others in the rapacity which their knife-eater exhibited; for in June, 1822 (*New York Med. Repos.*, Oct. 1822), after having been duly initiated in the art, by swallowing a gold watch, chain and seals, billiard balls, and various other articles, at different times, which had passed through his callous digestive tube, he swallowed fourteen knives in the course of the day. This was his great, but his last exploit, for he died two months afterwards; having passed two of the knives by stool, the remaining dozen being found in the body,—eleven in the stomach, and one in the œsophagus.

5. The articles most commonly fancied by young females are paper, cotton, thread, chalk, vinegar and other acids. I once saw a sickly-complexioned lad, who was in the habit of eating sand; and a robust seaman, who occasionally would devour a whole wine or ale glass, having previously crushed it in small pieces with his teeth, and yet no bad effects resulted, at least for many months afterwards. (*Lond. Med. Repos.* vol. xviii.) The only other instance on record, where this most dangerous feat has been performed, is given by Camerarius (*Memorab.* cent. v.).

6. When *pica* is complicated with *bulimia*, as

is sometimes observed, most singular and even astonishing feats in the way of devouring substances of the most unsuitable kind are on record, —many of them also so large, that the possibility of their being conveyed into the stomach, if they had not actually been found there, might have been doubted. Some really astonishing and authentic instances of this kind have been related by M. Fournier (art. Cas. Rares, *Dict. des Sciences Méd.* t. iv. p. 135.).

7. Treatment.—The means of cure must, of course, have strict reference to the morbid condition of the system, of which it is so frequently a symptom. If it accompany pregnancy, I believe that the axiom which M. Francier adopts as the title of a treatise on the subject should be adopted, viz. A pregnant woman affected with pica should be well purged. If it be attendant upon *chlorosis*, aloetic *purgatives*, with emmenagogues, and these followed by or given alternately with *tonics*, are the most suitable means, and are equally beneficial in the pica which occurs about the period of puberty. In hysteria, similar measures, combined with valerian, asafœtida, camphor, and other antispasmodics, are indicated. In these three symptomatic forms of the disease, any of the Formulæ for those medicines in the Appendix may be adopted.

8. When the affection presents an idiopathic, which is comparatively rare, it is most commonly owing to a weakened state of the digestive organs, with, perhaps, an altered sensibility of the nerves, and acid state of the secretions of the stomach. In these cases, the combination of vegetable tonics with alkalies, and attention to the alvine secretions and excretions, are chiefly to be attended to. The treatment of cases of the affection induced early in life from habit, will be unsatisfactory, or without avail, until the cause is removed; but it differs in no essential particular from that now stated. In many cases the pernicious habit has commenced with early puberty, and, as well as in the cases associated with chlorosis, hysteria, pregnancy, and irregularity of the menstrual discharge, is evidently dependent upon the state of the uterine functions. (See Chlorosis, Menstruation, &c.)

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ARTERIES, their Diseases.—Syn. *'Αρτηρία*, Gr. *Artèria*, Lat. *Artere*, Fr. *Eine Schlagader*, *Pulsader*, Ger. *Arteria*, Ital. *Artery*, Eng.

1. The morbid conditions of arterial vessels cannot be appreciated, either in respect of their causes, symptoms, or consequences, unless their organisation and connections with other systems of the frame be clearly understood. It does not fall within my limits to notice all the connections which these vessels present with other parts of the body; but there are a few to which I will briefly allude, as most material in the causation of their diseases, and of certain sympathetic affections with which these diseases are related.

2. I. Organisation.—The arterial tubes are essentially constituted, 1st, Of an external and adventitious tunic, consisting of a very delicate and condensed cellulo-filamentous tissue. This tissue is never infiltrated by serum, nor loaded by fat; and possesses the greatest degree of resistance of all the other coats of the vessel. 2d, Of a proper coat, consisting of fine circular fibres placed closely together, and forming a strong tissue of a dun yellowish colour. The nature of this tissue has been a matter of much dispute with pathologists. It certainly does not possess the physical and chemical properties of the fibres of voluntary muscles, from which it chiefly differs in being much more close in its structure, and more elastic and fragile than they. It more nearly approximates to the fibres of involuntary and hollow muscles, as those of the intestinal canal. 3d, Of a very delicate cellular tissue, like a fine pellicle, the *second cellular* tunic of Haller, interposed between the fibrous or proper coat and that next to be described. It is in this fine membrane that the minute vessels supplying the arteries, and which proceed from the adjoining parts, terminate; and here also the ultimate distributions of the arterial nerves may be supposed to ramify, although they cannot be clearly traced further through the coats of the vessel than the proper fibrous tunic where I have distinctly followed them. This is the most vascular of the tunics strictly constituting arterial vessels; and one in which many of those changes which will fall under consideration commence. 4th, Of an internal membrane, presenting no linear or fibrous structure, semi-transparent, more readily detached from the one next to it in the longitudinal than in the transverse direction, and fragile. This delicate membrane is not possessed of vessels carrying red blood in the healthy state, but it is penetrated by minute red vessels when inflamed. It lines, with scarcely any perceptible modification, the canals of all the vessels conveying red blood, and the cavities of the heart.

3. The arterial vessels thus formed are surrounded by a sheath of loose cellular tissue, more or less abundant in some parts than in others, permitting the vessels to accommodate themselves to their varying state of dilatation, constriction, &c., and transmitting the vessels which are employed in their nutrition. The elastic properties, also, of the proper coat of the vessels, serves also to accommodate their capacity to the state of the circulating fluid; and as it is generally supposed that they are in a certain degree of distension during life, owing to the quantity of blood constantly being impelled through them by the heart's contractions, so it is believed that the contractions which they display on the removal of this fluid is at least partly owing to the abstraction of the distending cause.

4. No trace of longitudinal fibres can be detected in arteries. The elastic properties which they present in the direction of their axis, when extended beyond their natural limits, and their retraction upon their division, are chiefly owing to the dense cellular coat immediately surrounding the proper fibrous structure of the vessel. The different degrees of tenacity presented by the various structures composing the parietes of these

vessels, acting conjointly with the elasticity of the proper coat, have been considered by many as sufficient to account for the absence of hæmorrhage after laceration of these vessels. Doubtless these circumstances contribute, but I conceive that they are insufficient of themselves to account for this and other phenomena, which will be noticed in the sequel.

5. The arteries are surrounded by the ganglial nerves, which form a reticulum around them; and from this reticulum very minute fibrillæ are given off, and dip into their fibrous tunic. This disposition of the ganglial nerves on the arteries ought to be kept in recollection when we enquire into the functions and diseases of the latter. How far it is necessary, not only to the discharge of the most manifest actions which the arterial system performs, but also to those changes which the blood undergoes in disease, and to the assimilation of the chyle, and other absorbed fluids, I have ventured to state in the article on the Pathology of the Blood. It is evidently to the very intimate connection of this class of nerves with the arteries, and the effects resulting therefrom, that we must impute those changes, whether functional or organic, which take place in the latter, and which influence the state of the blood, and the circulation through them. (*See the* Author's *Appendix to* Richerand's *Physiology*, p. 556. 613.)

6. II. Nervous Affections of Arteries. — II. Class, I. Order (*Author*).

7. There is sometimes disorder referrible to a particular artery, or arteries, evidently depending on an affection of the nerves supplying them. Of this description are, 1st, Neuralgia of the arteries; 2d, The violent pulsations sometimes felt in a large arterial trunk. 1st. Laennec admitted the existence of *neuralgia* of arteries, and considered it to be characterised by acute pain in their course, with increase of their pulsations and the bellows sound; and to be independent of inflammation, as shown by the sudden accession and remission of the symptoms, and their periodic recurrence. That this affection is sometimes connected with irritation, or with an inflammatory state of its nutritious vessels, may or may not be the case; but it is certainly not always so connected.

8. 2d. *Violent pulsation* of arteries is more commonly observed unaccompanied with excessive pain. In these cases a loud bellows sound is often heard in all the principal arteries, particularly those in which the increased pulsation is felt. This affection generally supervenes and disappears suddenly in nervous and debilitated persons, particularly after large losses of blood. Morbid anatomy has not as yet thrown any light on its nature; and therefore we can only refer it to some peculiar influence exerted by the nerves supplying the vessels thus affected, and probably depending originally upon the state of the vital energies of the frame. It is sometimes associated with hypertrophy of the heart. In this case, it is in a great measure to be imputed to that disease.

9. *Treatment of these affections.*—When neuralgic pain is felt in the course of arteries, and is quite unaccompanied by inflammation, the same treatment which is recommended in the article on the *painful affections of* Nerves may be adopted. After morbid secretions and intestinal colluvies have been carried off by purgatives, tonics combined with antispasmodics may be employed. The preparations of iron, the sulphate of quinine, ammonia, camphor, alone or combined with opium, colchicum, belladonna, or prussic acid; the external application of the acetate or muriate of morphine, or the cyanuret of potassium, &c. may be tried. In the cases of inordinate pulsations, unassociated with pain of the arteries, attention to the alvine secretions and excretions, and the use of tonics and antispasmodics, will generally be productive of advantage. As these functional disorders are generally consequent upon disturbance of some internal organ or part, sometimes a distant or remote effect of pre-existing disorder, the seat and nature of such disturbance should be investigated, and the treatment directed accordingly. In all such cases, residence in a dry and salubrious air, occasional change of air, gentle and regular exercise, and a light and nutritious diet, will be of much service, (see *Art.* Aorta, § 2—6.)

10. III. Inflammation of Arteries. — Syn. *Arteritis*, or *Arteriitis; Artereitis*, Hildenbrand. *L'Artérite*, Fr. *Pulsader* —, *Arteri* —, *Schlagaderentzündung*, Ger.

Classif. III. Class, I. Order (*Author*, see *Preface*).

11. Defin. *Great and tumultuous vascular excitement, palpitations, anxiety, sense of heat and throbbing in the course of the principal arteries, followed by collapse of the vital energies, and occasionally by gangrene of a limb.*

12. This disease was not entirely unknown to the ancients, as Aretæus makes mention of inflammation of the aorta. But notwithstanding the incidental notice which was taken of inflammation of arteries by Morgagni, and Boerhaave, and afterwards by Grant, the attention of the medical practitioner was never directed to the subject, until J. P. Frank noticed it in a particular manner. It is, therefore, to the last-named author that we are chiefly indebted for the numerous researches of pathologists, respecting it in modern times. Since the appearance of Frank's work, arteritis has received due notice from Testa, Kreysig, Reil, Baillie, Burns, Corvisart, Schmuck, Portal, Scarpa, Hodgson, Travers, Ribes, Laennec, Breschet, Dalbant, Vaidy, Bertin, Bouillaud, Guthrie, Trousseau, and several others, and it is now generally recognised as a specific and most important disease, sometimes occurring primarily, occasionally consecutively and conjoined with other diseases, by no means of rare occurrence, and, in whatever form it presents itself, always threatening the most serious consequences.

13. Pathology of Arteritis.—Arteries, being composed of distinct tissues, may be supposed to be liable to all those kinds of inflammatory action, to which each of their constituent parts are most disposed. However frequently inflammatory action may originate in one rather than in more of the coats of an artery, it seems seldom to continue thus limited, but soon affects the rest to a greater or less extent. It may even seize simultaneously upon all the coats; but this is, I think, of comparatively rare occurrence. The individual tissues of an artery most frequently inflamed, in a primary manner, are the internal membrane of the vessel, and its connecting cellular tissue.

14. Arteritis may be *partial* or *general*, as respects its extension through this class of vessels; and it may present every grade of activity, from the most acute to the most chronic form. It generally attacks one or more of the arterial trunks and larger branches. When it affects the arterial capillaries, it constitutes, in the opinion of some pathologists, inflammation itself; but whether it can be demonstrated as existing in this latter class of vessels, or in what respects it may either differ or agree with inflammation when it does thus exist, are points which have not been yet settled by the few pathologists who have agitated the question.

15. Inflammation may possibly, however, seize upon a number of arterial ramifications in an organ, especially in an unhealthy habit of body, or in a part injured by external violence or excessive cold; but, when it is thus seated, all circulation through the part is quickly interrupted, owing to the effusion which takes place and destroys the permeability of the vessels. The consequences in such cases are, 1st, sphacelus and gangrene of an extremity or part, as we observe in cases of frost-bite; and, 2d, when the inflammation is limited to the capillaries of a circumscribed portion of an organ, particularly when this portion is surrounded by healthy structure, a breaking down of the texture, and its conversion into a foetid purulent-like matter, as in gangrene of the lungs, and some kinds of abscess formed in the parenchyma of several organs.

16. In constitutions possessing the power to limit the inflammation, which has thus seized upon a congeries of arterial vessels, by throwing out coagulable lymph, the extension of the inflammatory process to the larger branches and trunks is prevented; and, if the part already affected be an extremity, a distinct line of separation is thus drawn, or if it be situated in the centre of an organ, a cyst is thus formed by the lymph effused, tending both to the limitation of the inflammation, and to exclude, as it were, the parts which the loss of circulation has deprived of vitality, from the surrounding living textures, and from the contamination which the defect of this natural partition would allow to take place,

17. When the constitutional powers and vital energy of the vessels of the part are insufficient for the formation of the means of limitation here pointed out, the inflammatory action of the smaller arterial vessels extends itself to the larger trunks; and the affection of these, in addition to the preexisting inflammation of the small branches, increases the mischief; the gangrene extending itself without any line of separation being formed. In this case the constitutional powers fail rapidly, owing to the contamination of the surrounding structures and circulating fluid, from the absorption of the products of inflammation through the venous capillaries of the part, which seldom escape participating in the disease.

18. Such seem to be the results of inflammation affecting a congeries of arterial vessels, or the arterial branches and their ramifications throughout an extremity; and I conceive that those inflammations which are rapidly followed by sphacelation and gangrene, as well as some lesions considered under different heads, and which have been generally referred to the common seat and consequences of inflammation, are of the nature now described. It seems extremely probable that several lesions of a disorganised and disorganising description, following rapidly upon the first developement of deranged circulation, arise from the source now contended for; or, in other words, that some of the consequences usually referred to common inflammation, in conjunction with peculiarity of habit and of the part affected, actually spring from inflammation and obstruction of the arterial vessels, and cannot be otherwise satisfactorily explained.

19. Inflammation of arteries, like inflammations of all other parts, may, however, give rise to effects which will vary according to the degree of intensity of the morbid action, the coat or coats of the vessel in which it originates, or to which it extends, and the habit, diathesis, and constitutional energy of the patient. The duration of this disease, as well as its constitutional effects, will also depend upon the above circumstances; and in inflammation of this part of the system, more perhaps than in the inflammation of any other part of the body, excepting merely the rest of the circulating organs, the primary effects and products of the inflammatory act will be rapidly productive of ulterior effects, serious in their nature and results, even after the morbid action which originated them had altogether disappeared, and could be recognised only in those remoter but palpable consequences, some of which have been alluded to in the preceding paragraphs, and which will be more fully referred to in the sequel, particularly in the section on the morbid structure of arteries (§ 38.).

20. CAUSES.— 1st, The *predisposing causes* of arteritis are generally those of inflammation in general; but those which seem especially to favour the production of this disease, are the gouty and rheumatic diathesis; the middle and advanced epochs of life; certain constitutions of the atmosphere, or epidemic influence; peculiarity of climate, and whatever occasions a diminution of the crasis of the blood, or imparts to it an exciting influence on the vessels; indulgence in the use of much animal food, and vinous and spirituous liquors; a plethoric habit of body, particularly when conjoined to the sanguine and irritable temperaments; prolonged high temperature; intemperate and luxurious habits; the constitutional effects of syphilis or mercury; the suppression of accustomed discharges, particularly the sanguineous; reiterated or prolonged attacks of nervous, convulsive, or spasmodic diseases; and deficient secreting powers of the various emunctories, as the kidneys, liver, &c.

21. 2d. The *exciting causes* of this disease, besides those which are more commonly productive of inflammation, are congelation of parts from great cold, and the sudden exposure to a higher temperature; insolation; punctured, incised, lacerated, or contused wounds; surgical operations; ligatures of arteries after the operation for aneurism (CLINE, ABERNETHY, &c.), or amputation, and from tying the umbilical chord (OEHME); excessive suffering from long-continued operations; continued and fatiguing exertions; sudden and violent muscular action; the sudden extension of a part occasioning the elongation of the vessel and rupture of its internal coat; pressure in the course of arterial vessels; violent fits of passion; great mental emotions; exhaustion of the vital powers; puru-

lent and morbid secretions; animal matters and poisons absorbed into the circulation; chemical agents of any description introduced into the vascular system; and the sudden repulsion or suppression of exanthematous fevers and eruptive diseases. PORTAL records an instance of the disease which was occasioned by the repulsion of the eruption of measles. I met with an instance of inflammation of the internal membrane of the heart and arteries, in a fatal case of malignant scarlatina, with an imperfect and evanescent eruption on the skin. M. BRESCHET details several cases in which the disease was consequent upon erysipelas and chronic abscesses. I have found the internal surface both of the arteries and of the veins dark red, and softened, in two fatal cases of puerperal fever, characterised by evident signs of absorption of sanious matter from the uterus. A case also lately came before me of erysipelas followed by gangrenous escars on the sacrum, where the internal surface of the sanguiferous system, and particularly of the aorta and large arteries, as far as they were examined, presented a similar appearance. In all these cases the inspection had been made within eighteen hours after death.

22. The causes of arteritis consist, therefore, 1st, of those which act externally as respects the vessels; and, 2d, of those which irritate in a direct manner the internal surface of the arteries themselves, by being conveyed into the circulating fluid, the properties of which they may have previously changed. But, in whichever of those ways they may act, their first effect seems to be to change or influence the vital energies of the organic nerves ramified to the coats of this system of vessels.

23. 3d. *Anatomical characters.*—As to the particular tissue of the arteries, in which the inflammation originates, I am of opinion that a careful examination of the phenomena of the disease in connection with its causes and complications will warrant the inference, that, when it arises from those causes which act exteriorly to the vessels (§ 21.), and which are chiefly local in their operation, the inflammation is generally limited as to its extent, being confined to a part only of the arterial system, or to two or more considerable branches; that it often affects more than one of the coats of the vessel in this case; and that it generally assumes the sthenic characters, giving rise to those changes which usually result from this form of inflammatory action, such as the effusion of coagulable lymph, forming fibrinous concretions and false membranes in the interior of the vessel, obstructing or obliterating its cavity; red vascular injection, thickening and softening of its tunics; and suppuration, with or without ulceration of its internal membrane.

24. On the other hand, when the disease originates from causes existing within the vessels, and acting through the medium of the blood itself, and more especially when it is complicated with malignant and eruptive fevers, with erysipelas, &c., or is caused by the absorption of morbid secretions, &c. into the current of the circulation, the vascular excitement is rapidly followed by symptoms of an ataxic or asthenic character; the inflammation is chiefly confined to the internal surface of the vessels, but it extends more or less throughout the whole arterial system, and, in many cases, also to the inner lining of the cavities of the heart, and even of the veins. In cases of this description, the lesions of the arteries which it occasions consist chiefly of a dark red or violet-coloured injection of the inner membrane and connecting cellular tissue; great softening and friability of those tissues, with slight sanious infiltration of the walls of the vessel in different parts.

25. It should not, however, be overlooked, that the inflammation of an artery may frequently commence from local causes, and originate in, and be for a time confined to, a particular trunk or its branches, presenting all the signs of the sthenic form of inflammatory action, and yet, owing to causes lowering the vital energies of the frame, or to the absorption of the matters secreted from the inflamed vessel into the current of the circulation, or to both, may pass into the generally diffused and ataxic state of the disease.

26. SYMPTOMS OF ACUTE ARTERITIS.—These will necessarily vary according to the stage of the disease, the severity and activity of the attack, and the organic changes which the inflammatory action has occasioned in the affected vessels. I shall therefore adduce, *first*, those symptoms which characterise the disease previous to the supervention of those changes which affect this system so as materially to impede its functions, or to change the condition of the circulating fluid; and *next*, those signs which indicate important changes in the state of the vessel, and of the blood itself.

27. The *first stage* is one frequently of much obscurity; and when the inflammation is *limited* to the vessels of a single limb or organ, it is very difficult to distinguish it from the common inflammation of the part. While the internal tunics of the vessels are yet the chief parts affected, and the effusion of lymph into their interior has either not supervened, or not obstructed their canals, the patient generally feels, either after a rigor, or at first alternating with rigors, an increase of the pulsations of the vessels of the part, with a sensation of heat, uneasiness, or pain. When arteritis is more *general*, and particularly if it be connected with inflammation of the heart's internal surface, as occasionally occurs, the symptoms are those of fever of an extremely inflammatory type, as has been remarked by J. P. FRANK (*De Cur. Hom. Morb.* t. ii. p. 175.) and M. BOUILLAUD (*Traité Clin. et Exp. de Fièvres*, p. 175.); commencing in rigors, at first alternating with, and followed by great anxiety, irritability, restlessness, uneasiness, a sensation of burning heat, and remarkable pulsation, with increased sensibility in the course of the large arteries. The patient complains of general and unremitting throbbing throughout the system, sometimes felt more intensely in one part than in another. The surface of the body is hot, tumid, and injected; the tongue red, the papillæ erect, and its base furred and loaded; the bowels are costive; thirst is urgent and unquenchable; the urine scanty, voided with a sense of scalding, and high-coloured; the patient is distressed with palpitations. The pulse at this stage of the disease is strong, tumultuous, throbbing, full, and frequent; and the contractions of the heart hurried and tumultuous. To these are sometimes added cough, occurring in paroxysms, with fits of dyspnœa. When the inflammation extends to the aorta and internal

lining of the heart's cavities, the characteristic symptoms of inflammation of those parts (see Aortitis, &c.) are superadded to the above.

28. The *second stage* is chiefly characterised by the greater severity of the symptoms, indicating that serious changes are advancing in the internal coats of the vessels, and influencing not only the state of the vital energies of the sanguiferous system, but also the state of the blood. At this period of the disease, the pulse generally becomes extremely frequent, and often wiry, weak, and irregular; whilst the palpitations, anxiety, and paroxysms of dyspnœa increase. The tongue is either dry, the papillæ erect, and its centre furred with a dark mucus or sordes; or it is smooth, glossy, and of a dark tint. The patient is liable to startings and spasms in different parts of the body. The desire for drink increases; the strength sinks; the countenance at first shrinks, is pallid or haggard, but, towards an unfavourable close of this stage, it often becomes somewhat bloated, œdematous, or cadaverous, occasionally injected, and the lips purplish. The extremities are frequently œdematous; and they, as well as other parts of the body, are sometimes affected with wheals, ecchymosis, phlyctenæ, or large vesications. In some cases, effusions of sero-albuminous fluids take place in some of the shut cavities; the surface of the body is covered by a cold perspiration; the extremities become cold, and sometimes of a purplish red colour; and a low muttering delirium appears during the night, from which, at last, the patient is never entirely exempt. To these often supervene a tendency to syncope upon raising the head; irregular palpitations; weak, irregular, hurried, and quick pulse; and a quick, short, and difficult respiration; sometimes orthopnœa and distressing cough. Hiccup and convulsions at last appear, and the patient expires.

29. If the inflammation be seated in large trunks, the serum effused from the internal surface of the inflamed vessel necessarily comes in contact with the circulating fluid; but I believe it does not readily mix with it in persons of a sound constitution, or whose vital energies have not been materially affected, but forms a coagulum, which either sheaths the internal surface of the vessel, partially obstructing it, or altogether filling up its channel. In this case, the symptoms indicate interruption of the circulation through a considerable branch of an artery: the limb becomes œdematous, cold, leucophlegmatic, or purplish coloured, with irregular phlyctenæ and large vesications on its surface, which sometimes go on to gangrene; especially when the disease has extended to the collateral arteries, which, if they had remained unaffected, would have performed the functions of the inflamed and obstructed trunk.

30. When arteritis occurs in a weak or cachectic habit of body, the fluid secreted from the inflamed internal surface of the vessels, owing to the state of the constitutional powers, will not coagulate, but, being of a dissolved and sanious quality, readily mixes with the blood, and no interruption to the circulation through the inflamed vessels occurs: but the energies of life become depressed from the morbid state of the vital current thus occasioned, and many of the symptoms of ataxic or malignant fever manifest themselves; — such as great prostration of the powers of the frame; low delirium; an impeded and morbid state of the secretions and excretions; weak, quick, and irregular pulse; a cadaverous and lurid countenance; accumulations of dark mucous sordes about the tongue and mouth; flaccidity of the soft solids, with the rest of the phenomena described as consequent upon *inflammation of* veins.

31. Chronic Arteritis. — The more acute and active states of arteritis, although frequently admitting only of a doubtful recognition during the life of the patient, are more readily ascertained than the chronic forms of the disease. These latter, however, seem more frequently limited to particular arteries than the acute, and hence oftener produce local effects; but these are generally so slight, and of so equivocal a character, that they commonly escape detection, and are unattended to by the patient until the lesion on which they depend arrives at that degree of advancement which seriously disturbs the functions, and even the vitality, of the part. A very large proportion of the lesions which will be described hereafter (§ 38.) seem to originate in chronic states of inflammation; and, if not actually commencing in these states, they are frequently complicated with them. It will be unnecessary further to notice those symptoms which seem to indicate the presence of chronic arteritis, than to state that they consist of many of the signs already adduced as attendant on the acute forms of the disease, but in a much slighter degree; and frequently no functional lesion can be remarked. When, however, the circulation through the vessel becomes impeded or obstructed, we may infer chronic disease of the arteries, from the inequality or entire absence of the pulsation in these arteries supplying the part whose functions are most affected; from œdema, coldness, discolouration, vesications, or from signs of the gangræna senilis in a limb; or from a feeling of weakness, and a state approaching to paralysis of an extremity or part.

32. Complications. — The states of morbid association of which arteritis forms an especial part have been more frequently disclosed to us after death than recognised during life; nor is it to be expected that, in some of the associations in which it has presented itself, it can be ascertained by the most diligent investigation of the case previous to dissolution. We are still so much in want of faithfully observed cases of the disease, even in its simple and unmasked forms, and of correct information on various topics respecting its history and pathology, as to render our diagnosis imperfect and doubtful; and how much more difficult must be our attempts to recognise it in its complicated forms, when it is masked by other diseases, the phenomena of which obscure it from the observation of the practitioner, and even abstract the attention of the patient himself from the feelings it may awaken. In noticing, therefore, the complications of which this disease often forms a part, it is with the sole view of turning attention to their importance, and in order that the circumstance may receive due consideration, when we give our prognosis respecting those maladies with which it has been found associated, and when we devise means for either their relief or their removal.

33. Inflammation of the arteries has been observed in fatal cases of inflammatory and malignant

fevers, and in those which have been characterised by great vascular excitement at their commencement, with symptoms of ataxy during their progress. In the great majority of such cases, it is a consecutive affection occasioned either by a greater concentration of the morbid action in a particular system, as explained when treating of *fevers;* or by an alteration of the properties of the blood, owing to hurtful materials having accumulated in it from deficient action of the eliminating organs, or to a morbid state of the nervous influence imparted to the blood from the vessels in which it circulates. (See the article Blood.)

34. Owing to similar causes, *arteritis* is sometimes consecutive of *eruptive fevers*, particularly when the eruption, and the morbid evacuation of which it consists, are imperfectly developed or prematurely suppressed; or it may supervene to *small-pox*, occasioning the most dangerous part of the symptoms forming the secondary fever of this disease. In cases of this description, the *arteritis* is almost always general, chiefly limited to the serous membrane of the arteries, but extending also to the same membrane of the veins; and evidently induced by the altered state of the blood, and the presence in it of hurtful materials. To this cause chiefly is to be imputed its occasional occurrence during *erysipelas, phlebitis*, and as one of the chief lesions observed in fatal cases of those diseases to which the term *puerperal fevers* has been applied. The complication of arteritis with *phlebitis* is one of the most frequent which occurs. That this should be the case, we might infer from the circumstance of the same causes generally acting upon both divisions of the vascular system, particularly those which act through the medium of the circulating fluid. M. Breschet found inflammation of the internal surface of the veins in a very large proportion of the cases (8 in 13) of arteritis which he has detailed at length in his interesting memoir.

35. Arteritis has likewise been found associated with *inflammation* of the *heart*, with that of the *lungs*, and with *tetanus*, particularly traumatic tetanus. A case of this last complication is alluded to by the writer of an able article in the second volume of the Medico-Chirurgical Review. It has also been observed, although rarely, conjoined with serous effusion into the shut cavities, particularly the pericardium, pleura, and peritoneum.

36. Diagnosis and Prognosis. — It has been very justly remarked by the writer to whom I have already referred, that, until numerous and diversified observations in clinical practice, illustrated by the examination of fatal cases, shall have further enlarged our knowledge of this malady, any attempt to delineate the symptoms which are diagnostic of its presence must necessarily be somewhat imperfect. But it may generally be inferred, — when the principal symptoms which have been enumerated appear — when the heat and pain attendant on this, as on other inflammations, are not concentrated in one part or organ, but are more or less generally diffused, particularly in the course of the arterial vessels — when these sensations are accompanied with an audible or perceptible impetuosity of action, propagated from the large trunks to the smaller and more superficial ramifications — and when, moreover, anasarcous injection of the surface or of the limbs, followed by wheals, vesications, or ecchymosed patches, supervene, — that the disease is inflammation of the arterial system, either in its partial or general form.

37. The Prognosis of arteritis may be said to be, upon the whole, unfavourable, even as respects its more immediate effects, in the acute states of the disease; but chiefly as regards its remote consequences in its chronic forms. The prognosis is more unfavourable when it is complicated with, or supervenes on other diseases (§ 33—35.). The morbid changes which it usually occasions are fully described in the next section of this article.

Before proceeding to offer any observations on the *treatment* of arteritis, I will describe the various changes of structures which arteries present, as the greatest proportion of these changes are produced by inflammatory action in some one of its various grades or states.

38. IV. Morbid Structure of Arteries. 1st, *Lesions of the individual coats of arteries.* — *A. Redness* of the inner membrane of arteries is often observed in post mortem examinations. *a.* It seems to proceed from *three* causes: 1st, from the imbibition of the colouring particles of the blood remaining in the vessels, being entirely the consequence of death, and the result of incipient decomposition; 2d, from a change in the state of the blood occurring in the course of the disease which occasioned death, and existing some time before this event; and, 3d, From a morbid or *injected* state of the capillaries ramified in the coats of the vessel, or terminating in this membrane. In an epidemic amongst horses, which occurred at Paris in 1825, characterised by symptoms of disease of the thoracic viscera, no morbid appearances were found in the lungs, but the internal membrane of the large vessels was uniformly red, and the muscular structure of the heart remarkably softened. From the experiments of Gendrin (*Hist. Anat. des Inflam.* t. ii. p. 9.), it is evident that the same varieties of colour, which we occasionally observe in arteries after death, may be produced by artificial irritation. There is, however, this important difference, — that when their redness is produced artificially, it is accompanied by other alterations of tissue, such as softening, serous or purulent infiltration, &c.; whereas, in almost all the cases where the arteries have been found of a red colour throughout, the change was unattended by any other morbid appearance in them. I believe that this coloration of the internal membrane of the arteries, as well as of the cavities of the heart, is more frequently owing to a morbid condition of the blood itself, than to any inflammatory change in them. This opinion is confirmed by the circumstances and states of disease in which it commonly occurs; these chiefly consisting of depressed vital energies, deficient secreting power, and a consequent morbid condition of the blood itself.

39. *b.* The internal membrane of arteries sometimes loses its *tenuity* and natural *transparency*, either in a few isolated points merely, or through a great extent of its surface. This state may amount to considerable *thickening* and *opacity;* but in many cases these appearances do not depend upon any remarkable change in this mem-

brane, but upon an albuminous exudation in its connecting cellular tissue.

40. *c. Softening* also takes place in this membrane, which is sometimes so friable as to be reduced to a pulpy mass by the slightest scraping with the scalpel. Possibly, owing to this state of the inner membrane, its *laceration* may take place upon stretching the vessel by the more violent motions of the body, or of a limb.

41. *d. Rupture* or laceration of the internal coat of an artery is sometimes met with: it necessarily occasions an effusion of lymph from the lacerated part, and the projection of the flaps of the divided coat into the canal of the vessel, either partially or entirely obstructing it. To this occurrence is chiefly to be imputed the cases of spontaneous obstruction of arteries, which are sometimes met with. This subject has been well illustrated by Mr. TURNER, in the third volume of the Transactions of the Medico-Chirurgical Society of Edinburgh.

42. *e. Ulceration* of the internal membrane of arteries is not infrequent. The ulcers are generally round; occasionally one only is to be found. Sometimes the large arterial trunks, and particularly the aorta, are studded with them. But this is rarely observed, unless other alterations exist in the subjacent tissues, such as ossification, softening, &c. M. BOUILLAUD is of opinion that the ulceration of the inner coat occasionally admits of cicatrisation.

43. *B.* The MIDDLE COAT is more frequently diseased than the internal. It is often *soft* and *friable*, and deprived of its natural elasticity; giving rise to serious modifications of the functions of the circulating system. M. ANDRAL has found this coat remarkably *hypertrophied*; the yellow fibrous tissue of which it is composed being as evident in the human subject as it is in the horse. This change may be confined to particular parts, occasioning irregularities in the diameters of the arterial canals, or it may extend throughout a whole artery. The fibrous coat may also become *atrophied*. In this state it approaches to the appearance of cellular tissue, and is much thinner, resembling the tunic of veins; and the artery loses its elasticity and collapses when divided. This coat may also acquire much rigidity, and be transformed into *cartilaginous* or even *osseous* rings, embracing the whole circumference of the vessel. This change is rarely met with in the aorta, but it not infrequently occurs in large arterial trunks, as the femoral artery, &c. *Ulceration* may extend to and penetrate this coat, most frequently advancing from the internal membrane.

44. *C.* The EXTERNAL OF CELLULAR COAT of arteries is liable to fewer alterations than the other coats; it often remains sound when they are extensively diseased, when it has alone to sustain the column of blood injected through it. But it also frequently participates in the changes of the other coats, becoming *ruptured* from the pressure of the stream of blood thrown into it, and more rarely *ulcerated*.— The foregoing changes of the individual coats of an artery combine to affect its functions and condition, and give rise to important alterations of its structure and of its calibre, which may be increased, diminished, or entirely obliterated. Each of these requires a separate but brief consideration.

45. 2d, *Changes of the structure and calibre of arteries.* — *A.* ANEURISM. *a. True aneurism, or dilatation of arteries* occurs; 1st, in a *part* only of its circumference, and, 2d, in its *entire* circumference: the latter is the more frequent occurrence of the two: it may embrace but a small extent of the vessel, or it may extend to a considerable portion; as, for instance, to nearly the whole of the aorta. Dilatation of a part only of the circumference of an artery is rare, but certainly not so rare as to warrant some authors in disputing its existence. M. ANDRAL states, that on more occasions than one he has traced distinctly the three arterial coats passing over the walls of a sac which seemed as if appended to the artery, with the cavity of which it communicated. Dilatation either of a part, or the whole, of the circumference of an artery, con-constitutes the *true aneurism* of authors; and according to its extent it may constitute *simple dilatation*, or true aneurism in its first stage, and *sacculated aneurism*, or the advanced state of this disease.

46. The coats of a dilated portion of artery, although not ruptured, may be otherwise altered. They are frequently thinner than natural, and the middle coat is generally deprived of its elasticity. In this state the vessel yields like a vein to the distending impetus of the blood. In other cases, the coats of the dilated portion of artery are hypertrophied. M. ANDRAL likens this state to the dilatations of the stomach and heart, which are often accompanied with an increased thickness of their parietes.

47. *b. False Aneurism.*—*Mixed aneurism.*—*Dilatation with rupture* of one or more of the coats, constituting the *false aneurism* of authors, is another frequent alteration. The internal and middle coats are those most frequently ruptured, the blood coming in contact with the external or cellular coat or sheath, dilating it in the form of a pouch, and thus forming the aneurismal sac. The parietes of this sac are generally much thicker than the cellular sheath of the vessel was originally, owing to the gradual condensation of the surrounding cellular tissue from the pressure of the tumour, and the additional envelope it thus acquires. The interior of the sac is filled more or less with fibrinous coagula, arranged in concentric layers, the more exterior of which frequently become so dense as to be distinguished with difficulty from the parietes of the sac. Around the exterior of the sac a degree of irritation is induced, giving rise to adhesions, which unite it more or less firmly to the surrounding parts. But these parts suffer other changes, particularly as the aneurismal tumour increases: they are mechanically compressed or displaced; or they are worn away by absorption promoted by its pulsations, or by inflammatory irritation terminating in ulceration and destruction of parts. This effect upon the adjoining structures has been shown under the article ANEURISM of the AORTA, and it is therefore unnecessary to illustrate it further. According to some authors, *false aneurism* consists of the ulceration or perforation of the internal coats, and of the dilatation of the external tunic only; the changes above described constituting *mixed aneurism*.

48. *c. Diffused aneurism, &c.* — In general the irritation created around the sac attacks, after a time, the sac itself, occasioning its ulceration and

perforation. Hæmorrhage is then the result, which may be so great as at once to occasion death. It is frequently arrested by the anatomical relations of the part: as when blood flows into the pericardium; or when the blood passes into the parenchyma, or loose cellular tissue connecting different organs or structures; in which case it passes into the state of *diffused aneurism*. In some cases the hæmorrhage is arrested by adhesions formed around the sac, constituting a second envelope to it, which confines the blood, and prevents it for a time from being further effused. Perforation of the sac, however, may take place without hæmorrhage, or even the production of diffused aneurism. This happens when a part in contact with the sac supplies the place of that portion of its parietes which has been destroyed, and affords sufficient resistance to the escape of the blood. Thus we have seen that the blood, in aneurism of the Aorta, may actually wash the partially destroyed vertebræ, no effusion taking place till still further destruction is occasioned; and the tumour, in other cases, coming in contact with the periosteum, produces thickening of this structure, or the secretion of an osseous matter from it which partially surrounds the sac, forming an envelope to it, and preventing the escape of its contents until this also is destroyed.

49. In *false* and *mixed aneurisms*, the inner and middle coats are first perforated or ruptured, and the *third* coat either remains entire, or gives way at some remote period, and thus a *secondary diffused aneurism* is formed (§ 48.). But there is another form of diffused aneurism, in which all the coats of the vessel are ruptured or perforated at once, and the blood, passing entirely out of the vessel, forms no sac, but is diffused in the adjoining parts; or it impacts the cellular and parenchymatous structure in its vicinity into a species of sac or envelope; or it is poured out into a shut cavity, or into some organ, whence it may be discharged externally, thus constituting *primary diffused aneurism*. In the majority of cases, however, the aperture in the artery is the result of ulceration of one or more of the coats of the vessel, the remaining tunic giving way before the impetus of the circulation; the blood being either confined by the surrounding parts, or escaping into a cavity, according to the situation of the artery, and of the aperture in it. This perforation and rupture of all the coats occur chiefly in the arteries of internal viscera, as in the splenic, hepatic, emulgent, iliac, and other arteries.

50. Aneurisms may *terminate favourably*, a spontaneous cure being sometimes effected by some one of the following processes: — 1st, by a gradual contraction of the sac, and absorption of the coagula; 2d, by the compression exerted by the sac upon the part of the artery immediately above it; 3d, by gangrene of the sac and obliteration of the artery; 4th, by inflammation or abscesses in the vicinity, and the coagulable lymph thrown out, obliterating the artery, as in the preceding case; and, 5th, by inflammation of the sac extending to the artery, and giving rise to adhesive inflammation of its interior, and ultimately to its obliteration.

51. *B.* Narrowing of arteries is either congenital or the effect of disease; when the latter, it is very frequently associated with, or occasioned by, ossific deposits,—a change which will be considered in the sequel. It is chiefly in the aorta and large vessels departing from it that we meet with either congenital or morbid narrowing. *Congenital* contraction of the aorta is generally connected with extreme thinness of its parietes, and in some cases this defective developement has been so remarkable that the abdominal aorta has not equalled the usual size of the external iliac artery.

52. The contraction of the aorta, or of an arterial branch, may exist throughout its extent, or may be confined to a particular part. The abdominal portion of the aorta is more frequently contracted (see Aorta.) than the thoracic; and when the former is narrowed, the latter is often dilated. Sometimes, however, the artery retains its natural calibre both above and below the constricted part: instances of this have been recorded by M. Paris, in the second volume of Desault's Journal, and by M. Reynaud (*Journ. Hebd. de Méd.* t. i. p. 161.). In many cases of constriction such as I have now noticed, it is difficult to determine whether this change has been congenital or the result of disease, inasmuch as the coats of the vessel have appeared unaltered from the healthy state. But there can be no difficulty in determining in favour of the latter alternative, when the coats of the contracted portion are thickened, or contain ossific deposits, or are otherwise changed. When the contraction is the result of disease, it is sometimes very remarkable, the canal of the vessel being nearly obliterated. The narrowing found in the principal trunks or branches of arteries is almost always the result of inflammatory disease; most commonly of ossific deposits, or of chronic inflammation.

53. *C.* Obliteration of arteries is frequently observed. This lesion may occur in any part of the system, even in the aorta itself, but it is most commonly met with in the second or third order of arteries. The smaller branches may also be obliterated; but they less frequently become the objects of examination than the larger trunks. The canal of an artery may be obliterated, 1st, by fibrinous coagula adhering firmly to the parietes of the vessel, or incorporated with them; 2d, by the conversion of the vessel to a ligamentous chord; 3d, by osseous concretions, or other morbid growths, filling entirely its cavity; and, 4th, by the advanced progress of aneurism to a spontaneous cure.

54. *a.* The *first* species of obliteration has been found in the aorta by Professor Monro (*Edin. Journ. of Med. Science*, vol. ii. p. 351.); the part affected being somewhat contracted and filled up by a plug of fibrine, which adhered to the surface of the vessel by coagulable lymph. This form of disease is common in the arteries of the extremities, particularly the lower, and is sometimes owing to the rupture of the internal coat of the vessel. It occurs also in cases of gangræna senilis, and, with the *third* species (§ 56.), is a frequent cause of the gangrene. It seems most probable that it is a more immediate consequence of inflammation than the *second* species.

55. *b.* The *second* form of obliteration is not uncommon in large branches of arteries, and has been found, in two cases, in the aorta: it is evidently a more remote cause of inflammation than the foregoing. The circulation being entirely ob-

structed, by the coagulable or fibrinous lymph poured out by the inflamed or ruptured internal membrane, and by the coagula thus formed, and being kept up by the enlargement of collateral branches, the obstructed part is deprived of its functions, and subsequently undergoes those changes which all vascular or other canals experience when they no longer are pervious to the fluids which usually circulate through them, — they have the fibrinous coagula, which have been formed in their cavities, and the lymph effused between their coats, absorbed, and their coats become condensed into ligamentous chords.

56. *c.* The *third* species has been met with in the aorta by Dr. Goodison (*Dub. Hosp. Rep.* vol. ii. p. 193.), and M. Velpeau (*Rev. Méd.* 1825, t. iii. p. 326.) In Dr. Goodison's case, an osseous deposit surrounded the canal of the vessel, which was completely filled at this part with a dense fleshy and fibrinous mass, resembling the structure of the heart. A similar obliteration also existed in the iliac arteries. In M. Velpeau's case, the obliteration was owing to the formation of a scirrhous or carcinomatous tumour in the vessel, resembling similar tumours developed in different parts of the body. Obliteration by polypous or other growths, by fibrinous coagula and coagulable lymph, by ossific deposits, &c. are also found in large arterial branches, especially in those supplying the lower extremities. The obliteration of the arteries by ossification is one of the principal causes of the gangrene of aged persons. When a considerable artery, or even the aorta, becomes either much obstructed, or entirely obliterated, in any of the above ways, the circulation is generally carried on by enlarged collateral vessels.

57. *d.* The *fourth* species has been observed in several large arterial trunks. Dr. Monro's case of obliteration of the aorta may be partly ascribed to this cause; the coats of the vessel, although entire, being dilated below the constricted part.

58. *D.* Albuminous and purulent matter. — M. Gendrin (*Hist. Anat. des Inflam.* t. ii. p. 9.) has clearly proved, by his experiments, that, when an artery is artificially irritated, its parietes soon become injected, swollen, softened, and infiltrated by a serous fluid; its internal surface is coated by an *albuminous exudation*, and *collections of pus* form, either in the interior of the vessel, or between its coats. He has, moreover, demonstrated that, if the artery continues full of blood during the experiment, this fluid is coagulated, and altered in a variety of ways by the morbid secretion poured into it from the internal surface of the inflamed vessel. Similar appearances have been observed from disease, particularly in the aorta and large arterial trunks, where they are most obvious. Mr. Hodgson and M. Bouillaud found the internal surface of the aorta lined with a perfect *false membrane*; and when this was removed, the surface of the vessel was of a bright red colour. M. Andral has observed the internal membrane of the artery raised by small *abscesses*, sometimes as large as the size of a nut, situated between the internal and middle coats. It is probably to the bursting of those into the vessel that ulceration of the internal tunics is owing. Pus is also sometimes found in the interior of arteries, either unmixed with the blood, or mixed with it and altering its appearance.

59. *E.* Atheromatous matter is frequently found between the inner and middle coats of arteries. It was first noticed in this situation by Monro and Haller. It is generally of the consistence of suet, of a cheesy opaque appearance, is greasy to the touch, with minute gritty particles thinly scattered through it. In some cases it resembles more nearly a semi-concrete pus, and seems to result from the changes which pus may have undergone subsequently to its secretion. In other cases the atheromatous matter abounds in gritty particles, which occasionally even exceed the suety part; and the deposition thus passes into the form of a calcareous concretion. It is extremely probable that these varieties of morbid formation are connected with chronic inflammatory action of the coats of the vessel.

60. A variety of the atheromatous matter has been described by Morgagni, Scarpa, Stentzel, and Craigie, under the denomination of *steatomatous* deposition. The name, however, as Dr. Craigie has remarked, is not well chosen, inasmuch as this formation is not adipose, but a firm cheesy or waxy matter, of a yellowish or fawn colour. It seems merely a more concrete variety of the foregoing, and differing from it chiefly in the absence of gritty particles. It is more frequently found at the bifurcations of arteries, but it is not limited to those situations; and is generally deposited between the inner and middle coats. When the quantity of this matter is considerable, it encroaches on the calibre of the vessel. This substance is met with either alone, or with patches of calcareous deposit. It probably derives its origin from a similar source to the atheromatous matter; and, according to Scarpa, always terminates in ulceration: but this is not invariably the case, as it has been observed, particularly when unattended with calcareous formations, distending the coats of the vessel to a great extent without any ulceration. This change, however, takes place very generally, either when the deposition of this matter is considerable, or when associated with calcareous formations. When ulceration takes place, the coats of the vessel are soon destroyed to a greater or less extent, and rupture follows; taking place, as shown by Mr. Hodgson, in a transverse direction to the axis of the vessel, and giving rise to extensive or fatal hæmorrhage, or to circumscribed or diffused aneurism, according to the situation of the aperture in the vessel.

61. *F.* Calcareous *or osseous concretions* are the most frequent morbid appearances presented by arteries. These concretions, however, differ from healthy bone chiefly in wanting the fibrous structure, in not being necessarily deposited in a cartilaginous matrix, in consisting of a larger proportion of phosphate of lime, and less animal matter, and in presenting an irregular, homogeneous, and unorganised appearance. Bichat and Baillie considered that the larger proportion of persons above sixty years of age have some part of the arterial system affected by these formations. This change is very seldom observed in early life. Young found it, however, in an infant; Wilson in a young child; and Andral in the aorta of a child of eight years of age. M. Andral has met with ossific laminæ in the aorta, in five or six persons of from eighteen to twenty-four years of age: and an extensive ossification of the

superior mesenteric artery of a person not quite thirty. This species of formation always is seated between the muscular coat and the internal membrane, which it often detaches from its connections; and it originates either in the atheromatous matter described (§ 59.), the place of which it sometimes takes; or in those whitish patches already noticed, which apparently consist of an albuminous exudation formed between the inner and middle coats, and which pass from the albuminous, first to the cartilaginous state, and subsequently to that of bone.

62. *a*. But this is not the only change which the vessel undergoes; for, whilst the calcareous deposits are going forward, the middle coat becomes either hypertrophied, thus contributing to the thickened appearance which the vessel sometimes presents, or atrophied, being apparently replaced by the calcareous concretion, and leading to the mistaken opinion that this coat itself has been transformed into bone. The osseous concretions exist in various forms: sometimes they consist of minute grains; at other times of irregular plates of different sizes; occasionally they incrust the the artery and convert it into an inflexible tube; and, more rarely, they give the sensation of a number of small bodies moving on each other, and as if jointed together.

63. The ossific concretions may be very considerable, without in any way changing the calibre of the vessel, or even its form; or they may project into it so considerably as to obstruct, or even to obliterate its canal. They thus occasion *gangræna senilis*. It has even been supposed, — and the opinion is very probable, — that they may project through, or penetrate, the internal membrane, and fall into the cavity of the vessel; and, being conveyed onwards with the current of blood until they arrive at arteries of smaller calibre, may thus completely obstruct them. The *calcareous concretions* found in some rare instances plugging up the canal of the vessel, evidently are produced in this way.

64. *b*. As to the *comparative frequency* of this lesion in various arteries, I may add a few remarks, derived from the interesting materials supplied by M. Andral (*Anat. Path.* t. ii. p. 395.). The aorta is the most liable of any to ossification in some part or another; but every one of the branches proceeding from it may likewise be the seat of this change. The coronary arteries are frequently ossified, both in their trunks and in their subdivisions. The large vessels which arise from the arch of the aorta often present at their origin a bony ridge projecting into their interior. The cerebral arteries of old persons are frequently found studded with cartilaginous and osseous laminæ; and M. Bouillaud has shown that this change disposes remarkably to apoplexy with sanguineous extravasation. Ossification is very common in the splenic artery, but exceedingly rare in the hepatic, and coronary artery of the stomach. A bony ridge is often found at the origin of the common iliacs. The arteries of the lower extremities are not infrequently the seat of these concretions; and they sometimes occur in the radial artery of aged persons. M. Andral has never met with this alteration in the hypogastric artery. Haller met with it once in this vessel (*Opusc. Path. Obs.* 59.); and this is the only case of the kind on record. — All the morbid depositions described above have been found in the pulmonary artery, but much more rarely than in the aorta and vessels proceeding from it.

65. *c*. *Origin of osseous formations in the arteries.* — The ossification of arteries has been ascribed by many authors to slight chronic inflammatory action. The experiments of M. Rayer and M. Cruveilhier seem to confirm this inference, as an occasional occurrence at least, particularly in the fibrous and cartilaginous structures: increased vascular action of those structures, artificially excited, being generally followed by ossiform depositions; but, in a number of cases, particularly in those where the deposit takes place in the cellular tissues, no inflammatory action can be detected previously to this change: besides, increased vascular action frequently exists, without being attended with ossiform depositions. This lesion, therefore, cannot be algether ascribed to this cause, although frequently resulting from it, in a certain order of tissues. It would be more correct to consider it merely as a consequence of disorder of the natural process of nutrition and secretion, frequently induced, in particular tissues, by a chronic state of inflammatory action. But to what cause is this disorder of the nutritive function to be imputed, particularly when it occurs in parts which have not evinced any sign of inflammatory action, as in the cellular tissue connecting the internal coats of arteries? The importance of this enquiry may appear from the very great proportion of persons, in advanced years, who are affected, in some organ or tissue, with this lesion, and from the remarkable part it performs in the production of a number of diseases of the most dangerous description.

66. In answer to this, M. Andral very plausibly observes, that physicians have frequently noticed the existence or succession of three different forms of calcareous productions in persons of a gouty diathesis: 1st, gravel and urinary calculi; 2d, hard concretions in the small joints; and, 3d, ossiform productions in the arterial system, and other parts. Is it not, therefore, probable that morbid ossification proceeds from a similar cause to those other calcareous formations? We have seen that gout generally originates in an excessive use of animal food, conjoined with deficient assimilative and secreting powers of the frame. The highly azotised blood of a person thus circumstanced becomes surcharged with urea and phosphate of lime, as evinced by the state of the urinary secretion, which always, in such cases, abounds with uric acid and the earthy salts. The experiments of M. Magendie have proved, that by changing the diet of a person who has been living chiefly upon animal food, and by substituting substances containing no azote, the uric acid and phosphates disappear from the urine. May we not, therefore, infer that in consequence of the excessive use of animal food, conjoined with imperfect assimilative and secreting powers, these substances will accumulate in the blood to a hurtful extent; the urinary organs being unable to eliminate them entirely from the circulating fluid? The necessary result of this state of the blood will be, that these substances will occasionally be deposited in other parts, giving origin to the uric acid concretions

found in the small joints, and to the phosphate of lime deposits found in the arterial system and some other parts. From this it will be apparent that the ossific formations met with in the arteries are derived from a similar origin to that which has been more fully explained under the articles, Gout, and Urinary Calculi. The increased vascularity, observed frequently to co-exist with the morbid secretion of calcareous matter, may proceed from the irritation produced in the capillaries by the morbid matters circulating in them; or it may be a necessary attendant upon the secretory process, especially when this process is of a morbid description; or the accidental occurrence of irritation and increased vascular action in the interior coats of the vessel may prove the determining cause of the ossiform deposit, to the formation of which a disposition had previously existed, owing to the excessive abundance of the phosphates in the blood. If this explanation of the origin of ossification in the arteries be correct, a rational method of preventing and combating this lesion is presented to us for adoption.

67. Treatment. — *A.* The more *acute states of arteritis* require the same general principles and details of treatment as inflammations of other parts. General and local depletions, calomel, and oleaginous purgatives, cathartic enemata, diaphoretics consisting chiefly of camphor, antimony, and opium, &c. (F. 39. 184. 358. 460.); cooling diluents, and the rest of the antiphlogistic regimen, are indispensably requisite. After a copious depletion, practised so as not to occasion full syncope, the following will be found of service in preventing the re-accession of increased vascular action.

No. 33. ℞ Camphoræ rasæ gr. iij.—v.; Pulv. Jacobi Veri gr. v. (vel Antimonii Tartar. gr. ss.); Calomel. gr. xii.; Opii Puri gr. ij.—iij.; Conserv. Rosar. q. s. ut fiat Bolus, statim post venæsectionem capiendus.

68. In the more *acute states* of arteritis, *digitalis*, and emollient diluents, with nitrate of potash, or the vegetable acids, may be exhibited. After depletions have been carried as far as may be considered prudent, and when there exists no constitutional vice contra-indicating the practice, the mercurial preparations may be given to the extent of affecting the gums. The repetition of the bolus now prescribed will generally be sufficient for this purpose, the bowels having been well evacuated previously. In this form of arteritis, Hildenbrand recommends (*Instit. Med.* t. iii. p. 26.) cold epithems over the seat of the inflamed vessels, the internal use of lemon ices, and the cautious exhibition of the *superacetate of lead* and opium (F. 206.), after depletions have been practised. *Colchicum* may also be given, or substituted for digitalis; but these medicines require great caution in their exhibition, particularly after large depletions, and when antimonials precede or accompany them. The *diet* ought to be very low, cooling, and chiefly farinaceous; and, during recovery, the more heating kinds of animal food should be abstained from. During the disease, as well as during convalescence, *perfect tranquillity* of body and mind should be insisted on.

69. In some states of acute arteritis, it may not be advisable to lower the powers of life too much; as we may thereby risk the occurrence of arterial throbbings, the extension of disease along the internal membrane of the vessel, and the vitiation of the circulating mass by the secretion poured into it from the inflamed surface. The tendency also to limit the inflammation by the formation of coagulable lymph, when the period of resolution is past, may also be overcome by too great depression of the vital energies, which ought therefore to be supported in extreme cases, and not depressed too low in others.

70. *B.* The more *chronic states* of arteritis require cooling purgatives, occasional depletions, and a low refrigerant diet and regimen. A vegetable, particularly a farinaceous diet, is extremely serviceable in these states of the disease, chiefly by preventing the consequences to which they usually lead. The richer and more stimulating kinds of animal food, and particularly pork, should be constantly avoided, and all tendency to plethora suppressed or subdued. In the chronic as well as the acute diseases of arteries, physical and moral tranquillity is particularly required. The abdominal secretions and excretions ought to be duly examined and regulated, undue sinking of the vital energies prevented or counteracted, pure air prescribed, and due attention paid to the first indications of disorder of the digestive functions.

71. *C.* The *consequences* of inflammation of arteries, whether those more palpable changes which constitute the different kinds of *aneurism*, or those which are merely matters of more doubtful inference, can be treated only upon the above principles: above all, vascular plethora must be avoided, and tranquillity observed. There is, however, one fact, which, I consider, should not be lost sight of by the practitioner, and which is the result of attentive observation; namely, that, even in aneurism, more mischief than advantage will be derived from depressing the vital energies of the frame too low, than from observing a more moderate, or rather a less vigorous, mode of treatment. When carried too far, relatively to the circumstances of the case, those guards which the restorative powers of the frame set up against the extension of the disease are thrown down; the destruction of adjoining parts extends; the fibrous coagula which fortify the weakened parietes of the vessel, and tend even to a spontaneous cure of the disease (§ 50.), assume, as Mr. Guthrie has very justly remarked, a loose and spongy state, and allow the blood to pass through it, or between it and the coat or coats of the vessel; and the disease, consequently, makes rapid progress. There can be no doubt, as hinted at by this eminent surgeon, that the extension, and ultimately the bursting, of aneurisms, are not altogether owing to the impetus of the blood in the vessel; and that, therefore, the treatment which is solely directed to this point must be deficient. The suggestions now offered (§§ 69, 70.), as well as those stated in the article on Aneurism of the Aorta, will be sufficient to guide the practitioner in this respect.

72. *D.* The *complications* of inflammations of arteries, and their consequences (§ 32. *et seq.*), require attention to the fact, that, when arteritis supervenes in the course of other diseases, it is generally during those stages which are characterised by depression of the constitutional powers, when the circulating fluid becomes materially changed from its healthy condition, and most

probably loaded with an unusual quantity of unassimilated, morbid, or irritating materials. Indeed, these are the circumstances which favour the occurrence of all inflammations affecting the different circulating systems — the lymphatic as well as the venous; and they account at the same time for the very frequent association of *arteritis* with *phlebitis*, particularly in the last stages of febrile and eruptive diseases. These considerations naturally suggest the propriety of having recourse to such measures as may be best suited to individual cases for the prevention of inordinate depression of the energies of life, during the advanced stages of diseases, when we fear the supervention or the existence of arteritis; or as may support those energies, whilst we excite the organs whose functions are chiefly to eliminate irritating and hurtful matters from the circulation. By thus opposing too great depression, further deterioration of the blood is more likely to be prevented than by any other indication of cure; whilst the removal of the cause, — the source of irritation of the internal surface of the vessels, — presents a probable chance of the disappearance of its effects. (See Aorta — *Diseases of*.)

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ARTHRITIS. (See Gout.)

ARTS and EMPLOYMENTS. — 1. Pathology. — *Etiology.* — An enquiry into diseases caused by the prosecution of the various arts of civilised life is of the utmost importance to the scientific professor of medicine in all countries, but particularly in this; for in no other country are the useful arts so extensively prosecuted as in Great Britain. The great importance of the subject has been acknowledged by the success of the able works of Ramazzini, Merat, Patissier, and Thackrah, on the diseases of artisans.

2. As it would be foreign to my plan to take into consideration at this place the diseases occasioned by the numerous arts which furnish employment and subsistence for a very large part of the population of this and many other countries; particularly as these diseases will be considered in their more important relations in other places, and many of them under distinct articles; I will here confine myself to a succinct account of the effects which the prosecution of the various useful arts directly or indirectly produce in the frame; interspersed with a few remarks as to their influence in modifying the characters of various diseases, and as to the means by which their injurious effects may be partially prevented or counteracted.

3. In offering these observations, I will only, in some respects, observe the arrangement adopted by Ramazzini, and closely followed by Fourcroy and Patissier. This arrangement is founded on the nature of the causes producing the diseases to which artisans are liable. The First Class of causes consists — 1st, Of *confinement, and insufficient ventilation*; 2d, Of *undue exertion*; and, 3d, Of *sedentary habits*. The Second Class comprehends — 1st, *Undue exertion of particular parts, and insufficient exercise of other parts*; 2d, *Unnatural or constrained positions in different employments*; and, 3d, *Temperature and moisture.* The Third Class embraces those causes which consist of material molecules, and which, coming directly or mediately in contact with the body, in the state either of vapour or of minute disintegration, penetrate the organs, and disorder their functions. These are — 1st, *Mineral molecules*; 2d, *Vegetable molecules*; 3d, *Animal molecules*; and, 4th, *Mineral and vegetable molecules* acting mechanically. On the operation and effects of each of these, as being intimately connected with the nature, complication, and removal of diseases, I proceed to offer a few remarks.

4. I. Class first. 1st, *The hurtful influence of confinement, and of insufficient ventilation*, is great in proportion to the youth or early years of those who are thus circumstanced. In the majority of factories, artisans are congregated in great numbers, necessarily confined during the greater part of the day in the same apartment, which, being usually warmed by artificial heat, — by pipes conducting heated air or steam, — have not the air renewed with that rapidity which necessarily obtains in apartments provided with the fire-places in common use. The consequences are, that those confined in them breathe an impurer air than under ordinary circumstances; and experience the debilitating influence occasioned by an atmosphere loaded with an increased quantity of carbonic acid gas and animal effluvia.

5. Persons who have already attained to their full growth, and those particularly who have nearly reached the meridian of life, seldom experience the deleterious effects of confinement under such circumstances, to nearly the same extent as those in early life. When the subject was brought before parliament by Sir Robert Peel, Mr. Owen of New Lanark stated, respecting the children employed in his manufactory, that, although they were extremely well fed, clothed,

and lodged, looked fresh, and, to a superficial observer, were healthy in their countenances, yet their limbs were generally deformed, their growth stunted, and they were incapable of making much progress in the first rudiments of education. This statement, which appears to have been made as a result of large experience, agrees with the observations of other able men. The evidence of Sir Astley Cooper is even still more decided, and is perfectly in accordance with the experience of every competent judge. The result of confinement, this eminent surgeon states, is not only to stunt the growth, but to produce deformity. Every traveller in countries, the population of which consists chiefly of those whose avocations bring them much in the open air, or in agricultural districts, must have remarked not only the much more fully developed frames, and larger lower extremities, of the inhabitants of those parts, but also the more phlogistic or inflammatory characters of their disorders, and their greater vital resistance and powers of restoration when exposed to the causes, or suffering from attacks, of disease, than are manifested by the inhabitants of crowded manufacturing towns.

6. Not only is confinement in itself detrimental to the frame, particularly during the epochs of developement of the various structures of the body, when air and exercise are nearly as requisite as food to their perfection, but the construction of the apartments, the want of ventilation, the accumulation of animal effluvia, and the moral depravation consequent upon continued assemblages of persons, little under physical or moral control, essentially increase its injurious effects, and co-operate with it in impressing an asthenic character on the frame; in disposing to the formation of tubercles, and to the strumous diathesis; in depressing the vital energies and mental manifestations; and, consequently, in disposing the body the more to the usual exciting causes of disease, and the mind to vicious habits and indulgences.

7. 2d, *Over-exertion* is a very frequent cause of disease among many artisans; and, like confinement, it is the more injurious, the earlier in life it comes into operation. In the lower animals, particularly in the horse, the consequences of over-exertion are fully manifested. This animal seldom reaches one half of its natural life as employed in this and many other countries. As to effects of over-exertion on man, much will depend upon his habits and modes of living. When well fed, and of regular habits, its injurious consequences are neither so great, nor so soon appear, as when he is poorly fed or addicted to the use of spirituous liquors.

8. Over-exertion shortens life, 1st, by injuring the continuity, cohesion, or relative situation of various parts; 2d, by inducing that degree of exhaustion which runs on to irremediable or fatal disease; and, 3d, by that gradual and insensible expenditure of vital influence, beyond the power of reinforcing it, whereby the mean duration of human life is shortened. The trades which chiefly illustrate the above positions are coal-heavers, navigators or ballast-dreggers, smiths, miners, &c.

9. It should not be overlooked, that in many trades the artisan is not only subjected to confinement in close and imperfectly ventilated apartments, but is at the same time obliged to overexert his physical powers. In such cases the ill effects are necessarily greatly augmented; more especially in children or very young persons, who are naturally impatient both of confinement and over-exertion; and in them particularly are the injurious effects, moral as well as physical, chiefly manifested. Many of those who become the most drunken, immoral, or feloniously depraved, have been initiated in vice from the associations formed in factories.

10. 3d, *Sedentary habits* are also adverse to health, but only in a negative manner, as respects persons living in well ventilated and wholesome situations. The simple neglect of due exercise, however, is after a time generally productive of disease, owing both to its effects upon the nervous and muscular energies — the manifestation of all our functions being improved by a moderate exertion of them — and to its influence on the secretions and excretions, which require a certain degree of muscular exercise for their promotion. Literary men suffer in a particular manner from want of bodily exercise, chiefly owing to the over-exertion of the mental powers, the bent position of the trunk, and the stagnant air of close apartments. Clerks, and various artisans, suffer also from the same cause, particularly tailors, shoemakers, watchmakers, weavers, jewellers, &c. In some of these the pressure made upon the lower part of the sternum and stomach proves very injurious.

11. Mr. Dobson furnishes very instructive information as to the effects of confinement to a particular posture and in a close atmosphere upon tailors. Of 334 men, employed by Stultz & Co., in London, six are above sixty years of age; fourteen about fifty; and the greater number of the remainder about forty. Three of the six above sixty have curvature of the spine. Their most common affections are dyspepsia, diarrhœa, headach, giddiness, and anal fistula, to which latter they are so subject that they have a "fistula club." They attribute their complaints to the bent posture of their bodies for thirteen hours a day, and the heat of the workshop. Tailors are the most intemperate set of workmen in London. A large proportion of them die annually of phthisis. (Thackrah, &c. p.17.) The diseases most commonly observed amongst shoemakers are chronic inflammations of the stomach, liver, and bowels, occasioned by the pressure of the last on the lower part of the sternum, where it occasions, in those who are long-lived, a considerable depression.

12. The sitting posture, when long or habitually continued, is very hurtful in persons of sedentary habits. M. Patissier remarks, that it causes the lymphatic to predominate over the nervous, sanguiferous, and muscular diathesis. Artisans and others who adopt it early in life, rarely acquire vigorous constitutions, or reach old age, although old age soon overtakes them. Persons with this habit soon become subject to dyspeptic disorders, to affections of the kidneys and urinary organs, to constipation, hæmorrhoids, various cachectic affections, obesity, and, in females, to fluor albus, and difficult or irregular menstruation. When, in addition to a long-continued sitting posture, the trunk is bent, and pressure frequently made over the epigastrium and sternum, as with shoemakers, weavers, at-

torneys' or bankers' clerks, &c., gastrodynia, nervous palpitations, chronic gastritis, pulmonary consumption, chronic pericarditis, and imperfect digestion, excretion, and assimilation, amounting even to complete asthenia, are the not infrequent results. The hurtful effects of the sitting posture and bent state of the trunk are much increased by deficiency of food on the one hand, or by too full living on the other; and by habitual excesses of any kind, but particularly in the use of ardent spirits.

13. Literary men who are of sedentary habits are liable both to the disorders which result therefrom, and to those which depend upon over-exertion of the mental faculties. Amongst the latter, melancholy, hypochondriasis, cephalalgia, paralysis, apoplexy, palsy, inflammation of the brain or of its membranes, mania, and softening of the brain, hold a prominent place. All these evils are, however, in a great measure prevented by moderate diet and regimen, by avoiding excesses of every description, by regular and moderate exercise in the open air, by early rising, by sufficient but not too much sleep, with attention to the digestive organs, and to the promotion of the abdominal secretions and excretions.

14. II. Class Second. 1st, *The undue exertion of particular organs, with or without insufficient exercise of other parts,* is often productive of most injurious effects; but much of the evils imputed to this cause by MM. Gosse, Merat, and Patissier, are either imaginary, or merely matter of occasional coincidence. *A.* The consequences of undue *muscular exertion* are chiefly hernia, aneurisms of the large vessels, dilatation of the cavities of the heart, hæmorrhages from the lungs or nose, injuries of the ligaments and intervertebral spaces, sprains and lacerations of muscles; and are chiefly met with among those occupations that are of a laborious kind, as porters, coal-heavers, draymen, &c. Of all these injurious consequences, hernia are very much the most frequent. Amongst all those persons who bring the back and superior extremities into frequent energetic exercise, it will be observed that the muscles of these parts are not infrequently developed either at the expense of those of the lower extremities, or to a degree far beyond them. This partly arises from the shuffling gait of those persons, and from not throwing the gastrocnemii muscles into action.

15. *B.* Over-exertion of the *vocal organs* is not infrequently productive of disease. The affections which proceed from this cause are hæmoptysis, laryngeal phthisis, aphonia, œdema of the glottis; functional, and subsequently organic, diseases of the heart and large vessels; nervous and cerebral affections. The persons most liable to be affected by this cause are public singers and orators; but I believe that the ill effects resulting from it, in any of the above states of disease, are not so great nor so frequent as some writers have stated. Much of the mischief imputed to this cause is referrible rather to the enthusiasm of singers and orators, to the passions which are called up during the exercise of their powers, and to the various dissipations and exposures into which their vocations lead them. The occurrence of musico-mania from excessive musical enthusiasm is known to all physicians. It is obvious that the first signs of the accession of the above diseases in the persons of singers and orators, require strict avoidance of the cause.

16. *C.* The continued or intense *action of light* on the eyes, and *application of them* to small objects, as amongst workers at iron forges and furnaces, engravers, watchmakers, embroiderers, painters, &c., are often followed by injury to, or entire loss of sight; persons thus employed being liable to amaurosis, cataract, inflammation of the retina, iris, or capsule of the lens, and to short-sightedness, owing to the more convex form the eye acquires from continued compression, by the muscles attached to the eye-balls.

17. 2d, *Unnatural or constrained positions* are extremely injurious in the prosecution of any art or employment. Occupations that require *long-continued standing* have been said to be productive of varices in the lower extremities; but I am not aware that such affections are more common amongst printers, who usually stand at the frames, than in other persons. There is no doubt of *undue pressure* made upon any particular part of the body in the exercise of any art or trade, or even slight pressure when long continued, being most injurious. This is remarkably the case when the pressure is made upon the abdomen, particularly over the epigastrium, and still more so if it impede the actions of the respiratory muscles. Various occupations, which are injurious from this cause, might be pursued with great assiduity by attending to those circumstances, many of them trivial, which may remove or counteract it. Thus clerks, and others, who are often injured by stooping over a desk, and by pressing the chest against it, as well as by the sitting posture too long continued, would be much benefited by frequently, or even occasionally, standing at a raised desk. Tailors and shoemakers are also very liable to suffer from this cause. The stooping posture is not infrequently productive of cerebral and nervous affections; hence the frequency of them in gardeners. Working in constrained positions shows its effects most decidedly in *miners* and *colliers*, who labour chiefly in the sitting or kneeling posture, frequently with the body bent in the greatest degree, in an unnatural atmosphere, often containing hydrogen, or carburetted hydrogen, and carbonic acid gases, and with artificial light. They are, moreover, exposed to changes of air, and occasionally work with their feet in water. They are generally spare men, with slightly curved spine, and bowed legs. When the dirt with which their skin is usually loaded is removed, the complexion seems sallow and unhealthy. Their complaints are asthma, rheumatism, disorders of the head, intolerance of light, &c., evidently resulting from the circumstances just stated, connected with their employment, and their exclusion from the beneficial influence of sunshine, light, and air. They are not generally very intemperate, yet they seldom live beyond fifty.

18. 3d, *Temperature and moisture*, and particularly rapid vicissitudes of them, are extremely productive of disease amongst artisans, but chiefly from negligence, and the want of caution in exposures to them. Forgers, glass-blowers, brass and iron founders, bakers, brewers, and various other classes of artisans, are liable to be affected by the *high temperature* in which they work, and by imprudent exposure to cold, when perspiring,

and often without any additional clothing. The most frequent consequences are checked perspirations, producing catarrhs, rheumatism, bronchitis, asthma, and inflammation of the lungs, or of some one of the abdominal viscera.

19. *a*. The bad effects of *moisture* only are problematical, or at least not very remarkable. It is only from the circumstance of its being either the cause of a greatly depressed temperature, or the very common vehicle in which other agents of disease are dissolved, and thereby diffused in the air, or applied in a more active state to the different organs, particularly the respiratory, that it becomes a very active agent of disease, as is demonstrated by the etiology of the intertropical and malignant diseases. When exposure of the external surface of the body to moisture is injurious, the mischief is caused chiefly by the depressing effects of the low temperature which it occasions. The animal heat is less rapidly carried off by entire submersion in water, than by aspersion merely. In the former case there is no evaporation, in the latter more or less evaporation takes place, and much cold is thereby generated. The histories of shipwrecks abound in proofs of this position. Dr. CURRIE, in his well known work, has adduced a striking example of it. It is owing to the evaporation which takes place from damp or moist clothes, and the consequent rapid reduction of their temperature, that disease isoccasioned by them.

20. Artisans who, from the laborious nature of their occupations, perspire copiously, and thereby render their clothes damp, seldom suffer from this cause while they continue their labours; but when they relax, or desist altogether, their wearing the moistened clothes, particularly in a state of exhaustion, is frequently productive of disease. Inattention to, or inability of, changing damp or wet clothes, are the most common causes of the disorders met with in milkmen, gardeners, fishermen, washerwomen, fullers, water carriers, and persons whose occupations are chiefly out of doors. In marshy or unhealthy localities the effects of this cause are greatly increased. The steepers and cleaners of hemp and flax are extremely liable to intermittents, owing to the conjunction of vegetable effluvia with moisture. Even persons constantly employed in crowded factories, where the stagnant air becomes loaded with the foul vapours exhaled from the lungs of a number of persons, may have their clothes so saturated with moisture as thereby to occasion the usual consequences of cold, when exposed to a drier or opener air. It should be kept in recollection, that cold, when it continues to act for any time upon the frame, is sedative — it depresses the vital influence; and, when acting partially, or directed to parts of the body only, that it is one of the most productive causes of altered energy and sensibility of the nervous system of such part, of irregular distributions of vital influence and of the blood, and consequently fruitful of inflammations, and of morbid discharges and actions.

21. *b*. The *prevention* of diseases resulting from the description of causes adduced under this head is important. Wearing flannel next the skin is amongst the most efficacious. For those who are exposed to moisture from out-of-door vocations, the use of external garments of dressed skins, or of tanned leather, or of oil-skin, during the time of exposure, is extremely serviceable, and is generally adopted by the fishermen of northern countries.

22. III. CLASS THIRD. 1st, The *mineral molecules*, which, either in the form of vapour or of minute disintegration, come in contact directly or immediately with various parts of the body, are extremely frequent causes of disease in artisans, and some of the maladies they produce are possessed of specific characters.

23. *A*. *Mercury* is one of the most common causes of the diseases of artificers, particularly workmen in quicksilver mines, glass-platers, gilders of buttons, toys, &c. Dr. GOSSE has remarked the greatly increased sensibility of those persons to cold, even to the slightest diminution of temperature, evidently owing to depression of the vital energy and organic actions, and consequently of the process of animal calorification. Persons long or habitually exposed to fumes of quicksilver are generally affected with ulcerations of the mouth and fauces; painful or rheumatic affections of the periosteum, joints, limbs, and ligaments, particularly after exposure to cold; eruptions on the surface of the body, and all the affections, to which the term pseudo-syphilis has been applied; as well as many of those which are usually denominated cachectic. The effects are altogether the same, although slower in their accession and progress, as those which result from a too long continued, but not violent mercurial course.

24. *a*. Amongst the most important of the affections produced by the fumes or oxides of mercury in artisans is the *mercurial palsy*, the *tremblement mercurial* of the French pathologists. It is almost, but certainly not altogether, peculiar to these persons. Its approach is generally gradual, but occasionally sudden; it usually commences with slight convulsive snatches, followed by agitations and tremors of the affected muscles, particularly those of the arms, which it first attacks, occurring as it commonly does amongst the workers in mercury. If the person continues his employment, the affection extends to the lower extremities and whole body. He becomes incapable of muscular exertion, and even of the avocations requiring the least precision of muscular action. Restlessness, falling out of the teeth, constipation or disorder of the bowels, a dry and brownish state of the skin, slight atonic convulsions, cephalalgia, delirium, great depression of the nervous powers, and of the general health, take place, in which state the patient may continue to live for many years. (MERAT and COLSON.) Although it is chiefly long-continued exposures to mercurial preparations which produce this affection, a single exposure to their fumes, even for a few *hours*, when they float in the air, may occasion it; the effects being both rapid and violent when their vapours are inhaled with the atmosphere, and act upon the extensive surface of the bronchial tubes and air-cells.

25. *b*. The habits of the workmen exposed to the fumes or oxides of mercury, render the *treatment* of this affection extremely difficult, owing chiefly to the circumstances of their frequent recourse to spirituous liquors, for the temporary advantage they afford, and to their deferring having recourse to medical aid until the disease becomes confirmed. In recent cases, leaving off the trade

that occasioned it will alone produce a cure. In long-continued or confirmed cases, benefit is obtained with much more difficulty; and, when procured, the disorder is extremely apt to return after the slightest exposure to mercurial fumes. DE HAEN prescribed electricity in the cases which occurred to him. LETTSOM recommended sulphur; and I believe that its good effects are very considerable. In a case which lately came before me, of violent cephalalgia, with muscular tremors, &c., after a severe mercurial course, large doses of sulphur merely, given every night in treacle, produced a cure in a few days. Mr. PEARSON chiefly relied upon exposure to a dry and open air. SEMENTINI states, that he obtained uniform advantage from the internal use of the nitrate of silver, beginning with an eighth of a grain, and gradually increasing the dose to three grains in the day. I have lately employed the *tincture of iodine* in two cases of this affection with success; and in one case I lately prescribe *strychnine*, but lost sight of the patient before its effects were apparent.

26. *c.* It is obvious that it is of importance to be in the possession of plans to prevent the injurious effects of mercury on those employed in the arts in which it is used. These are sufficiently simple, and consist chiefly of common attention to cleanliness, and avoiding the fumes of the mineral during the various parts of the processes of gilding. Workmen should avoid touching the amalgams that are used with the naked hand; and ought to make frequent ablutions, particularly before taking a meal. During the process of volatilising the mercury by heat, the utmost caution should be exercised in performing the operation with a stove in which the current of air is very brisk, so that the fumes may be carried fully up the flue. In most of the manufactories in this country, the stoves are now sufficiently well constructed for this purpose, the carelessness of the artisan being the chief cause of danger from his occupation. M. JUSSIEU states, that the free workmen in the large quicksilver mines at Almaden, who took care to change their whole dress, and attended to cleanliness, were but little affected by their occupation; but that the slaves, who could not afford a change of raiment, took their meals in the mine generally without ablutions, were subject to swellings of the parotids, aphthous sore throat, salivation, eruptions, and tremors. (*Mém. de l'Acad. des Sciences*, 1719, p. 474.)

27. *B. Lead. a.* Injurious effects from lead, in the various states in which it is used, are very frequent and often fatal. Its oxides may be carried off in a state of vapour, dissolved in volatile substances, as by turpentine in painting, and thus be inhaled into the lungs, and act most injuriously on the frame. It may also pass into the alimentary canal in various ways, or it may be absorbed from the skin, particularly of the hands, where it will both act locally, and be carried into the system, and produce its effects as when introduced by the two former channels. These effects are chiefly lead colic and paralysis. The workmen employed in lead mines, those who are engaged in procuring it from its ores, who cast it or manufacture its various preparations, and who use them in the different arts, as plumbers, glaziers, painters in oils or water-colours, colour-grinders, type-founders, printers, are the most liable to be affected by lead; but all classes, under certain circumstances, may also experience injurious effects from it. The deleterious nature of this mineral is certainly very great; but the fatal results are surely not one in three annually, as stated by Sir JOHN SINCLAIR.

28. *b.* M. MERAT has furnished some very interesting information respecting the frequency of *colica pictonum* in the various classes of artisans who come in contact with any of the different preparations of lead. It is derived from the list, kept at the hospital La Charité, in Paris, in the years 1776 and 1811. The total number in both years were 279. Of these 241 were artisans, whose trades exposed them to the poison of lead, viz. 148 painters, 28 plumbers, 16 potters, 15 porcelain makers, 12 lapidaries, 9 colour grinders, 3 glass blowers, 2 glaziers, 2 toymen, 2 shoemakers, 1 printer, 1 lead miner, 1 shot manufacturer. Of the remainder, 17 belonged to trades exposed to copper. Of the 279 cases, 24 were under twenty years of age, these being chiefly painter boys, not above fifteen; 113 were between nineteen and thirty; 66 between twenty-nine and forty; 38 between thirty-nine and fifty; 28 between forty-nine and sixty; and 10 older than sixty. Among the 279 cases, 15 died, or 5·4 per cent. (See the article COLIC, FROM LEAD.)

29. *c.* The *measures of prevention* from the action of the preparations of lead differ in no respect from those which have been stated in relation to mercury (§ 26.). They chiefly consist of strict attention to personal cleanliness. The instructions given by M. MERAT are very complete, but are too particular to be followed by workmen. He recommends that the working clothes should be made of strong compact linen, be changed and washed once or twice a week, and be worn as little as possible out of the workshop; a light impervious cap ought always to be worn on the head. The artisan should never take his meals in the workshop, or without strict ablution of the hands, mouth, and face; and he ought to breakfast before leaving his home.

30. Derangements of the digestive organs ought to be watched with care. If colicky symptoms occur, he should leave off work, and take an aperient. He ought always to guard against constipation. The *diet* of those exposed to be affected by the preparations of lead is of consequence. It should be light and digestible; and poor acid drinks ought to be avoided, particularly cider, as themselves often containing lead. Various articles of diet have been recommended as calculated to impede the hurtful action of lead on the frame. HOFFMANN mentions brandy — a somewhat dangerous recommendation. Fat food has been accounted preservative. DE HAEN states, that the workers in a lead mine in Styria were much affected by colic and palsy, but, by being told by a quack doctor to eat a good deal of fat, particularly at breakfast, they were exempt from these diseases for three years (*Rat. Med.* p. i. ch. ix.). Similar facts respecting the good effects of fat meat, as a preventive of the effects of lead, are recorded by Sir GEORGE BAKER (*Trans. of Lond. Coll. of Phys.* vol. ii. p. 457.), and Mr. WILSON (*Edin. Phys. and Lit. Essays*, I. p. 521.). Those who work at furnaces in which lead is smelted, fused, or oxydised, should be protected by a strong draught through them. Mr.

Braid, of the extensive mines at Leadhills, informed Professor Christison (*see his most valuable work on Poisons*, &c. p. 506.), that wherever furnaces of such a construction have been built, the colic has disappeared.

31. C. *Copper*, although extensively used in the arts, is seldom productive of much disease. Patissier states, that the workmen in copper become prematurely old, having a meagre and sickly appearance. This is, however, as much owing to confinement in ill-ventilated places, and intemperance, as to the metal. Merat has adduced evidence of their being frequently subject to colica pictonum. They are likewise liable to diseases of the respiratory organs,—particularly those engaged in filing the metal; but this is entirely owing to the mechanical irritation occasioned by the finer particles when inhaled into the lungs. Asthma is frequent amongst brass-founders, owing probably to this cause, and partly to the vaporisation of a portion of the zinc with which copper is amalgamated.

32. D. *Zinc, arsenic, and antimony* are seldom productive of hurtful effects amongst artisans; owing probably to the first being chiefly employed in the metallic state, in which it has no effect, although it is deleterious when oxydised; and to the circumstance of arsenic and antimony being generally used in small quantities.

33. E. The *acrid vapours*, which proceed from the *mineral acids* often produce violent effects when respired; chiefly asphyxia, and severe inflammation of the air-passages; but they are easily guarded against, and chiefly by operating in nearly open places. Persons who prepare articles for gilding, by cleaning them in aquafortis, are equally liable to respire the vapours of these acids, but may avoid them with even a moderate share of caution. The inflammations of the respiratory organs occasioned by them, differ merely in respect of their intensity, from the same diseases proceeding in an acute form from other causes. Chlorine gas, when respired in considerable quantity, produces inflammation of the air-passages. The chief effects of habitual exposure to it are acidities and other complaints of the stomach. The trades in which workmen are exposed to chlorine do not seem to be unwholesome. Corpulent men are soon reduced by it to their natural size. During the epidemic fever that raged all over Ireland from 1816 to 1819, the people at the chemical manufactory at Belfast were entirely exempt from it.

34. 2d, *Molecules of animal matter in a state of decay* are frequently productive of disease, both in persons whose avocations expose them frequently to this cause, and in those who approach it only incidentally. Nightmen are chiefly exposed to this source of disease, particularly in Paris. The gases evolved when emptying the *fosses d'aisances* of that capital are frequently productive of serious and even fatal consequences. The exact nature of these varies with the vapours evolved. Ammoniacal vapours usually occasion what the French term *la mitte*: sulphuretted hydrogen, hydro-sulphuretted ammoniacal gases, and azote, produce *le plomb*.

35. *A*. The *symptoms of la mitte* are smarting of the eyes, with the sensation of sharp or pungent odour and uncomfortable feeling about the nose. To these succeed pain, extending to the forehead, and discharge from the eyes, occasionally with blindness enduring for two or three days. These effects, if not very intense, generally pass off by shading the eyes, and exposure to the open air: if they are more severe, the application of cold epithems to the eyes, and protecting them from the light, are usually efficacious.

36. *B*. *Le plomb* is of two kinds: 1st, that occasioned by azote, and which is simply Asphyxy (which see) from the privation of respirable air, attended with coma or stupor; 2d, that caused by sulphuretted hydrogen and hydro-sulphuretted ammoniacal gases, which is the most dangerous and common, and is generally attended with convulsions. (See Poisons.) The former is commonly prevented by a free circulation of air; the latter is avoided by employing the chlorurets of lime or of soda, a solution of which is poured in the privies, and reservoirs or drains, shortly before they are emptied. (See *Treatment of* Asphyxy and of Poisoning *by deleterious Gases*.)

37. C. The animal effluvia proceeding from slaughter-houses, dissecting-rooms, chandlery or adipocire manufactories, and other places where in the substances are manufactured or employed animal arts, are seldom so concentrated as to be productive of disease; but there can be no rational doubt of their unwholesome influence when concentrated, or accumulated in a stagnant atmosphere. The liability of butchers and cooks to be corpulent has been absurdly enough ascribed by some superficial writers to the absorption of nutritive particles from the air, without attending to the fact of a much larger quantity of animal food being taken by them than by any other class of persons.

38. Dr. Withering had noticed (Letter to Dr. Beddoes, 1793.) the comparative exemption of butchers and catgut-makers from phthisis. M. Patissier has made the same remark; and Dr. Beddoes has added to these employments soap-boilers, and the fishermen and fish-wives in the vicinity of Edinburgh. Glue and size boilers are exposed to putrid and ammoniacal exhalations from the decomposition of animal refuse. But these workmen are generally fresh-looking and robust. A similar observation is applicable to *buckram manufacturers*. *Tanners* are subject to animal vapours; but so combined with the odours of lime and tan as entirely to counteract any injurious effect which the former might produce. They are much exposed to wet and cold; yet they are generally healthy, robust, and tolerably exempt from pectoral diseases, particularly consumption. Mr. Thackrah states, that he has carefully enquired at several tan-yards, and could not hear of a single example of this disease.

39. 3d, *Vegetable molecules*. Corn-millers suffer remarkably from breathing an air loaded with the particles of flour. They are chiefly affected by indigestion, asthma, and morning coughs with expectoration, terminating either in consumption or in asthma; and are generally pale, sickly, and short-lived. This is the case only with those who work in the mills. Those amongst them who labour in the open air with the carts are not thus affected; but, as other persons raising heavy weights, are subject to herniæ. *Maltsters* are liable to the same diseases, arising from the same agents, and from the heated and sulphureous air of the kilns. *Bakers* are exposed to similar causes,

but to a much less extent, and suffer accordingly — chiefly from cough, asthma, affections of the stomach, rheumatism, and a peculiar chronic eruption on the skin. *Snuff-makers* are exposed to the dust of the tobacco; but they are not so much affected by it as may be expected. They chiefly complain of disorders of the head, stomach, and air-tubes: of the former, from the narcotic effect of this vegetable; and of the last, from its irritation. The narcotic odour to which *tobacco manufacturers* are liable is not productive of any very appreciable mischief, owing to their having become insensible to its influence.

40. 4th, I shall here briefly notice those trades, the workmen in which experience the very injurious effects of inhaling an atmosphere in which various *vegetable, animal, or mineral molecules are floating*, — causes which, although very dissimilar in themselves, generally act in nearly a similar manner — namely, by irritating the bronchial surface, and superinducing various modifications of disease, according to peculiarities of constitution, temperament, and habits of life. *a.* The artisans who suffer the most from these causes are dry grinders and needle-pointers; edge-tool, gun-barrel, and other grinders; flax-dressers, and pearl and horn button makers; iron, brass, and other metal filers; stone-cutters, miners, and quarriers, particularly in sandstone; wool-carders and feather-dressers; sawyers, turners, weavers, and starch-makers. All these suffer more or less, generally in the order here followed (needle-pointers and dry-grinders the most, and starch-makers the least), from chronic bronchitis, in one or other of its modifications: in some, from the spasm of the bronchi thereby occasioned, with the symptoms of asthma predominating; in others, with those of chronic inflammation extending to the lungs; in a few, with pulmonary emphysema; and in many, with tubercular and cretaceous formations. The most inflammatory effects seem to result from needle-pointing, dry-grinding, and stone-cutting; whilst the more asthmatic affections proceed from the horn and pearl button manufacturing. These workmen seldom live above forty years, and the greater number not beyond thirty or thirty-five. They often experience but little inconvenience till some time before the fatal disease takes place; but they are as often affected in early life, particularly pearl and horn button makers, the disease subsequently assuming an asthmatic character.

41. *b.* Various means have been invented in order to prevent the molecules or dust arising in these trades from accumulating and being inhaled into the lungs of the workmen; but nearly every measure hitherto advised has been neglected by them. Amongst other contrivances, the muzzle of damp crape recommended by Dr. Johnstone, the sponge by Dr. Gosse, and M. D'Arcet's "fourneau d'appel," which is, however, not known in this country, may be named. The best means yet devised seems to be that invented by Mr. Abrahams of Sheffield, in which magnetic attraction is employed to arrest the floating metallic particles. This, as well as the use of the "damp bag" suspended over the stone, in grinding and pearl button turning, are most useful inventions. In mining, quarrying, or cutting stones, dry-grinding, &c., much good would probably result from having moistened or wet woollen curtains suspended over the heads of the workmen, and in such a way as to be agitated through the air of the place. The simpler the means, and the less trouble required in their use, the more likely are they to be adopted.

42. *c.* In respect of the treatment of the pulmonary diseases which result from these causes, very little difference from that employed under ordinary circumstances is required. The frequent use of emetics is adopted by the workmen themselves; and there can be no doubt of their utility in the most of the diseases of the air-passages. The other means of cure are fully noticed in their respective places.

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ASCARIS. See Worms.

ASCITES. See Dropsy of the Peritoneal Cavity.

ASPHYXY. (From the privative *α*, and *σφύζω*, I beat, I leap.) Syn. *Ἀσφυξία*, Hip. *Asphyxia*, Auct. Lat. *Apoplexia Suffocata*, Cullen. *Asthenia Suffocatio*, Young. *Asphyxie, Le Pouls manquant*, Fr. *Der Scheintod, Pulsstillstand, Eine tödtliche Ohnmacht*, Ger. *Mancamento di polso*, Ital.

Classif. 2. *Class*, Nervous Diseases; 1. *Order*, Comatose Affections (*Cullen*). 4. *Class*, Diseases of the Nervous Function; 4. *Order*, Affecting the Sensorial Powers (*Good*). I. Class, III. Order (*Author*, see *Preface*).

1. Defin. *Suspended animation proceeding from a primary arrest of the respiratory actions, the other functions being thereby abolished.*

2. Asphyxy, according to its etymology, should be defined, the cessation of the action of the heart. In this case it would be synonymous with certain forms of syncope, from which, however, it most essentially differs. Yet even in syncope the most complete, the action of the heart never altogether ceases; it is only unusually weakened, and previously to respiration being affected. Attention to the phenomena to which the term asphyxia has been so long applied, will inform us that the actions of respiration are primarily arrested; that the functions of circulation are subsequently abolished; and that death is the result of this succession of events. It may, however, be stated, in justification of the change of signification which this term has undergone, that there is no state of the system from which recovery is possible, that is characterised by a more complete abolition of the action of the heart than this, although it takes place secondarily only from the arrest of the respiratory functions.

3. Asphyxy has been very generally viewed as proceeding from causes which act in various ways; and the opinions respecting their nature and mode of operation have been extremely deficient in precision and accuracy. According to the meaning which I have attached to the term, as stated above, asphyxy can only occur in a direct or primary form, from causes which either exclude

the air from the lungs, prevent its renewal, or abstract that constituent of it which is requisite to the respiratory functions. Authors have, however, included, under the head of asphyxies, those states of suspended animation which proceed from the respiration of deleterious gases: and Dr. GOOD has comprised under it death or suspended animation from lightning and from intense cold. In every case of the action of deleterious gases, of lightning, and of intense cold upon the system, the respiratory organs, although one of the channels for the action of the latter, are not the first to have their functions arrested. The action of all these agents is primarily exerted upon the ganglial and nervous systems; and, owing to their effects upon these systems, the function of the brain, of respiration, circulation, &c. are subsequently abolished. As the action of the greater number of deleterious gases, when respired, is similar to that of other irritating and narcotic poisons, I shall consider them under the head of gaseous poisons (see POISONS). When, however, they are of such a kind, or are present to such an extent, as to irritate violently the larynx, and, by exciting spasm of it, to exclude the air, or so as to displace, and to occupy the room of, the respirable atmosphere, their action is similar to other agents primarily occasioning simple asphyxy: and they therefore require no further notice than by adducing them as causes of this state. In respect of the influence of cold and lightning upon the frame, it may be observed that, although exciting and concurrent causes of asphyxy, and producing this, with other changes in the vital functions, but in very different ways, they act directly upon the nervous system, and give rise to asphyxy only secondarily; and, like the more poisonous gases, chiefly through the medium of this system, particularly that part of it which presides over the functions of the brain and heart. Their action will therefore fall under different heads.

4. I. CAUSES. — Asphyxy takes place in a primary and simple form, from whatever excludes, or prevents the renewal of, air in the lungs of a healthy person, or consecutively upon other affections or diseases, especially those affecting the nervous system, and particularly the respiratory class of nerves. In the former state of the frame it is an *idiopathic* or *essential* affection; in which light it will be chiefly viewed in this place: in the latter it is *symptomatic*, or rather one of the modes in which disease terminates life. These states of asphyxy may proceed, *first*, from a primary cessation of the mechanical phenomena of respiration, and, *secondly*, from a primary default of the chemical changes which take place during the respiratory actions.

5. To the FIRST of these is to be referred the asphyxy which depends upon inaction of the respiratory muscles (*A.*); and (*B.*) upon deficient expansion of the lungs, the inspiratory muscles performing their functions. *A.* Deficient or impossible action of the inspiratory muscles proceeds, 1st, from mechanical obstacles applied to them, as in the instances of death occasioned by earth falling upon the trunk of the body, and pressing it so strongly as to prevent them from expanding the thorax: 2d, from deficient or interrupted influence of the nerves supplying these muscles, as from injuries or division of the pneumogastric nerve; injury or pressure upon the medulla oblongata or spinal chord, either from fracture or dislocation of the spine, particularly of its cervical portion; and from the paralysis of the nervous system occasioned by a stroke of lightning, or any other cause abolishing its energy: and, 3d, from want of activity, or deficient irritability of the inspiratory muscles themselves, as from the benumbing influence of cold, and the suspended animation of new-born infants.

6. *B.* The asphyxy which proceeds from a deficient expansion of the lungs, is generally owing, 1st, to mechanical impediments, as the passage of some of the abdominal viscera through the diaphragm, the accumulation of fluids in the pleura, or similar causes: and, 2d, from paralysis of the nervous energy of the lungs, as in cases of death from cold, from lightning, from various poisonous gases, &c.; whereby the vital expansibility of the organ is abolished, along with the other respiratory actions.

7. The SECOND class of causes, or those which act by impeding or abolishing the chemical changes effected by respiration, may be referred to two heads: — 1st, Those which present a mechanical obstacle to the entrance of air into the lungs, as strangulation; submersion; the introduction of foreign bodies into the larynx, trachea, or even the large bronchi: and, 2d, Those which consist of a deficiency of respirable air, as a too rarified atmosphere, or the presence of azote, hydrogen, carburetted hydrogen, protoxide of hydrogen, or indeed of any of the deleterious gases. It is evident, however, that asphyxy is often occasioned by the combined operation of more than one of its proximate causes. Thus it may proceed from paralysis of the respiratory muscles, and of the nervous energy of the lungs themselves; and hence be characterised by abolition of the respiratory efforts, by deficiency of the expansive power of the organ, and by arrest of the chemical changes which take place during respiration: and, on the other hand, several of the remote causes act by individually producing more than one of the pathological conditions now specified.

8. II. *Characteristic phenomena of Asphyxy.* — When asphyxy takes place slowly, especially from causes which interrupt the nervous influence actuating the respiratory muscles, it commences with greater or less difficulty of elevating the thorax; anxiety, with urgent desire to inspire, and constant attempts to fill the lungs, giving rise to continued gaspings, or quick, short, and imperfect respiratory efforts; pandiculation; vertigo; failing of consciousness and sensation; sometimes to convulsive movements both of the limbs and trunk, followed by immobility of the parietes of the thorax and abdominal muscles, weak and languid pulsation of the heart, and absence of pulse at the wrist; the face is coloured, livid, tumid, injected, and its veins distended; the hands and feet, as well as the face, present a reddish violet hue; and the cutaneous surface patches of a similar tint. At last the circulation is entirely arrested, and asphyxy is complete. The animal temperature, however, and the absence of rigidity of the muscles, continue for a long time afterwards, — almost always for a much longer period than from death under other circumstances, and from other proximate causes.

9. These *phenomena* vary, particularly as respects the rapidity of their progress, according to the causes whence they proceed, and to the extent to which air is excluded from the lungs. Where no obstacle to the action of the inspiratory muscles is present,—the obstruction to respiration existing in the air passages,—the efforts to renew the air in the lungs are much more convulsive and laborious. The anxiety is extreme, but of short duration, and rapidly followed by abolition of consciousness, voluntary motion, and of the functions of circulation. In this case the description of SHAKSPEARE is physiologically accurate:—

"But, see! his face is black and full of blood;
His eyeballs further out than when he lived,
Staring full ghastly, like a strangled man;
His hair uprear'd; his nostrils stretch'd with struggling;
His hands abroad display'd, as one that grasp'd
And tugg'd for life, and was by strength subdued."

10. In cases where asphyxy arises from a sudden *abolition of the nervous influence* of the respiratory muscles, as from injuries inflicted on the medulla oblongata, &c., or when the trunk of the body is so compressed as to prevent all action of these muscles, but particularly when it proceeds from the former cause, the phenomena supervene and succeed each other with great rapidity; but generally in the order in which I have enumerated them, excepting that all respiratory efforts are instantly suppressed. In drowning, however, the progress of the symptoms are less rapid and somewhat different, as will be shown in the sequel.

11. III. The *duration of life* in cases of asphyxy is very different, according as the causes which occasion it act with greater or less promptness, or more or less perfectly, in preventing the renewal of air in the lungs. In general, the more slowly that abolition of the respiratory function takes place, as in cases of drowning, the longer does the action of the heart continue, although feebly and slowly, even after respiration has ceased; and to this circumstance, as well as to the fluidity of the blood, which is long preserved, is owing the power we possess of recalling the asphyxied to life; the more slowly the state of asphyxy supervenes, the longer the person retains the ability of being reanimated, and *vice versâ*.

12. The length of time, however, after which resuscitation cannot be accomplished is necessarily varied by different circumstances; and not only by the causes of asphyxy, and their modes of operation, but also the strength of constitution, age, and previous health of the person, and the manner in which abstraction of air has taken place. Much will also depend upon the changes which the asphyxy has produced in the brain,—the degree of congestion, or the occurrence of extravasation there,—circumstances which, when present to any very considerable extent, more particularly the latter, will generally preclude the possibility of reanimation.

13. IV. *Appearances observed on dissection of asphyxied persons.*—A reddish or violet red hue of the countenance and various parts of the surface of the body, which continues to retain its warmth an unusual length of time after death: this tint does not arise from the position of the body after death; and is chiefly seated in the mucous or vascular tissue of the skin, which, upon incision, allows the blood to escape in a state of fluidity. The eyes are bright and prominent; the mouth sometimes natural, at other times expressive of suffering; the limbs are rigid, and continue in this state unusually long, after having been late in assuming it. The veins and sinuses of the brain generally are filled with a dark fluid or semi-fluid blood; the substance and cavities of the brain are not otherwise materially altered. The base of the tongue is generally full or injected, and even tumified, and its papillæ developed; the mucous membrane of the larynx, trachea, and bronchi, is injected and red—the colour becoming darker as we descend from the larynx to the bronchial ramifications, where it assumes a violet or reddish brown tint. Their smaller branches often contain a little sanguineous frothy mucus. The lungs are distended, rise around the pericardium, and present a brown or blackish brown hue; their parenchyma, when divided, are of a redder tint, but give out, upon pressure, large drops of a thick, fluid, and very black blood. The liver, spleen, and kidneys are gorged with blood, presenting a similar appearance. The veins of the heart are congested; and its right cavities, the vena cava, and other large veins, are engorged with black and semi-coagulated or fluid blood.

14. V. *Theory of Asphyxy.*—It is chiefly to GOODWIN and BICHAT that we are indebted for the near approaches which have recently been made to a satisfactory and consistent theory of asphyxy, upon which a rational mode of treatment may be based. The venous blood sent by the right ventricle to the lungs, which contain a diminished quantity of air calculated to convert it into arterial blood, is returned to the left side of the heart, but slightly changed from its venous state, from whence it is propelled through the arteries to the different organs. The consequence of the imperfect changes effected in the blood, owing to the interruption or cessation of the respiratory actions, is imperfect excitation of the most important organs of the body; and in proportion as the blood sent from the left side of the heart is possessed of more of the venous characters, the absence of excitation is more manifest, until, as respects the brain, and lungs particularly, which are the first of all the organs to experience the effects resulting from the circulation of venous blood, a sedative or stupifying effect, but negative in respect of its nature, is produced upon them; as is frequently evinced on the brain in cases where asphyxy takes place slowly, and when the blood sent from the left side of the heart is completely venous in its characters.

15. In tracing the phenomena it will be observed, that the capillary system of the lungs is the first to experience a loss of their vital tone and undergo congestion. This arises from the following causes:—1st, The absence of the usual stimulus of pure air in the air-cells: 2d, The circumstance of their being the first to receive the blood after being returned from other parts of the body fully charged with venous properties: 3d, The cessation of the mechanical actions of respiration; and, with them, of the expansive motions of the lungs themselves: 4th, The arrest of those changes which the blood undergoes from oxygenated air, and the influence of a darker blood than usual upon the pulmonary vessels: 5th, The loss of nervous influence, arising from the sedative effect of venous blood upon the

nervous centres, when circulating in arterial vessels: and, 6th, The circumstance of the systemic capillary vessels retaining their tonicity and power of reacting, for a longer time, upon their contents, when circulating venous blood, than the pulmonary capillaries; consequently the blood is returned by them into the veins, and thence to the right side of the heart to be sent to the lungs, which are the first, from this and the foregoing causes, to experience congestion, and to lose the power of restoring it to the left auricle. Thus it will be seen, that the interruption to the circulation commences in the capillary system of the lungs, in consequence of the stop put to the mechanical and vital actions of this organ; and that the heart, which does not cease to contract until the functions of the lungs and brain have been abolished, no longer is supplied with blood from the lungs; the left side of the heart being thus the *ultimum moriens*.

16. The early and manifest effects of asphyxy on the brain have been fully proved by the experiments of BICHAT. This organ is deprived of its functions, and the comatose state is rapidly and profoundly expressed; the venous blood conveyed to it, chiefly from its negative effects, giving rise to all the phenomena usually occasioned by a narcotic poison. Even the heart itself, although the last of the three organs to experience the effect produced by the circulation of venous blood, is soon enfeebled in its action. This evidently arises partly from the abolition of the functions of the brain, and partly, or even in a greater degree, from the circulation of dark blood to the ganglia and nerves, whence the heart derives its action, and to its proper structure. But the experiments of Dr. EDWARDS and Dr. KAY evidently show that the circulation of dark blood does not destroy the irritability of muscles, but that it is a less powerful supporter of this property; and consequently that the irritability of the heart is not abolished, as BICHAT supposed, but only insufficiently excited. Indeed, if this property were destroyed, resuscitation would be impossible.

17. The long continuance of the animal heat after the total cessation of the heart's action can only be explained by the integrity of the vital energies of the frame at the time of the event, by the continued fluidity of the blood, and the circulatory or oscillatory motion of this fluid in the systemic capillary system for a considerable time after the heart has ceased to contract, — phenomena, which have been satisfactorily observed in cases of asphyxy. The patches of lividity, and the dark colour of the surface, depend upon the injection of the capillaries of the surface with dark blood, and the engorgement of the veins. The slow accession of rigidity of the limbs after death is referrible to the longer duration of the animal temperature, and the fluidity of the blood, than in other cases; and to these causes also are to be imputed the possibility of resuscitation after a longer period from the cessation of respiration than in any other morbid condition of the frame. The marked rigidity of the limbs, after the body is quite cold, must be chiefly imputed to the perfect state of the vital energies when asphyxia took place.

18. It has long been observed that the body of an asphyxied person appears to contain much more blood than that of an individual who has died in a different way. BICHAT explains this by supposing that the organs receiving venous blood, which is devoid of the materials necessary to nutrition, yield all the fluids which they usually furnish without appropriating those which they usually do under other circumstances; so that the quantity of blood is actually increased, particularly in cases where the asphyxy takes place slowly. In proof of the accuracy of this view, it has been stated that, when asphyxy occurs suddenly, and the functions cease rapidly, less engorgement of the venous system and of the lungs is observed, than when death is caused more slowly, as in the case of asphyxy from burning charcoal. Perhaps the quantity of blood in the system seems greater from the circumstance of its fluidity, or rather the absence of coagulation; for when this takes place, the serum of the blood partly escapes into the shut cavities after death, and exudes through the vessels and tissues.

19. From the foregoing, therefore, it may be concluded that the cessation of the actions of respiration, — first the mechanical or muscular actions, next the vital or expansive motions of the lungs, — is soon followed by an arrest of the pulmonary circulation, afterwards by abolition of the nervous functions and influence, and lastly by cessation of the heart's action, in consequence of the blood not being restored to the left auricle and ventricle; the latter of which, however, continues to contract as long as blood is sent to it. Hence, as respects the circulation, first, stagnation of the blood in the pulmonary capillaries upon the cessation of respiration takes place; next, a deficient supply of blood to the left side of the heart; and, lastly, an accumulation of it in the pulmonary arteries, and right auricle and ventricle, which are no longer able to overcome the resistance opposed to its passage in the congested pulmonary vessels. Thus it will be seen that the left ventricle is actually the *ultimum moriens*, and not the right, as supposed by many. Upon this view of the procession of phenomena in death from asphyxia, our endeavours to restore animation are founded.

20. V. The *varieties of Asphyxia*, in a practical as well as physiological point of view, deserve particular notice. The respiration of several gases is often followed by fatal consequences; but as asphyxy is only one of the deleterious effects they occasion, I have considered them in another place (see POISONS — *Gaseous.*). Of all gaseous bodies from which asphyxy may arise, azote and hydrogen alone act simply by producing asphyxy; and they have this effect only when they are present in considerable quantity in the air, or when they are respired for some time. The effects which they produce differ in no respect, in the present state of our knowledge, from those described above.

21. *A. Asphyxy from submersion.* — *a.* There are various circumstances, both proper to the individual, and connected with the submersion, which will modify the resulting asphyxy, and should be taken into account in our endeavours to restore animaion. When a person is immersed in water he is seized with an urgent feeling of anxiety at his breast; his pulse becomes weak and frequent. He struggles to relieve his distress, and thereby

rises to the surface of the water, and throws out some air from his lungs. His anxiety continues to increase, and his pulse becomes weaker; his struggles are renewed with more violence; he rises to the surface again, throws out more air from the lungs, and makes hurried attempts to inspire, and in some of these attempts a quantity of water goes down the throat with the air, and excites cough and spasm of the glottis. These efforts tend to determine blood to the head, which, owing to the impeded state of respiration, partakes of the venous properties; and rapidly induces, from this circumstance as well as from the pressure it occasions, insensibility, loss of voluntary motion, slight lividity of the surface of the body, particularly of the face, loss of pulse, relaxation of the sphincters, and as the body sinks to the bottom, the expulsion of a portion of the air contained in the chest.

22. *b.* On *dissection*, nearly the same appearances as those already described are found. In addition to these, a frothy fluid is met with in the trachea, and ramifications of the bronchi, with some water, the quantity of which varies in different cases. From Dr. GOODWYN's very satisfactory experiments, confirmed by Mr. COLEMAN and Professor MEYER, it appears that this small quantity of water enters during the struggles to inspire, and, mixing with the mucous of the bronchi, forms a frothy fluid, insufficient, however, to occasion the fatal changes in drowning. A considerable quantity of fluid is found in the stomach. According to Dr. CURRY, the vessels of the brain are not particularly distended; but there are exceptions to this. Dr. BERGER, of Geneva, found that the air remaining in the lungs had lost nearly all its oxygen. Mr. COLEMAN states that the left ventricle of the heart is never entirely empty, it generally containing about half the quantity of that found in the right ventricle; and that a little blood is also found in the aorta.

23. *c.* In cases where a person, in falling into the water, has been struck on the head and stunned, or is intoxicated, or benumbed with the cold and fright, the efforts at preservation will scarcely be made, and the case will be more completely that of simple asphyxia. In cases of this description the countenance is generally pale. The period after which reanimation may be procured is extremely various—generally from five minutes to three quarters of an hour. Of twenty-three persons recovered from drowning, one had been three-quarters of an hour under water; four, half an hour; three, a quarter of an hour; and the rest for shorter periods. Dr. EDWARDS has very satisfactorily demonstrated that life is more rapidly extinguished by submersion in water of a very low temperature than in that of higher grades, evidently owing to the sedative effects of cold upon the nervous system. When submersion takes place during intoxication, there is greater risk of congestion or extravasation in the brain being superinduced; and if syncope, by the fright attending submersion, occurs, fatal congestion and paralysis of the heart and lungs will chiefly supervene, but in a slower manner than under other circumstances; and, as M. LEROY (*Archiv. Gén. de Méd.* t. xvii. p. 469.) supposes, thus admitting of resuscitation at a longer period after submersion.

24. *B. Asphyxy from strangulation.*—When asphyxy is produced by hanging, and if the exclusion of air from the lungs is complete, the following appearances are generally observed:—After loss of sensibility, epileptic convulsions, sometimes slight, at other times marked; and generally attended with erections and emissions; turgidity, suffusion, and lividity of the face, extending to the shoulders, chest, arms, and hands: the eyes are open, projecting, and their vessels injected; the features are distorted, and the tongue thrust out of the mouth; the external muscles of respiration are firmly contracted; the hands are clenched, and the sphincters relaxed. When the air is not perfectly excluded in hanging, the sufferings are prolonged, the engorgement of the head and face is greater, the lungs are less loaded with blood, and the vessels of the brain more congested, than when the air is completely excluded. In the majority of cases of asphyxy from hanging, the lungs contain more air than after death from natural causes, or from suffocation by a pillow when the air is only imperfectly excluded from the lungs.

25. There can be no doubt, that although death is caused by asphyxy in cases of strangulation, as proved by DE HAEN, MONRO, and others, the interruption which the cord occasions to the return of blood from the head, and the consequent congestion of the encephalon, accelerate death. In some instances, also, there is reason to believe that fracture, dislocation, or subluxation of the vertebræ of the neck is produced in the execution of criminals; but it very rarely, or perhaps never, occurs in cases of suicide by strangulation. To these additional effects upon the encephalon and medulla oblongata is to be partly imputed the want of success in our attempts to restore animation after strangulation.

26. VI. GENERAL TREATMENT OF ASPHYXIA.—The indications which naturally suggest themselves from the consideration of the causes of asphyxia, their mode of operation, and the ultimate results which they produce, are, 1st, to remove the patient as soon as possible from the causes which occasioned the asphyxied state; and, 2d, to restore the function of respiration, and, through it, the circulation. The necessity of fulfilling the former of these is sufficiently obvious, and the means of doing so will necessarily vary with the nature of the cause, which should be instantly ascertained; but without delaying the employment of means to restore respiration.

27. The restoration of the function of respiration is to be attempted by various means, calculated, in the *first* place, to dislodge the impure air contained in the lungs; *secondly*, to replace it with pure air; *thirdly*, to excite the remaining vitality of the nerves and muscles; and, *fourthly*, to restore the circulation by measures calculated to return the blood from the lungs to the left side of the heart. The simultaneous attainment, as far as may be, of these objects, is to be attempted by a judicious combination of means. *a.* The patient should be placed on his back, in an *open air* of a mild or somewhat high temperature, of from 65 to 70 deg. of Fahr., with the chest, shoulders, and head slightly elevated. He should be stripped of his clothing, and enveloped in a warm blanket. None but the assistants ought to be admitted into the room. The body should be

placed at a convenient height for the employment of the measures of reanimation. *Pressure* should then be made upon the breast and abdomen, *alternating with relaxation*, in such a manner as to simulate the actions of the chest in respiration. By this means the foul air will be thrown out of the lungs; and the restoration of the capacity of the thorax, upon the removal of the momentary pressure, by the elasticity of the costal cartilages, will draw fresh air into the lungs. It will sometimes be of service to apply a hand upon each side of the thorax below the arm-pits, and by gentle shocks endeavour to expel the vitiated air. Whilst this is being performed, bottles of warm water should be placed to the feet, under the knee-joints, between the thighs, and under the arm-pits. Dry warmth is particularly beneficial when applied to the epigastric region. Warm stimulating frictions over the surface should also be employed.

28. *b.* After having used pressure so as to simulate respiration for a few moments, *insufflation* of the lungs is next to be resorted to. This may be performed by the mouth, or by a bellows. When the latter is not at hand, the former must be adopted. The operator having closed the nostrils, and applied his mouth to that of the patient, is to blow forcibly into it, pressing the chest afterwards, in order to expel the air, and again blowing forcibly into the chest. If the lungs cannot be inflated in this way, the operator should blow into one nostril, having closed the other and the mouth; and if a small wooden tube can be procured, this may be used for the purpose, by inserting one end of it into the nostril, and blowing into the other; or the pipe of a bellows may be inserted into it.

29. *c. Insufflation* of the lungs by the breath of the operator has been recommended by some in preference to the use of the bellows, on account of the higher temperature of the air thrown into the lungs by the former mode; whilst others prefer the latter method, on account of the purer air furnished by it. I believe that the advantage of the higher temperature of the former nearly counterbalances the disadvantage of less purity. If, therefore, insufflation by the bellows of a warm air could be had recourse to, considerable benefit might be obtained. If the bellows are used, the pipe is to be introduced into one nostril; and, whilst the mouth and other nostril are closed, and the *pomum adami* pressed gently backwards and downwards by an assistant, the bellows are to be opened and immediately closed, so as to throw air into the lungs by a single stroke; after which, allowing the mouth and nostril to open, the chest is to be pressed so as to expel the air: thus air is to be forced in, and again expelled, about fifteen or sixteen times in a minute, so as to simulate respiration.

30. *d.* The *external* and *internal* use of stimulants has been recommended by J. P. FRANK and DEVERGIE. Of this class of means, *galvanism* holds the first place; but it is seldom that an apparatus can be procured. When it can be obtained, slight shocks may be directed through the diaphragm or heart; or if an electric apparatus is at hand, as strong shocks of electricity as the machine can furnish may be tried. Whilst we are proceeding with insufflation of the lungs, *frictions* of the surface of the body, particularly over the chest, on the insides of the thighs, &c., in order to promote the circulation and the animal heat, should be continued; and the nostrils may be irritated, or touched occasionally with a feather dipped in spirits of hartshorn or of aromatic vinegar. Substances which are likely to increase the coldness of the surface by their evaporation should not be employed by friction. The introduction of *warm stimulating fluids* into the stomach, by means of a flexible tube and syringe, has been recommended, and may be tried after insufflation of the lungs has been performed for a short time. More advantage, however, will probably accrue from the administration of a clyster of warm spirits and water than from the injection of stimulants into the stomach, unless this can be done with an apparatus admitting of easy application. Tobacco-smoke has also been directed to be thrown up the rectum; but it is a more uncertain remedy than the clyster now mentioned.

31. *e. Bleeding* is one of the measures respecting which the greatest difference of opinion has existed. In certain circumstances it is often of great service, and in others detrimental. It is generally proper when the countenance is swollen, injected, or purplish; the veins full or distinct; and the skin reddish, or approaching the violet tint. It is not always, however, possible to obtain blood; but even when we fail in procuring it, the opening which had been made should be carefully closed and bandaged, in order to prevent subsequent hæmorrhage, which may occur when least expected. Bleeding is also often required during the progress of recovery, particularly when the respiration is laborious, the brain loaded or oppressed, and when delirium, the not infrequent attendant on restored animation, is present.

32. *f.* The means now recommended, particularly frictions, inflations of the lungs, and the occasional use of stimulants, should be persisted in for several hours, unless stiffness of the limbs, and other indications of death, present themselves. Convulsive snatches of the respiratory muscles, with gaspings, followed by sighing, a more natural respiration, and slight palpitations, are the first signs of returning animation. When the circulation is restored, convulsions sometimes take place, and suddenly destroy the patient. Such seizures may occur even a considerable time after recovery has apparently been effected. The patient should therefore be watched for several days; and if an attack of this kind occur, blood-letting, and artificial respiration during its continuance, may save the patient. *Delirium*, and all the forms of morbid reaction which occasionally appear recovery from asphyxy, require depletions, with the means usually employed to restore the secretions and excretions, and to excite the emunctories to carry off the hurtful materials accumulated in the blood during the state of asphyxy.

33. VII. TREATMENT OF PARTICULAR KINDS OF ASPHYXY. — *A. Of asphyxy from submersion.* But little, in addition to what has been stated above, need be adduced under this head. The body should be carried from the place of submersion to where means of restoration are to be used, in the recumbent posture, with the head and shoulders elevated; but neither of them bent, or hanging in an injurious posture. The wet clothes are to be immediately removed, the

mouth and nostrils cleansed, and the body placed in warm blankets: this should be done as soon as the body is found, if the weather be cold, and the distance to the place where resuscitation is to be attempted be considerable. The directions given in preceding paragraphs (§ 27. *et seq.*), are now to be followed. Some advantage will be derived from placing the body in a warm sun, or before a fire, or surrounding it with dry warmth; heated substances may likewise be applied to the epigastrium, the extremities, and insides of the thighs. Where a warm bath can be readily procured, the body may be placed in it, and the temperature regulated to about 98° or 100°. *Animal heat*, proceeding from some of the domestic lower animals or from a healthy person placed by the side of the body, is, especially in the cases of children, a very efficacious mode of resuscitation. But all these means should not interrupt the performance of artificial respiration. The other measures recommended in the foregoing section may also be resorted to, with the exception of *bleeding*, which is seldom beneficial until the circulation has been restored; when it will not infrequently be required, to subdue morbid reaction, in conjunction with other remedies calculated to restore the secretions, &c. (§ 32.)

34. *B. Asphyxy from strangulation* requires the same measures which have been described under the head of *general treatment* (§ 26. &c.), and particularly *bleeding*, which may generally be advantageously performed in the jugular vein. The head and shoulders ought to be raised as high as may be consistent with the means used for resuscitation; and, if a restoration of animation be effected, the usual means of guarding the brain from the ill effects of reaction or congestion, to which this organ is more liable after strangulation than after asphyxy from other causes, are to be put in practice.

35. In cases of asphyxy from *obstruction of the glottis and larynx*, or from substances having passed into this situation, or into the *trachea*, the operation of *tracheotomy* should be resorted to. Several instances of this description have been recorded, wherein it has been successfully performed. In all cases of recovery from asphyxy, the patient should be carefully watched for two or three days, and every appearance of reaction affecting any organ, more particularly the brain, instantly subdued by means appropriate to the circumstances of the case. Pure air, and the use of deobstruent purgatives and diuretics, are generally necessary, in order to purify the circulating fluid, and change it from the unnatural state it had assumed during the asphyxy.

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1. ASPHYXY of New-born Infants is frequently met with, particularly in those who are naturally feeble, or weakened by rupture of the chord or laceration of the placenta, in consequence of sudden delivery, or of the operation of turning, especially when required by uterine hæmorrhage. It is also occasioned by compression of the chord, and a protracted parturition.

2. Besides the absence of respiration and of muscular motion upon delivery, the surface is pale; the flesh and limbs are soft and flaccid; the heat of the body is rapidly diminished, but the circulation still continues, at least for some time. Several cases which are viewed as *asphyxy*, more properly belong to *syncope*, or *loss of blood*, or participate in those states as well as in *privation* of the respiratory actions. This privation may depend upon imperfect circulation in the pulmonary arteries, and through the lungs; or upon inactivity of the respiratory muscles, and torpor of the nerves which supply them, owing to imperfect circulation in the brain; or upon these causes conjointly. Care should be taken to distinguish these cases from apoplexy; as the states of the vascular system, and of circulation in the brain, and consequently the treatment which is required in each, are very different.

3. The *treatment* of these cases consists of deferring the ligature of the chord for some time; of taking care that no blood is lost from dividing it; of enveloping the infant in warm flannel; of holding it near a warm fire, or plunging it in a warm bath, rendered exciting by means of salt or mustard; of removing all obstruction to the passage of air into the lungs from about the throat and mouth; warm frictions of the surface of the chest, with gentle succussation with the palm of the hand on the shoulders; tickling or irritating the nostrils and arm-pits with a feather; dropping a little diluted aromatic, or ammoniated spirit upon the lips; and most particularly inflation of the lungs by the breath of the medical attendant, either blown directly into the mouth, the nostrils being closed, and the trachea gently pressed backwards; or through a curved tube introduced into the larynx, as recommended by Chaussier, and employed by him at the "*Maison d'Accouchemens*" in Paris. This latter method is certainly preferable. Insufflation is to be managed in the same manner, in other respects, as described in the foregoing article. But I think that the breath of the attendant is better suited to infants, than cold air thrown into the lungs by a bellows.

4. M. Desormeaux complains of his want of success from inflation of the lungs, even when carefully and assiduously employed, and places more dependence upon means calculated to excite the respiratory muscles to contract. For this purpose, he recommends a species of spirit douche, and directs the practitioner to take a mouthful of brandy, and dash it forcibly against the anterior parietes of the chest. He states that this is seldom required oftener than twice or thrice. Mechanical irritation of the nostrils, or exciting

powders applied to the pituitary membrane, may be cautiously tried; a stimulating clyster may also be thrown up. Galvanism or electricity may likewise be resorted to when within our reach. We should not relinquish our endeavours at resuscitation under two or three hours, or even longer; and, if we ultimately succeed, the state of the infant should be carefully watched for two or three days.

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ASTHMA. DERIV. and SYNON. *Ἆσθμα*, anhelatio: from ἄω, I breathe; *ἀσθμάζω*, I breathe with difficulty. *Suspirium*, Celsus, Seneca. *Dyspnœa Spastica*, Auct. Var. *Myspathica Spastica*, Ploucquet. *Asthma Chronicum*, J. P. Frank. *Asthma Convulsivum*, Baglivi, Alberti, Hoffmann, Sauvages. *Asthma Spasticum*, Juncker. *Pneusis Asthma*, Young. *Asma*, *Bolsuggine*, Ital. *Pousse*, *Asthme*, Fr. *Die Engbrüstigkeit*, *das Keuchen*, Ger.

CLASSIF. 54. *G.* Asthma; 3. *Order*, Spasmi; 2. *Class*, Neuroses (*Cullen*). 4. *G.* Asthma; 2. *Order*; 2. *Class* (*Good*). 37. *G.* Asthme Convulsif; 4. *Order*; 4. *Class* (*Pinel*). II. CLASS, III. ORDER (*Author*, see *Preface*).

1. DEFIN. *Great difficulty of breathing, recurring in paroxysms, accompanied with a wheezing sound, sense of constriction in the thorax, anxiety, and a difficult cough, terminating in mucous expectoration.*

2. There are few diseases, the nature of which has been a subject of greater doubt and difference of opinion than asthma. Until the writings of FLOYER, WILLIS, HOFFMAN, ALBERTI, and JUNCKER, directed particular attention to its pathology, it was generally confounded with dyspnœa, being usually denominated intermittent or remittent dyspnœa. By these writers, and more recently by SAUVAGES, CULLEN, PINEL, and GEORGET, asthma was considered as essentially nervous in its nature; and the lesions found upon the dissection of fatal cases viewed as its consequences, and not as its causes. More recently, and even at the present day, among many, it has been considered as a symptom of organic change of either the heart, large blood vessels, or of the lungs, air-tubes, &c. But this doctrine, although generally accurate in respect of DYSPNŒA, is quite erroneous as applied to asthma.

3. PATHOLOGY OF ASTHMA.—The dependence of dyspnœa, not only upon organic lesions of the organs seated within the chest, but upon the form of the thorax, upon diseases of adjoining viscera, and upon the state of the air-passages, is sufficiently obvious. The difficulty of breathing proceeding from these sources may be either continued or remittent; but it never is, whilst the causes on which it depends are in existence, characterised by intervals of perfect ease. True asthma, however, presents intervals of healthy respiration; and although repeated returns of the attack will generally induce some change in the organisation of either the lungs or the principal organs of circulation, yet this is not uniformly the case; and moreover, an attentive examination of the thoracic viscera, in recent attacks, fails of detecting in them any appreciable change, particularly during the intervals between the paroxysms. The disease has even proved rapidly fatal during the attack, and yet no alteration adequate to account for the symptoms could be detected on dissection. Instances of this description have been adduced by WICHMANN (*Hufeland's Journ.* b. i. p. 18.), PARRY, GEORGET, ANDRAL, LAENNEC, and GUERSENT, and justify the opinions of those who have referred the disease chiefly to the nervous system. In some cases, after repeated returns of the attack, and when they have induced organic change, the intervals are less distinctly marked, consist of remissions merely, and the disease may, at last, pass into confirmed dyspnœa.

4. *a. The structure of the air-passages and bronchi* evidently shows that these parts are susceptible of preternatural or spasmodic constriction. During 1821 and 1822, when engaged in some researches into the pathology of diseases affecting the trachea and bronchi, I was enabled distinctly to trace muscular fibres throughout those parts, both in man and in the lower animals. The disposition of those fibres, in many of the lower animals, and the mode of their connection with the cartilaginous rings, are peculiar, and beautifully adapted to guard against the contingencies to which they are liable from varying positions and habits of life. Upon those, however, I cannot here enter. About the same time that my attention was directed to this subject (*Lond. Med. Repository*, vol. xxii. p. 418.), the researches of REISSEISSEN of Berlin, and of LAENNEC and CRUVEILHIER of Paris, appeared; and the results, in respect of the structure of the bronchi and larger ramifications of the trachea, upon the whole, agree with what I had observed. It had been denied that the membraneous, or any other, part of the air-passages contain muscular fibres. But this was asserted chiefly by those who cannot believe that a part is muscular, unless the fibres are the same in appearance as those which enter into the composition of the muscles of voluntary motion. Other anatomists, who take a more comprehensive view of the conformation and functions of the muscular system, consider, with greater justice, that the muscles which are acted upon by the will, form an order by themselves; and that there is another and a very important order of muscular parts, which are not directly influenced by volition, but which contract from stimuli acting on them, either immediately or mediately, and which present certain peculiarities in respect of the appearances of their fibres, of the mode of their distribution, and of the manner of their connection with internal tissues and organs. Now, the fibres which are discovered in the trachea, and traced to the smaller ramifications of the bronchi, are in every respect similar to other involuntary muscular fibres, in their organisation; in their connection with a mucous surface, forming, in many respects, a tunic concentrically with the mucous coat; in being disposed in circular fibres, surrounding hollow tubes; and in being supplied entirely by ganglial or involuntary nerves. The disposition of the fibres, therefore, which are detected in the air-passages, being altogether similar to that which obtains in other canals, the muscular structure of which is not disputed, as in the alimentary tube and urinary bladder; the organ-

-isation of the fibres being also similar; their connection to a mucous surface, and the circumstance of their being supplied with the same order of nerves, being at the same time considered; are we therefore to be surprised that agents affecting either the mucous surfaces thus related to them, or the nerves supplying them, should be followed with analogous effects to those which we observe after the action of agents directed to the mucous surface or nerves of the alimentary canal?

5. *b. The lungs possess a vital power of expansion.*—The structure of the air-passages, then, would lead us, independently of the results of observation, to infer that the circular fibres are liable to experience, with all other involuntary muscular fibres, a spasmodic constriction; and it evinces, particularly in the conformation of the cartilaginous rings with which the trachea and larger ramifications of the bronchi are provided, a marked provision against an inordinate continuance or degree of this constriction; the rings, by their permanent elasticity, acting as antagonists to the circular fibres, preventing extreme constriction, and at last overcoming long-continued spasm, particularly in those larger branches, the inordinate constriction of which might have the effect of excluding the air from a very large portion of the lungs. In the larger ramifications of the bronchi, the muscular fibres connecting the extremities of the cartilaginous rings are thus antagonised by these rings; but, in the smaller ramifications, where the rings cease to be detected even in the imperfect forms in which they there exist, and where the fibres are perfectly circular, the only provision which can prevent an inordinate constriction of those fibres, is in the structure of the lungs themselves, which must necessarily undergo a change in bulk, and become more condensed by this constriction, in those parts, at least, to which the spasm extends; unless we believe that the lungs, like various other organs, are endowed with an expansive power,—a power which physiologists and pathologists have too much overlooked in their exposition of the healthy and morbid actions of the animal economy.[*]

6. The mechanism of the expansive power is so little understood, and generally so insufficient for the explanation of this phenomenon, that we must refer chiefly to the vital actions of the part, which must necessarily depend on the energies of the body generally. The expansile action of the penis, nipple, heart, uterus, &c. cannot be explained by their organisation only: it is manifested to us only during life, and the perfection as well as imperfection of this action are always accordant with the degree of vital energy with which these organs are endowed.

7. I have long since had occasion to remark that the motions and functions of the lungs (*Physiological Notes, &c.* to M. Richerand's *Physiology*, 2d ed. p. 628.) have been too generally and exclusively referred to the mechanism of the respiratory organs, and to chemical changes produced in the lungs, to the neglect of a much higher influence, always controlling, modifying, or altogether changing, the subordinate powers to which their functions have been thus referred. That the vital energies of the frame are most powerfully exerted in the lungs, through the medium, especially of the organic nerves with which they are provided, must be evident to all who will contemplate the nature and extent of the changes constantly taking place in these organs upon the blood circulating through them; and the relation which subsists between their functions and the vital energies of the system generally. Now, it does appear to me that there exists a vital expansion of the lungs independent of that which they experience from atmospheric pressure, and from following the dilated parietes of the thorax during inspiration. In experiments upon living animals, where the walls of the chest have been opened, the lungs are observed to swell and contract alternately. This fact, which was first insisted upon by M. Roux (*Mélanges de Chirurg.* p. 87.), has since been duly appreciated by Prus, Laennec, and a few others. Even in cases where the portion of lung has protruded itself after a wound of the chest,—a circumstance which could only occur from active expansion of the lung itself,—this portion has been, although thus unnaturally placed and subjected to the pressure of the atmosphere, observed to dilate during inspiration. The not infrequent occurrence of ossification of the cartilages of the ribs in old persons, and consequent perfect immobility of the ribs, even without any evident dyspnœa, furnishes another proof of the inherent expansibility of the lungs: for without having recourse to this vital property, we cannot explain the performance of the actions of inspiration and expiration by the diaphragm alone.

8. This vital property, therefore, with which the lungs, in common with some other organs, seem to be endowed, together with the disposition and elasticity of the cartilaginous rings of the bronchi, furnishes an antagonising force to the unnatural constriction of the tubes from spasm of their circular fibres; and, while it serves to explain the natural functions of the organ, with their modifications from the various influences to which this property is subjected, is one of the sources to which we are to impute some of the diseases, and more especially the one under consideration, to which the lungs are liable.

9. Having thus shown, from the structure of the air-passages that they, in common with all other hollow tubes of the body, admit of spasmodic constriction, and that they also present a provision against the undue extent or continuance of this state, I should further remark, that a close observation of the phenomena of disordered respiration is sufficient to convince us that they frequently experience this state, owing to the operation of certain causes acting either directly on the mucous surface of the tubes, and impressing the nerves terminating in it, or originating in and irritating the nerves themselves, either at their origins or in their ramifications and connections.

10. I. Symptoms and History of Asthma.—The *premonitory* symptoms of this disease are languor, sickness, flatulency, and other dyspeptic

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[*] That the lungs, however, really possess this property, may be inferred from the permanent elasticity of their structure, which continues for some time after death; and which is still more marked during life, as shown by exposing the lungs of a living animal. This state may be with propriety called the vital expansibility of the lungs, inasmuch as the degree of this state is chiefly dependent upon the vital energy of the system, and partly on the peculiar organisation of the lungs themselves.

disorders; heaviness over the eyes, and headach; uneasiness an anxiety about the precordia, with a sense of fulness and straitness in this region and in the epigastrium. In some cases pain is complained of in the neck, with uncommon drowsiness and stupor. It is also often preceded by costiveness and inefficient calls to stool.

11. *A.* The *invasion* of the attack of *spasmodic asthma* is generally soon after midnight, or about one or two in the morning, and during the first sleep. The patient wakes suddenly from a sense of suffocation. He feels a most distressing tightness at his chest, with great anxiety, difficulty of breathing, and impediment to the free admission of air into the lungs. He assumes with eagerness the erect posture, and cannot bear the least incumbrance about the chest. The breathing is wheezing, interrupted, and laborious. The shoulders are raised, the elbows directed backwards, and every effort made to enlarge the thorax. Owing to the interrupted circulation through the lungs and heart, the countenance, which was at first pale and anxious, becomes, particularly in plethoric habits, red or bloated, and covered with perspiration. The eyes are prominent, and the conjunctiva injected. A considerable quantity of pale urine is usually passed at the commencement, or previous to the accession, of the paroxysm; and the lower extremities are usually cold. The pulse is generally accelerated, weak, irregular, and often intermittent. During the fit, the patient has commonly an instinctive desire for cool fresh air, which always revives him. A small or close room is offensive, and all warm substances given internally increase the flatulency of the stomach and bowels, and aggravate the symptoms. When the fit has continued from half an hour to one, two, three, or even four hours, it leaves the patient; and his respiration, pulse, and feelings assume their natural state.

12. This is the common course of a first and moderate attack of the disorder. Sometimes the patient has but one such fit; but more generally a slight constriction of the chest is felt through all the succeeding day, and the paroxysm returns at the usual period of the night; and this continues for three, four, or even seven days; when the patient is at last altogether relieved from the attack. The disease may be suspended for a month, or several months; but it is liable to recur from changes of air, errors of diet, and from the operation of the other causes productive of it.

13. In some cases the attack is more severe from the commencement, and continues, with slight remissions for several days, accompanied with a harsh suffocative cough, great distension of the abdomen from flatus, and more or less of the symptoms which characterise the complaint in the severer states resulting from repeated attacks.

14. When asthma once seizes on the system, it seldom fails of recurring, though the intervals between the paroxysms are of very uncertain duration. In many cases it recurs periodically every ten days or a fortnight. Sometimes the attack returns at the full and change of the moon, or at one of those periods only. It has been observed to recur in females just after the menstrual discharge, or to precede this evacuation. Persons who have become subject to the disease seldom escape an attack in the spring and autumn.

15. After repeated seizures, the disease often assumes the most violent and distressing features; the difficulty of breathing in the fit amounts to the utmost degree, and is attended with the greatest tightness over the whole chest, the patient feeling as if he were bound with cords. His anxiety at this period is inexpressible, and he labours in respiration as if every moment would be his last. Severe vomiting also frequently occurs. The matter discharged is slimy and frothy, or of a greenish yellow colour. He is subject to palpitations and faintness; and cool fresh air becomes absolutely necessary. About this period a loose stool sometimes takes place. The eyes are prominent, the face sometimes pale, sometimes high-coloured, bloated, or livid: the nose and ears are cold; the face, neck, and chest, covered with perspiration. The pulse is generally extremely weak, irregular, and even intermitting: there is often much difficulty of swallowing. The patient can scarcely speak, cough, or expectorate, and the stomach and bowels are much distended with flatus. As the paroxysm abates, the cough becomes freer, and is attended with the expectoration of a little viscid mucus; and, in proportion as the cough and expectoration increase, the distressing symptoms abate; this evacuation, which had been retained by the spasm of the air-vessels, indicating a solution of the spasm and a freer access of air to the cells of the lungs. An easy and free expectoration, particularly if it be accompanied with softness and moisture of the skin, and a sediment in the urine, is a certain indication of the subsidence of the attack. Sometimes when the paroxysm is unusually long, the patient experiences only a single occurrence of it during the attack.

16. *B.* The *Humoral* form of asthma is generally gradual in its accession, and attended by extreme oppression, a suffocative cough, and a copious secretion and expectoration of mucus from the commencement of the seizure (§ 11.). It is sometimes the consequence of repeated attacks of the preceding variety; and is generally more severe and of longer duration than it, owing to the accumulation of viscid mucus in the air-vessels conspiring with the spasm it occasions to aggravate the symptoms. There are also less perfect intervals of ease in this form of the malady, than in the spasmodic. After the subsidence of the patient's sufferings during the first night of the attack, and while the expectoration is easy and copious, the lungs still continue irritable through the day, and the respiratory function embarrassed from the slightest causes. At the approach of night, the fit recommences with the usual symptoms, and the night is passed nearly as the former. On the third day the remission is more complete, there is some additional expectoration, and bodily motion is performed with less distress, but still with great inconvenience. After the paroxysm has been renewed in this manner for three or four nights, or for a longer period, sometimes for several days or even weeks, — for the duration of an attack varies much, — the expectoration and cough are more easy and free, the daily remissions become more perfect, and the strength of pulse and vigour of action increase.

17. When the chest is examined by the ear or

stethoscope, the sound of respiration is weaker during the fits, than in the intervals, but it is seldom altogether suspended in certain points of the chest; it is attended by a sonorous rattle, flat or sibilous, imitating the chirping of birds, the note of a violoncello, or the cooing of the wood-pigeon. With this there is frequently intermixed a mucous rattle; but this conveys the impression of being produced by a thinner fluid than the mucus of common catarrh. In the intervals of the attacks, these various species of rattle exist, but in a much less degree. The respiratory sound is louder than during the paroxysms: sometimes it is almost puerile. If the complaint have occasioned dilatation of the bronchi, the respiration assumes more or less the character of the variety called bronchial; in all cases it varies in intensity at different points of the chest, and these points change their situations from day to day (LAENNEC). The chest generally sounds well, throughout the attack, upon percussion.

18. I have stated (§ 16.), that the humoral form of asthma is often consequent upon repeated attacks of the spasmodic; but this latter may also occur, although rarely, after the former; or the attacks in some persons present an evident complication of both forms of the disease. The stomach and bowels are extremely liable to disorder in asthmatic persons, particularly in those subject to the spasmodic form of the disease. Colic pains, flatulence, loss of appetite, an irregular state of the bowels, and a disturbed, impaired, and unrefreshing sleep, generally harass the asthmatic patient, even in the intervals between the seizures. In females, the menses are generally impaired or irregular, and an attack often precedes the period of the menstrual discharge, the supervention of which generally acts as a crisis of the attack.

19. Symptoms of fever are not essential to the disease, though they often occur, especially when the humoral asthma, or an attack of catarrh, is complicated with the convulsive. Hectic fever, colliquative diarrhœa, faintings, palpitations, vomitings, coldness of the extremities, swelled legs, and other dropsical symptoms, are common in the last stage of the disease, and indicate organic changes in the substance of the lungs or heart, with obstruction to the circulation in these organs, and effusion of fluid in the chest, — results, however, which can only be ascertained with precision by means of auscultation and percussion.

20. *C. Terminations.* — An attack of asthma generally terminates in one of three ways: — 1st, By a return to the healthy function: 2d, By inducing further lesion; in which it either disappears, or becomes complicated: and, 3d, In death. On each of these I shall offer a few remarks.

21. *a.* Although the paroxysms of asthma frequently terminate in a return to the healthy functions, a perfect immunity from future attacks can rarely be procured. Yet these attacks may be frequent, severe, and of long duration, recurring for a long series of years; the patient, notwithstanding, arriving at a very advanced age, before a fatal issue takes place. But they often produce the following organic lesions.

22. *b.* The most common consequences of the disease to which I may now advert, are, chronic inflammation and dilatation of the bronchi the different forms of emphysema and œdema; of the lungs; hæmoptysis; tubercular formations, with which asthma may also be associated from its commencement; enlargement, and dilatation, &c. of the cavities of the heart; effusions of fluid in the pleura or pericardium; and wasting of the heart, or polypous concretions, within its cavities. As the reader will find all those lesions treated of under their distinctive heads, I shall here only remark respecting them, that, when they supervene to asthma, many of the distinctive characters of this disorder entirely disappear in those of the superinduced disease, and the lesions of the respiratory functions assume the distinctive features of chronic, continued, or remittent dyspnœa. Severe attacks of asthma may also terminate in congestions or effusions within the head, giving rise either to epilepsy, coma, or apoplexy.

23. It was already remarked, that auscultation and percussion furnished merely negative information in the different forms of asthma. But this information is still important, inasmuch as it intimates the non-existence of any of the foregoing organic changes; and, when they do exist, those means of diagnosis enable us not only to recognise them, but also to ascertain with precision their nature, progress, and extent, and thus to form an accurate diagnosis and prognosis in respect both of the primary disease and of the consecutive organic changes.

24. *c.* When the disease ends in death, this event is brought about generally by superinducing some one of those changes already referred to as terminations of the disease, or of those lesions, with which it is frequently associated (§ 22.). Death may, however, occur, but much more rarely, from the severity of the attack; the requisite changes not being effected on the blood by respiration, owing to the obstructed state of the air-vessels, either from spasm or the accumulation of viscid mucus, or from both, whereby the nervous centres are supplied with blood unsuitable to their functions, and the heart ceases to contract with sufficient energy to preserve the circulation in a requisite state of activity through the lungs and brain.

25. *D. The appearances after death* may be inferred from what has already been stated. These appearances are rather the consequences of the disease, than the disease itself; for it is seldom that we have an opportunity of examining the body in recent and uncomplicated cases of asthma. Where, however, this has been done, the lesions, even when any have been detected, have been insufficient to account for the disease, WILLIS records a case of protracted asthma, in which no morbid appearance could be detected; and similar cases have occurred to LAENNEC, ANDRAL, CRUVEILHIER, BOUILLAUD, JOLLY, and others. FERRUS, after extensive experience, states that he has been unable to detect any lesions which can be attributed to uncomplicated asthma. The changes which have been noticed, therefore, by authors, are to be viewed chiefly as accidental occurrences, or associated maladies; and, perhaps, more frequently as the remote results of repeated or protracted attacks. The appearances usually observed in fatal cases are the same as have been described (§ 22.).

25. II. VARIETIES OF ASTHMA, AND OF THEIR PATHOLOGY. — SAUVAGES has enumerated no less

than eighteen forms of this disease, many of them presenting no modification of the phenomena constituting the disease, but merely peculiarities as to cause, particularly as respects the occasional causes. Several of his varieties, also, strictly belong to the more generally symptomatic complaint to which the the term DYSPNŒA is usually applied. The varieties of idiopathic asthma, according to CULLEN, are the SPONTANEOUS, EXANTHEMATIC, and PLETHORIC. Dr. BREE, who has given a comprehensive account of the disease, has divided it into forms which have reference chiefly to the doctrine which he has espoused respecting its pathology. He assigns to it four species: — 1st, Asthma produced by the irritation of effused serum in the lungs; being its most common form: 2d, That occasioned by the irritatation of aërial acrimony in the lungs: 3d, That dependent on irritation in the stomach, or some of the abdominal viscera: and, 4th, That dependent upon habit. Dr. YOUNG has adopted a similar arrangement.

26. M. LAENNEC has given a simpler view of the disease, and assigns it two forms, viz. asthma attended with *puerile respiration*, in which the vital expansibility of the lungs is increased, from a temporary augmentation of the want of the system for respiration, occasioned by some unknown modification of the nervous influence; and *spasmodic asthma*, from a spasmodic constriction of the air-tubes. Dr. GOOD has divided the disease into the *dry* and *humid*; but he has encumbered these two species with nearly as many varieties as have been assigned by SAUVAGES. The *dry* or *nervous* asthma he subdivides into the simple, metastatic, phlegmatic, vaporose, and organic, — a refinement which is neither founded in nature, nor can be available in practice; for a simple nervous asthma may be induced by injurious vapours, or by repelled eruptions, and hence we have the first variety produced by either his second or fourth; and the second, or the phlegmatic nervous asthma, may proceed from the same varieties. His fifth variety is certainly not admissible under asthma, unless as a consequence of the disease, but falls more properly under dyspnœa, either in its continued or remittent forms. The HUMID or *common* asthma he subdivides into the simple, plethoric, and atonic, — a division much more accurate than the foregoing, but still objectionable, inasmuch as it is impossible to draw any line of demarcation between them, and as the three varieties insensibly pass into one another.

27. By the great majority of authors who have written on the disease, it has been viewed simply in respect of its IDIOPATHIC and SYMPTOMATIC forms; both, however, presenting modifications resulting from peculiarity of causes, and the circumstances of the patient, but insufficiently marked to constitute distinct varieties. In the following observations I shall observe the same distinction, and divide the IDIOPATHIC FORM of the disease into, 1st, The *nervous* asthma; 2dly, The *primarily spasmodic* asthma; and, 3dly, The *pituitous* or *humid* asthma.

28. 1st, *Nervous Asthma.* The asthma with puerile respiration, *Laennec.* — CHAR. *Anhelation from a feeling of want of a more complete respiration than the patient enjoys, the pulmonary expansion distinctly taking place with promptitude, completeness, and uniformity, so as to furnish a general puerile sound on auscultation; usually accompanied with a slight cough, and with a free mucous expectoration.*

29. This form of the disease was first accurately described by LAENNEC, who pointed out the difference between it and the forms depending on spasm of the air-tubes. In this variety no spasm seems to exist in the smaller air-vessels and cells; for the whole tissue of the lungs is dilated to its full capacity, and with unusual promptitude and completeness, so that the puerile respiration is heard in every part of the chest; whereas in the other varieties the respiration is generally somewhat more indistinct than in health. M. LAENNEC contends, and apparently with justice, that the wants of the system, in respect of respiration, may be exactly measured by the intensity of the respiratory sound; and that the intensity varies much, according to many circumstances, and particularly according to the age of the individual, it being much greater in childhood than in adult life. There is no morbid affection, he observes, which can be more satisfactorily referred to simple disorder of the nervous influence, than this dyspnœa accompanied with puerile respiration. In cases of this kind, the respiratory sound has resumed all the intensity which it possessed in early life. The pulmonary expansion evidently takes place completely and rapidly in all the air-cells, and yet the patient feels the want of a more extensive respiration than he enjoys; and the lungs, although dilated to their utmost, have not, nevertheless, capacity enough to satisfy the wants of the system. This affection is common in persons affected with chronic mucous catarrhs, attended by a copious and easy expectoration; but even in them, during the severest attacks, the completeness with which respiration is performed is quite astonishing. Nevertheless the patient feels oppressed, and requires a more extensive respiration than his organisation allows; the wants of the system in respect of this function being increased beyond the standard of health.

30. In this form of the disease it is not in the small air-tubes that we are to look for its proximate cause, but in the trachea and large bronchial trunks, and particularly in the nervous influence itself; and this will equally hold good even if we adopt the chemical theory of respiration, and refer the affection to an extraordinary want of oxygen in the blood, arising from impeded function of the respiratory mucous surface, owing to the mucous secretion covering it. M. LAENNEC believes, as this species occurs only in persons affected with chronic mucous catarrh, that it can never amount to asthma, without the catarrhal complication. Adults and old persons, he remarks, who have puerile respiration without catarrh, are not, properly speaking, asthmatic; but they are short-breathed, and dyspnœa is induced by the slightest exertion, though when sitting still they frequently experience no oppression whatever.

31. This variety may be considered as depending upon a temporary augmentation of the want of the system for respiration, occasioned most probably by some unknown modification of the nervous influence; and apparently consisting in an expansile action of the lungs increased much beyond the healthy standard. But here a ques-

tion suggests itself, viz. can this augmented action of the lungs be owing solely to the state of this organ, or is it associated with, or partly depending upon, increased activity of the respiratory muscles, particularly the diaphragm? M. LAENNEC states that it cannot be produced at will by a full inspiration; and, therefore, infers that this state of the lungs is a primary condition of them, and not depending on increased inspiratory efforts.

32. From this consideration I am led to infer that, although the vital expansile action of the lungs may be increased in this variety of asthma, it is accompanied with, and much assisted by, augmented activity of the diaphragm, which performs its office more promptly and completely in this variety of asthma than in any other; that instead of the disease being characterised by spasm of the smaller ramifications of the bronchi and air-cells, as in the second variety of asthma, the air penetrates more fully into them than usual; and that, if any spasm exists, it is limited to the trachea and large bronchial tubes; the exalted state of expansion of the lungs, and of function of the diaphragm, being an effort to counteract this morbid condition of the large tubes, and to supply the wants of the system by a more forcible inspiration; the increased rapidity with which the air is thereby made to pass through the strictured canals making more than amends for the diminished calibre of the passage. This form of the disease is frequently *symptomatic* of nervous affections, particularly of hysteria when the globus hystericus affects the state of the trachea, and of various diseases, in which the blood is imperfectly changed in its circulation through the lungs. But when thus symptomatic, it is often slight and evanescent.

33. 2d, *Spasmodic Asthma*. SYN. Periodic Asthma. Convulsive Asthma, *Willis*, *Baglivi*, *Boerhaave*. Asthma Siccum, *Musgrave*. Occult dry Asthma, *Etmuller*. Spasmodic Asthma, *Laennec*. Dry Asthma, *Good*.—CHAR. *Paroxysms sudden, violent, and of short duration, attended with hard spasmodic constriction in the chest; slight, dry, and difficult cough, and with a scanty expectoration, occurring only towards their close.*

34. I stated that the vital expansive action of the lungs was increased in the foregoing variety. In this the ramifications of the air-tubes, and perhaps the air-cells themselves, seem to be unnaturally constricted. The respiration, when examined by the stethoscope, or by the ear merely, is heard either very imperfectly even on the most forcible respiration, or to a small extent only, or its sound may be but little impaired. The chest, during the paroxysm, sounds ill on percussion. These phenomena indicate that there is an imperfect entrance of the air into the air-cells. M. LAENNEC states, that if the patient, after holding his breath nearly as long as he can, breathes quietly, the spasm will often be overcome as it were by surprise, and the entry of the air into the cells will be heard in a clear or even puerile sound. This, and various other circumstances, independently of the proof furnished by the structure of the air-tubes, indicate that the obstruction to the entrance of air into the cells is owing to spasm of the muscular fibres.

35. Dr WILLIAMS believes that spasmodic asthma may be partial, affecting one lung only, or one more than the other; but this is very seldom the case, unless when it is occasioned by, or complicated with, dry catarrh, which is sometimes partial; or when the spasmodic constriction is excited by a collection of a pituitous fluid in some of the bronchi,—a complication of not infrequent occurrence, but falling more strictly under the next form of the disease. Although the paroxysms of the primarily spasmodic asthma are sudden, and generally of short duration, yet the disease is often of long continuance, and may, to a certain extent, become habitual, as shown by Dr. BREE and others.

36. During the spasm, the lungs seem, from an attentive examination of the thorax, somewhat drawn together, owing to the constriction of the air-tubes; and the parietes of the chest, being necessarily pressed inwards at the same time, generally yield a less clear sound on percussion. The scrobiculus cordis is also drawn inwards and upwards, indicating the manner in which the diaphragm is affected during the paroxysm. This phenomenon, which was first pointed out by SCHEIDEMANTEL (*Fränkische Beträge*, No. 5.), arises either from the diaphragm being prevented from contracting to its full extent by the spastic constriction of the air-vessels, or from a temporary paralysis of this muscle. That the latter state should take place, and be followed in a short space of time by a perfect restoration of action, and that repeated seizures of this description should be always succeeded by a similarly rapid return to the healthy state, cannot be admitted by any person who takes an intimate and comprehensive view of the operation of the animal economy in health and disease. That retraction of the epigastrium, and even of the hypochondria, is owing to imperfect descent of the diaphragm form constriction of the air-cells, seems proved by the circumstance, that the pleural cavity is perfectly closed, and forms nearly a vacuum, and consequently the capacity of the thorax cannot be enlarged by the action either of the diaphragm or of the other respiratory muscles, without the expansion of the lungs. But this organ is only imperfectly expanded, owing to the spasm of its air-vessels; consequently the diaphragm either cannot assume its usual place, or does so imperfectly, notwithstanding its efforts to accomplish this end; and the parietes of the thorax are every where pressed inwards, following the retracted state of the lungs themselves, and are only partially dilated after the most energetic action of the respiratory muscles, which at last overcomes the spasm of the air-tubes, as the want of respiration throws the former into spasmodic action, and tends to relax the spastic state of the latter.

37. This condition of the air-vessels, and the antagonising action of the respiratory muscles during the paroxysm, have a necessary tendency to form a vacuum in the thoracic cavity; but this can take place to a very small extent only, as the action of the respiratory muscles is insufficient to overcome both the pressure of the atmosphere surrounding the chest, and the spastic stricture of the air-tubes, as long as this stricture continues in full force. The consequence, however, of this antagonising action and tendency to form a vacuum is, that a larger quantity of blood is drawn into the large veins within the thorax, and

into the venous sinuses and auricles of the heart, occasioning congestion of those cavities, impeded circulation through the lungs, congestion within the head, and inordinate and irregular action of the heart, with various other injurious effects upon the central organs of circulation, as well as upon the cerebro-spinal centres.

38. In addition also to these effects, which take place during the antagonising struggle characterising the paroxysm, rupture of one or more of the air-vessels or cells sometimes takes place, in consequence of the violent action of the inspiratory muscles on the one hand, and the unyielding state of constriction of the air-vessels on the other (§ 136.); and emphysema of the lungs is superinduced, forming one of the most common lesions found upon dissection of fatal cases, and in the opinion of some pathologists the proximate cause of the disease. (See Emphysema.)

39. 3d, *Common or Humid Asthma.* — Syn. Catarrhal Asthma; Continued Asthma; Humoral Asthma; Pituitous Asthma. Spitting Asthma, *Floyer.* Asthma Humidum, *Riverius* and *Musgrave.* A. Pneumaticum, *Willis.* A. Humidum, *Baglivi.* Pituitous Catarrh, *Laennec.* — Char. *Gradual accession of the paroxysms, which increase in severity, are protracted, and attended with heavy and laborious constriction of the thorax, severe suffocative cough, and with expectoration, often commencing early, at first viscid and scanty, but becoming copious and affording relief.*

40. This common form of asthma may present various pathological states and relations. It may, as stated by Cullen and Good, be characterised by *plethora* of the vascular system generally, and of the pulmonary tissue especially, particularly when it supervenes to the suppression of some accustomed evacuation. It may also be associated with a relaxed or *atonic* state of the exhalants of the bronchial surface, particularly when it takes place after chronic catarrhs, and in aged or phlegmatic subjects; and it may be attended with both these states, namely, with plethora of the sanguineous system, and atony of the exhalant pores of the respiratory mucous surface. Besides these states, it may vary in respect of the acuteness and chronicity of its symptoms and progress; it being either *acute* or *chronic*, or presenting grades intermediate between both.

41. The chief characteristic of this variety of asthma is the copious discharge of viscid mucus accompanying it. But the questions with several modern pathologists have been, whether the phenomena of the disease are to be imputed solely to the accumulation of this fluid in the air-passages, or in part only; and whether spasm of those passages also exist in conjunction with an increased secretion of mucus, or not. I believe that an attentive observation of the phenomena of the disease, with the assistance of auscultation and percussion, — which, however, occasionally furnish but little information, and that of a negative description, in this disease, — will lead to the inference that it depends upon both those morbid states. The limits of our enquiry are now narrowed to the question of the priority of their existence, and the relation which the one holds to the other. As to these points it may be remarked, that the early occurrence of expectoration, as well as its abundance, forbid the inference that the production of viscid mucus is the consequence of relaxation of the spasm; whilst they favour the idea that the spasm is occasioned by this secretion in the irritable and morbid air-tubes; the severity and duration of the paroxysms being occasioned by these double states of disease, — an abundant secretion of viscid mucus in, and a spastic constriction of, the air-passages.

42. But it may be further enquired, are not those morbid changes the effect merely of a certain condition of the air-passages still more intimately connected with the disease than they are? I do not deny the possibility of lesions antecedent to those now specified; but the difficulty of ascertaining their exact nature must be conceded. It would certainly be advantageous to obtain this information, inasmuch as on it would be based the means of cure, which might be employed early in the disease. That it is not inflammation is proved by concomitant and symptomatic phenomena, by the course of the paroxysms and of the disease, by the terminations usually characterising it, and by observation of the *juvantia* and *lædantia* during its progress. It seems, however, extremely probable that the morbidly increased secretion and spasm are preceded by a congestive state of the mucous respiratory surface; this state disposing to the spasm, and being, as well as the spasm itself, at last relieved by the copious effusion of mucus; the mucus first effused tending, however, for a time, to increase the spastic constriction of the air-passages, and the consequent struggle of the respiratory muscles to overcome it (§ 36, 37.), and to procure a fresh supply of air in the lungs. This antecedent state of vascular turgescence of the mucous surface of the bronchi in asthma, is perhaps most marked in that form of this variety, in which little or no expectoration accompanies the cough, at least early in the attack, and which, from this circumstance, and the causes which induce it, has been called the *dry* catarrhal asthma.

43. If it be still further asked, to what cause are we to impute this congestive state of the respiratory surfaces? I can only answer, to a certain primary change of the vital energy of the organic nerves supplying the blood-vessels, and actuating the muscular fibres of the bronchi; and hence, as the morbid changes of the circulation, secretion, and calibre of the air-passages, are merely effects of one cause, — of a previous change of the vital manifestations of the nerves of the organ, — it becomes of the utmost importance to ascertain the nature of this primary change with as much accuracy as possible, in order that remedial agents may be directed with precision to its removal; but the prosecution of this very interesting topic falls under another division of my subject. In estimating, however, the nature of this, as well as the other varieties of asthma, the difficulties opposed to expiration by the spasm of the air-tubes and the accumulation of viscid mucus in them, have been too generally overlooked in our eagerness to ascribe all the morbid phenomena to impeded inspiration. But I believe that the disease, particularly this variety of it, is as much occasioned by the obstacle these states of the air-passages present to free expiration; the air, by the greater power of the inspiratory over the expiratory muscles, being drawn in sufficient abundance into the lungs,

from which it is imperfectly expelled. From this circumstance the lungs are often kept in a state of inordinate dilatation, and the respiratory muscles excited to convulsive actions, occasioning dilatation or rupture of the air-cells, and consequent emphysema of the lungs. In the more advanced stages of the disease, in old and debilitated subjects, this struggle to dilate the thorax still further, proceeding from the wants of the system for respiration, and to expel the air from the lungs through the obstacles placed in its way, generally terminates unfavourably to the latter part of the respiratory actions; consequently expectoration is impeded or suppressed, and life is terminated, with the air-tubes and cells, and even the substance of the lungs, loaded and infiltrated with mucus, air, and serum. It is in this state that active stimulants and emetics, by rousing the energies of the frame, and by exciting the expiratory efforts during the process of vomiting, prove so frequently beneficial.

44. This form of asthma may be partial, affecting one lung only, or one more than another; but it is more commonly general; and in some constitutions, particularly in aged persons, and when it has supervened to repeated attacks of catarrh, the quantity of viscid mucus expectorated is very great.

45. Its *anatomical characters* are, slight swelling, or thickening, and softening of, the mucous membrane, with a slight appearance of redness in parts, and with marked congestion, and purplish tint of portions of this surface in the more severe or protracted cases. Sometimes these lesions are accompanied with slight œdema of the membrane, and the developement of miliary tubercles in the lungs.

46. As the majority of cases of this disease is characterised from the commencement by copious expectoration, it becomes a question how far it deserves to be considered as a variety of asthma; but taking all its phenomena into consideration, particularly the spasm of the air-passages, and convulsive action of the respiratory muscles, as well as the circumstance of it having been usually considered as a species of asthma, and the difficulty of arranging it otherwise, I was unwilling either to assign it a different place, or to make it a distinct disease, to which it scarcely can lay claim. M. Laennec has placed it amongst catarrhal inflammatory affections of the bronchi: but I conceive that it is seldom inflammatory either in its origin or progress; and that, although occasionally commencing in, and always aggravated by, catarrh, it is not necessarily a catarrhal disease. Besides, inflammations of the bronchi and catarrhs are not identical affections, although the latter frequently pass into the former.

47. But, besides these considerations, many of the phenomena essentially characteristic of asthma always attend it to a greater or less extent. Upon an attentive examination, however, of the chest of a person afflicted with this affection, by auscultation and percussion, these phenomena are found to vary, in different cases, or even in the same case, at different periods of the attack; yet they are essentially the same as those which mark the preceding varieties, although not so evident to the senses as in them, inasmuch as they are obscured by a more prominent symptom — the copious mucous secretion and expectoration. Sometimes it is manifest that certain parts of the air-tubes are differently, or even oppositely, affected at different periods of the attack. When the viscid mucous secretion proceeds from, and is still present in, the smaller ramifications of the air-vessels, this condition, together with some degree of spastic constriction of their circular fibres, either in a part only, or more or less throughout the organ, occasions many of the symptoms which characterise the *second* or spasmodic variety of the disease. But in proportion as the secretion rises to the larger air-tubes, and leaves the smaller ramifications clear; or when the mucous secretion proceeds chiefly from the former parts, and excites, or is accompanied with, spasms of these canals, but not to the extent of preventing the passage of air into the parts of the lungs which they supply; these parts generally expand freely, owing to the vital activity of the organ, the wants of the system for the changes effected on the blood by respiration, and the active contraction of the inspiratory muscles during the convulsive efforts of the paroxysm. Hence the part of the lungs thus affected generally furnish the puerile respiration, and a clear sound on percussion, with a full and prompt performance of the inspiratory actions, — phenomena characteristic of the *first* or nervous form of asthma.

48. Diagnosis. — From the foregoing account of the symptoms and forms of asthma, it will appear obvious that the distinction of it from every other disease cannot be difficult, particularly if we carefully bring auscultation and percussion to our assistance. The sudden attack of the paroxysms, the short period of their duration, the violence of their symptoms, their returning after intervals of ease and of tolerable health, are sufficient to characterise the disease. It is only when asthma is complicated with, or has induced, other diseases — as chronic or acute bronchitis, pneumonia, tubercular phthisis, organic changes of the heart and large vessels, or effusions of fluid within the thorax — that difficulty can arise in determining the exact state of parts; and here we have it in our power to resort to auscultation and percussion, which, if this disease be simple and uncomplicated, will furnish us with no very unnatural sound, at least with none which will exist with any permanency in any particular part of the chest; and if it be complicated, the nature and the extent of the organic changes will be ascertained by these means, as pointed out under their respective heads.

49. *A. Spasmodic affections of the larynx* may be mistaken for asthma; but they may readily be distinguished from it by the sound occasioned by the passage of air through the narrowed passage, which is very different from the wheezing sound of the asthmatic respiration. Besides, in all the affections of the glottis, the patient readily points to it as the seat of his sufferings. The patient also betrays much more alarm of impending suffocation; whereas in asthma he is seldom apprehensive of the result, however severe the attack may be.

50. *B.* Severe cases of *acute bronchitis*, owing to the viscid and copious expectoration accumulated in the bronchi and trachea, and to the spasm excited in these parts and in the glottis during its expulsion, are often accompanied with fits of

difficult and spasmodic respiration, so severe as to approach nearly to the character of the asthmatic paroxysm. But the presence of inflammatory fever in bronchitis; and the copious, albuminous, thick, and glutinous expectoration; the absence of the distressing sense of stricture of the chest and dyspnœa which attend asthma; the gradual accession and increase of bronchitis; its continued character, and slow subsidence; and the varying appearance of the expectoration, with the different stages of the disease; will be sufficient to distinguish it from the humoral form of asthma, unless both affections are associated, or the one passes into the other, which sometimes occurs, as when bronchitis seizes the asthmatic subject.

51. *C. Angina pectoris* may also be mistaken for a severe fit of asthma. But the circumstances inducing an attack of both affections, and the periods of their accession, are different. Besides, the fit of angina pectoris is attended with a feeling of impending dissolution — a sensation which never accompanies the asthmatic paroxysm. The peculiar pains, also, under the sternum, and pain and numbness of the left shoulder, arm, &c. characterising the former, are not present in the latter affection. When asthma becomes associated with *disease of the heart* and *large vessels*, these sensations may accompany it, which will render the diagnosis more difficult. But still the accession of the asthmatic fit in the evening or night; the comparative immunity from it during the day, and in the open air; the history of the case; and the antecedent or attendant disturbance of the gastric functions; will still continue, and serve to point out the nature of the disease.

52. *D. Hydrothorax* is frequently attended with suffocating paroxysms of difficulty of breathing occurring during the night. But it may readily be distinguished from asthma by the scanty urine; by external œdema, particularly of the extremities; and the dead sound furnished by percussion, and the absence of the respiratory murmur. It must not, however, be forgotten, that hydrothorax is not infrequently consecutive of chronic asthma, particularly when the valves and cavities of the heart have become diseased in the course of the asthmatic attacks. — The affection denominated the *Acute Asthma of Infants*, by MILLER; *False Croup*, by GUERSENT; and the *Spasmodic Croup*, by WICHMANN, MICHAËLIS, DOUBLE, &c., is nearly allied to spasmodic asthma; one of the chief differences being its occurrence in infants. Its diagnosis, &c. will be found in the article on CROUP — *Spasmodic*. The practitioner should also be careful not to confound the disease with the difficulty of breathing which sometimes accompanies hysteria, hypochondriasis, and the passage of foreign bodies into the trachea.

53. PROGNOSIS. — There are few diseases which continue longer without shortening life; and which, therefore, admit of a more favourable prognosis in respect of a fatal result, or a more unfavourable opinion as regards a perfect recovery. It is chiefly from the consequences of a severe or protracted state of the disease that we are to apprehend any danger; and these are to be ascertained by auscultation and percussion, and our opinions formed accordingly. *a.* The circumstances which warrant a *favourable* prognosis as to *recovery* are, a recent attack, and its occurrence from a decided cause; the constitution of the patient being but little impaired; the absence of deformity and malformation of the chest; a free and easy state of the respiration, and a tolerably healthy condition of the various functions, during the intervals between the attacks. If the occupation of the patient be not injurious to the lungs; or, if so, can be readily relinquished; if the attacks are not extremely severe, nor of very long duration; and more particularly, if auscultation and percussion, as well as the rational symptoms, indicate an uncomplicated state of the disease, we have still greater reason to give a favourable opinion as to its issue.

54. *b.* On the other hand, an *unfavourable* idea must be entertained, especially as respects the perfect recovery of the patient, and his immunity from future attacks, if the fits be very severe; the cough difficult, suffocative, and attended with great expectoration mixed with blood and purulent mucus, — a state of the expectoration generally indicating rupture or dilatation of the small air-vessels, or the existence of tubercles in the lungs. If the occurrence of hæmorrhage from the lungs, of epistaxis, of hæmorrhoids, or of the menses in females, be not followed by a complete solution of the attack; — if the disorder be of long standing, and present remissions merely, or imperfect relief in the intervals, the attacks continuing for several days; — if the means of cure furnish but little or no relief; — if the patient be far advanced in life, and his constitution have suffered much either previously to, or from the malady; and if the body evince signs of cachexia; — if he has neglected his disease, or has been injudiciously treated; — and if the symptoms characterising any of the organic changes which I have stated to proceed from, or to be associated with, asthma (§ 20—24.), present themselves, particularly dropsical effusions in the pleura or pericardium, and the nature and extent of these changes are determined by means of auscultation and percussion, an unfavourable result must be looked for sooner or later; yet may this result be often deferred for a long period by judicious management. The exact degree or proximity of danger will depend entirely upon the nature and extent of the existing organic lesions, and the state of the vital energies of the frame.

55. If the expectoration become purulent, round, and globular; if hectic fever be present, with irregular or intermittent pulse; if palpitations occur, and alternate with leipothymia or syncope; if the urine be in small quantity and high coloured, the hands and ancles being œdematous; if the countenance continue bloated or livid during the imperfect intervals between the attacks; if the patient become restless, with slight wandering or low delirium; a fatal termination is not very far distant, unless under the most favourable circumstances of regimen and medical treatment, when life may be occasionally protracted for some time.

56. CAUSES.—1st, *Predisposing causes.* Asthma is not a disease of early life, in its primary or idiopathic form. I have seldom or ever seen it before the 23d year of age. Some authors state that they have met with it in infancy and childhood; but I believe that they have confounded this affection with other diseases of the respiratory organs, and particularly with those to which young children are liable, and which has been termed spasmodic

croup, Millar's asthma, &c. by several modern writers, and its nature very generally misunderstood. The reader will find them treated under other articles. (See Larynx—*Spasm of*; Croup—*Spasmodic;* and Catarrh—*Suffocative.*) I believe that affections of the respiratory apparatus in children, which are not connected with inflammation, are generally symptomatic of disease of some other organ.

57. Asthma is evidently sometimes dependent upon hereditary disposition and conformation. It invades all temperaments, but especially the melancholic, the sanguineo-melancholic, the nervous and irritable. The male sex is much more disposed to it than the female, particularly those of the former sex who are of a full habit of body and advanced in life. Joseph Frank surely reckons the proportion of cases in males somewhat too high, when he states that six are affected to one female. So far, however, as my own experience enables me to judge, the proportion is not much less. Persons endowed naturally with great sensibility of the nervous system, or who have acquired this state from indulgence of the passions — from masturbation, venereal excesses, the immoderate use of warm bathing, long continued mental exertions, want of the requisite sleep, frequent excitement of temper, mental depression, and exhausting discharges, are much more disposed than others to be affected by the exciting causes of the disease.

58. The *spasmodic form* of asthma attacks most frequently persons of a spare habit, and who have been weakened or emaciated by the foregoing causes; or who have passed a laborious and anxious existence; whilst the *humoral variety* of the disease is commonly met with in those who are gross, phlegmatic, corpulent, robust, or full of blood, and who have been long exposed to the causes of chronic and general weakness, and have led an indolent, luxurious, or sensual life.

59. In addition to the foregoing causes, sanguineous plethora; malformation and injuries of the lungs, chest, or spine; peculiarities of formation of the air-passages, of the cavities of the heart, and large blood-vessels; constitutional irritability of the air-passages and lungs; narrowness of the glottis, and morbid sensibility and irritability of the nerves and muscles of the larynx; congestions, enlargements, habitual distensions, or organic changes, in the large viscera adjoining the diaphragm, as of the liver, stomach, spleen, and colon; previous disease of the lungs and air passages, particularly frequent attacks of catarrh, and neglected winter coughs; and adhesions of the pulmonary pleura to the costal or diaphragmatic pleura, may be ranked amongst the predisposing causes of the disease. It should not, however, be overlooked, that the foregoing do not only dispose the system, and particularly the lungs, to the operation of the exciting causes, but are also of themselves capable of producing the disease, when they act intensely, or when their operation is of long duration.

60. Neglected or confirmed *dyspepsia;* erratic or metastatic *gout;* suppressed eruptions, discharges, and habitual perspiration of the feet, are also predisposing and concurrent causes of the disease. In addition to these, I may add, the warmth and closeness of our apartments, luxurious habits, and previous diseases affecting the lungs in a particular manner — as whooping-cough, measles, small-pox, and typhoid fevers — as having a marked influence in predisposing to asthma.

61. 2d. The *occasional or exciting causes* are, various mental emotions and affections; paroxysms of anger, vexation, disappointment, anxiety, and all the violent or depressing passions; great fatigue; prolonged watchings; strong exertions of the voice, reading long aloud, or long speaking; terror, or surprise; sudden refrigeration of the surface of the body; or exposure to, and the respiring of a cold or hot, or a too moist or too dry air — these states of the atmosphere acting differently in different persons and varieties of the disease. Thus, the *third* and *first* varieties are generally relieved by a dry and pure air, whilst the *second* variety is occasioned or aggravated by it; and a very moist and cold air, or a humid, close, and warm air, whilst it frequently relieves the latter, always augments the former; but it is not infrequently observed, that states of the atmosphere which cannot be referred to grades either of temperature or humidity act very differently on different persons labouring under the disease, although the form may be the same. It seems to me extremely probable that this is owing, in a great degree, to the electrical states of the atmosphere, and the electro-motive condition of the frame; as we sometimes see the disease occasioned by close and oppressive states of the air, particularly when these states precede a thunder-storm, — thunder and lightning being less influential in its production than the electrical states of the atmosphere which terminate in these phenomena.

62. There are, perhaps, few causes which more frequently produce asthma, than those which act directly on the air-tubes through the medium of the respired air, as various kinds of dust and irritating particles floating in it (see article on Arts, *as productive of disease*); common coal smoke, the vapour from lime or brick-kilns, metallic fumes of every description, mephitic gases, every kind of acrid vapour, the fumes from chemical manipulations; hydrogen, nitrogen, carburetted hydrogen, carbonic acid gas, and all other gaseous productions floating in the atmosphere; employments which lead those prosecuting them to breathe an air charged with minute particles of vegetable, animal, or mineral productions, as manufacturers of cotton and wool, furriers, grinders, needle-pointers, &c. Odours of every description occasionally excite the disease, particular odours acting differently in different persons; those occasioning it in some, alleviating it in others — as the aroma of various flowers and plants, the smell of tobacco, ipecacuanha, &c.

63. The disease may also be produced, or rather a paroxysm may be occasioned in those subject to the disease, by whatever deranges the healthy function of the digestive organs, and particularly if it occasion acid or acrid eructations, which irritate the epiglottis and glottis, or cardialgia, flatulent or inordinate distension of the stomach or colon, or impedes the free descent of the diaphragm (*Ast. Stomachicum*, Baglivi; *Ast. Flatulentum*, Floyer, Schrœder, Baldinger), and by irritation and spasm of the glottis and trachea, (Willis, Lieutaud, Desgranges, &c.). It is also sometimes occasioned in the female by hys-

terical affections (*Ast. Hystericum*, HORSTIUS, BAGLIVI, SAUVAGES, &c.); by misplaced, suppressed, or metastatic gout (*Ast. Arthriticum*, MUSGRAVE, HOFFMANN, STOLL, &c.); by the syphilitic poison; (*Ast. Venereum*, JUNCKER); by the slow introduction of lead into the system (WILLIAMS; *Ast. Metallicum* of ETTMULLER and ILSEMANN); by great obesity (FLOYER); the suppression of accustomed discharges and evacuations, and from vascular plethora proceeding from this cause (*Ast. Plethoricum*, DOVER, CULLEN, SAUVAGES; *Ast. Sanguineum*, HOFFMANN); by the repulsion of eruptions, the retrocession of exanthematous diseases, and the drying up of issues and eruptive discharges (*Ast. Exanthematicum*, CULLEN, et VAR. AUCT.). It may also proceed from a cachectic habit of body (*Ast. Cachecticum*, HOFFMANN, SAUVAGES, &c.); from excessive impregnation of the system with mercury (SCHENK, BONET); and from chronic catarrh and bronchitis (LAENNEC, BOISSEAU, &c.).

64. 3d, *Symptomatic Asthma.*— But little is required to be added under this head, further than to specify in a general way some of the organic lesions that sometimes excite phenomena, which either closely resemble, or are the same as, those which accompany the idiopathic disease. Amongst those, the disturbance of the pulmonary circulation, and the nervous and muscular irritation, occasioned by organic lesions of the heart and large vessels; by aneurismal tumours; by tumours affecting the diaphragmatic and pulmonic nerves (BÉCLARD, ANDRAL, and PARRY); enlargement of the cavities of the heart, and obstacles to the circulation through the openings into the ventricles or arterial trunks; by ossific deposits in these situations, or in the coats of these vessels, or in the external surface of the heart, or pressing on the pulmonic plexus of nerves (FERRUS); by polypi in the cavities of the heart and large vessels (DIEMERBRÖCK, FLOYER, ROSTAN); by adhesions of the pleura, and organic changes of the parietes of the chest, diaphragm, or spine; by curvatures of the spinal column, and lateral contraction of the chest, &c.; by hernia of the diaphragm (HECKER, BONET); by tumours and effusions within the chest and pericardium; by organic changes in the vicinity of the larynx and trachea; by enlargement of the lymphatic glands within the chest and the glands of the bronchi; by tumours developed in the mediastinum (SCHÆFFER); by foreign substances which have escaped into the trachea and bronchi; by organic changes of the lungs themselves, especially miliary tubercles, or similar productions in advanced stages of growth and change; by œdema of the lungs, or sero-sanguineous infiltration of their substance; and frequently by emphysema of the organ, and pituitous collections in the bronchi, the emphysema being a very common consequence and complication of the severer forms of the disease (BAILLIE, LAENNEC, &c.). Besides being sometimes induced by one, or more, of the above lesions, it may also be symptomatic of congestions and organic lesions of the liver and spleen; but, although those, and various other organic lesions enumerated under DYSPNŒA, produce spasmodic and convulsive states of impeded respiration in some rare instances, yet they are more commonly productive of continued or remittent dyspnœa. Asthma is, moreover, sometimes symptomatic of lesions affecting the *medulla oblongata* and spinal chord, of *hypochondriasis*, and of diseases of the colon and rectum.

65. III. COMPLICATIONS OF ASTHMA.— From the foregoing statement, it will be readily admitted that asthma very frequently presents itself in practice in complicated forms. Indeed, when the disease occurs in consequence of any of the states of the system described in § 60—64., or of any of the previously existing diseases and organic lesions of which I have stated it occasionally to be consecutive and symptomatic, it should be viewed as complicated with such lesion, and our attention directed to the whole of the morbid association, both pathologically and therapeutically. Our enquiries should likewise be extended even to the functions of distant organs, as it will occasionally have an intimate relation even with them, particularly to the functions of the digestive, assimilative, and generative organs. Amongst the most common complications of the disease, I may mention the various forms of *catarrh*, *dyspepsia*, *hypochondriasis*, *hysteria*, *emphysema*, and *œdema* of the lungs, *hæmoptysis*, *chronic bronchitis*, and *enlargement of the* cavities of the *heart*, as especially requiring our attention during the treatment. (See the articles EMPHYSEMA, ŒDEMA of the LUNGS, and BRONCHITIS.)

66. The paroxysm of the *third* variety of disease is often occasioned by a common catarrh; and owing to this circumstance, as well as the presence of many of the symptoms of this affection, it has often been denominated catarrhal asthma. It is sometimes also complicated with active congestion of the lungs, particularly of its mucous surface. Dr. PARRY conceived that this state of the respiratory organs constitutes the disease; and instances the case of a person, who died in about twenty minutes with all the symptoms of spasmodic asthma, and in whom the only lesion was complete suffusion, of a damask rose colour, amounting in parts almost to blackness of the mucous membrane of the trachea and bronchi. Dyspepsia not only accompanies asthma, but very generally precedes an attack. The complication with bronchitis and hæmoptysis is chiefly observed in the third variety; whilst the association with hysteria and hypochondriasis is most commonly met with in the nervous and spasmodic forms of the disease.

67. *Organic diseases of the heart* and large vessels are very frequently complicated with asthma. The former seems to be most commonly a consequence of the latter; but, in some cases, an opposite order of causation obtains. In all such states of disease, either too little, or too much blood enters the lungs, and the healthy relation between respiration and the pulmonic circulation is changed: if either too much, or too little blood passes, it is imperfectly purified, and the wants of the system occasion a sense of anxiety and anhelation. But I believe that the phenomena of associated disease of the heart, and of the pulmonary functions, may be more correctly explained by referring them to the state of the nerves supplying the organs. These nerves are so intimately related, anatomically and physiologically, that disease originating in, or affecting, any one part of them, will frequently influence the functions of the whole, or of such of them as are most intimately connected with the originally

diseased part. When, therefore, we find a portion of the particular order of nerves, which supplies the respiratory and circulating organs, remarkably affected—whether such portion influence the state of the bronchi, or the circulation through the lungs, or the actions of the heart—can it be a matter of surprise that an analogous disorder should extend to parts so intimately related anatomically and functionally as are the air-passages, the pulmonic circulation, and the heart and large vessels?

68. Upon taking a review of the causes of this malady, we shall perceive that it may be occasioned, like several other chronic diseases of the respiratory organs,—1st, By whatever lowers the vital energies of the frame, particularly as they are manifested in the lungs, and increases the susceptibility of the organ to the impression of external agents, or to internal morbid associations (§ 57.);—2d, By mental or moral states deranging the nervous influence actuating the respiratory and circulating organs (§ 61.);—3d, By agents which disturb the equilibrium existing between the cutaneous and respiratory functions (§ 61.);—4th, By causes acting, during respiration, directly on the seat of disease, either by depressing the vital and nervous influence of the organ, or by irritating its mucous surface, and thereby exciting its fibrous structure to undue contraction (§ 62.);—5th, By causes acting during respiration, especially aërial vicissitudes and states which modify or impede the respiratory functions, and favour congestion of the pulmonary mucous surface, or of the substance of the lungs;—6th, By whatever impedes the action of the respiratory muscles, or embarrasses the motions of the parietes of the chest (§ 63.);—7th, By lesions of the circulating organs deranging the circulatory function of the lungs or heart (§ 64.);—8th, By the extension of irritation from adjoining viscera or parts (§ 64.);—9th, By the destruction of the equilibrium between absorption and excretion (§ 58.);—10th, By the transference of morbid action from other parts of the frame (§ 63.);—11th, By affections of the respiratory nerves and plexuses, either at their origins, or in any part of their distributions (§ 57. 64. 67.). Hence the propriety of dividing asthma not only into the *nervous*, *spasmodic*, and *humid* varieties, but also into *two divisions*, as respects its relations to its causes, and to other diseases; viz. into Idiopathic and Symptomatic.

69. Proximate Cause.—The majority of writers on this disease, from Willis down to the times of Hoffmann and Cullen, have referred it to spasm of the bronchial tubes; and the same opinion has been espoused by many contemporary authors, particularly Laennec, Williams, &c. Rostan and several French pathologists consider the disease as altogether symptomatic of organic changes seated chiefly in the heart and large vessels: but, although this may be conceded to be the case occasionally, I conceive that they substitute the effect for the cause; lesions of these organs necessarily supervening in the manner already explained (§ 67.), after repeated attacks. The doctrine, moreover, has been completely overturned by the post mortem examination of cases of the disease by Corvisart, Ferrus, Georget, Laennec, Andral, Delens, and Bricheteau, in which no such changes were found. Bree, Parry, and Broussais ascribe asthma to inflammatory congestion and irritation of the mucous membrane lining the air-passages; and this doctrine is at present adopted by many British and continental pathologists. I do not mean to dispute the existence, to a certain extent, of irritative congestion of the respiratory mucous surface, particularly in the *third* variety into which I have divided the disease, but still I believe that it is a part only of the changes from the healthy state, which constitute this malady. M. Georget contends that it proceeds from irritation about the base of the brain, and particularly at the upper part of the medulla oblongata, and origin of the respiratory nerves, occasioning convulsive paroxysms of the inspiratory muscles. MM. Roche and Sanson (*Élémens de Pathologie, &c.* t. ii. p. 642.) ascribe it to irritation of the nerves supplying the respiratory surfaces, occasioning convulsive actions of the respiratory muscles; Zallony to suppressed influence of the pulmonary nerves, and imperfect change of the blood in the lungs; Dupuytren to an affection of the par vagum; and Horn, Henke, and many others, entirely to spasm of the bronchi. That the disease, in a great measure, depends upon the morbid state of the nerves supplying the lungs and respiratory muscles, is evinced by the case which occurred to M. Ferrus, who found, on the dissection of a female who had been subject to spasmodic asthma, a considerable ossific deposit in the centre of the pulmonic plexus, and compressing part of its nerves. There can be no doubt that irritation of the nerves, or impeded or interrupted nervous influence, will produce spasm of those muscular parts which they supply, and interruption of those functions which are dependent on their healthy influence.

70. The proximate cause assigned to the disease by Cullen, Parr, and other modern authors, differs but little from that contained in the writings of Willis, Baglivi, Hoffmann, Boerhaave, Sauvages, and others of their predecessors, excepting that it is stated by them with greater precision. It seems to me so correct, in the majority of cases, as not to admit of dispute. Doubtless the researches of contemporary pathologists have tended to show that many cases closely resembling this disease, and which would have been imputed to the same pathological states as it by our predecessors, depend on other conditions of the respiratory organs, and those differing widely in their nature from each other; thus abridging the number of purely asthmatic cases, and consigning to different organic lesions many that present nearly similar functional derangements to those which are strictly asthmatic.

71. I therefore conclude, with many of my predecessors, some of them unmeritedly overlooked at the present day, that asthma depends on a preternatural or spasmodic constriction of the air-passages, accompanied in many cases, especially in the humoral or catarrhal variety, and particularly when it assumes what M. Laennec has called the dry catarrhal form, with turgescence of the vessels of the lungs, particularly those supplying their mucous surface, and an increased secretion of mucus: and I would add, that, in this form of the disease, the spasmodic constriction of the air-tubes, the turgescence of their mu-

cous lining, and the accumulation of mucus in them, present an obstacle, not only to inspiration, but also to expiration; the lungs being thereby often kept in a state of inordinate dilatation, and the respiratory muscles excited to convulsive efforts, occasioning, in some cases, dilatation of the air-cells, or their rupture, and consequent emphysema of the organ, with effusions into the air-tubes, and other consequences described in the article on *Organic Diseases of the* LUNGS.

72. IV. TREATMENT.—The treatment of asthma is generally directed to the fulfilment of two *intentions;* viz. to shorten or alleviate the fit; and to prevent its return, and thus remove the disease. The means of cure may therefore be divided, 1st, Into those which are to be resorted to during the paroxysm, with the view of attaining the first intention; and, 2d, Such as may be employed during the interval, for the accomplishment of the second. I shall notice successively the measures which may be resorted to for the fulfilment of these ends, with as strict a reference to the forms and complications of the disease as my limits will permit.

73. 1st. *Treatment of the paroxysm.* — In treating the fit of asthma, the practitioner will take cognizance of certain particulars, which should materially influence the choice, the combination, and the extent of the means, which are to be put in operation. The duration of the paroxysm; the age, temperament, and habit of body of the patient; the period he has been subject to the disease, the frequency of the attacks, and the particular form they assume; the state of health in the interval; and the presence or absence of concomitant, functional, or organic lesions of the lungs, heart, and digestive organs, are all of the utmost importance to be known; and, without tolerably accurate ideas respecting them be entertained, the disease cannot be judiciously treated. As individual cases vary greatly as to each of these circumstances, it would be impossible to describe in connection all the measures which may be employed in a paroxysm of asthma, so as to be appropriate to each of its numerous states and complications. Such descriptions, although they would be sometimes perfectly suited to a case, would as often be inappropriate, or even altogether inapplicable. I shall, therefore, detail separately the means of cure which have been found most beneficial, and point out the states and circumstances of the disease to which each of them seems best suited, at the same time arranging them in such a manner as to fulfil intentions of cure, based on the pathology of the disease.

74. *A. To remove congestion or repletion, when present.* — There are various symptoms which frequently present themselves during the asthmatic paroxysm, which would suggest the propriety of blood-letting. But it is often either of little service or positively prejudicial, especially in the first two varieties of the disease. In the third variety, however; and in the young, robust, middle-aged, and plethoric subject; or when the paroxysms are very severe, and are attended with signs of much congestion of the lungs and brain, as lividity and fulness of the countenance, stupor, extreme dyspnœa, &c.; blood-letting is indispensable, and should be performed either from the feet, or by cupping between the shoulders. Yet, even in these cases, bleeding will seldom do more than relieve the more urgent symptoms: it will seldom or ever put a stop to the paroxysm, and it should be practised always with much caution.

75. *B. To moderate or relieve spasm by antispasmodics, anodynes, and narcotics &c.*—These medicines may be viewed in connection, as a combination of them are more suited to the asthmatic fit, than the exhibition of them singly. They are beneficial chiefly in the first and second varieties of the disease, and in the third, when attended with severe convulsive and spasmodic fits of cough. When the disease occurs in hysterical females, or is associated with organic change of the heart or large vessels, these medicines are generally of much service. In the humoral form of the disease, and particularly when it commences, or is complicated with catarrh, they are less serviceable, although sometimes beneficial when judiciously employed. The particular remedies belonging to the above classes, which have received the approbation of the best authors, are *camphor, assafœtida, valerian, castor, musk, ammonia, æthers, coffee, opium, stramonium, tobacco, belladonna, hyosciamus, conium, prussic acid, colchicum, digitalis, lactuca virosa,* &c. &c., in various forms, and modes of combination.

76. *a. Camphor* is one of the most generally beneficial of any of this class of remedies, and is, when judiciously exhibited, applicable to nearly all the forms and complications of the disease. In the nervous and spastic varieties it is most serviceable when given in large doses (from three to ten grains), and combined with musk, castor, assafœtida, and the preparations of æther, opium, or hyoscyamus (see F. 25. 186. 423. 493.), and the following: —

No. 34. ℞ Camphoræ rasæ, gr. iij.—vi.; Ammon. Carbon. gr. iij.; Pulv. Ipecacuanhæ gr. j.; Extr. Hyosciami gr. iij.—v.; Mucilag. Acaciæ q. s. M. Fiant Pilulæ iij. statim sumendæ cum Haustu sequente, et horas post binas repetendæ, si sit opus.

No. 35. ℞ Magnes. Subcarb. ℈j.; Aq. Anethi ℥x.; Spirit. Æther. Sulph. Comp. ʒj.; Tinct. Castorei ʒj.; Olei Anisi ♏iv. M. Fiat Haustus.

77. In the pituitous or catarrhal form of the disease, or in cases where blood-letting may be practised, and where we suspect active congestion of the mucous surface of the air-tubes, camphor is best exhibited in moderate doses, and combined with nitrate of potash, ipecacuanha, kermes mineral, James's powder, and other antimonials (see F. 494—496.).

No. 36. ℞ Pulv. Jacobi Veri gr. iij.—vj.; Camphoræ rasæ gr. ij.—iv.; Pulv. Ipecacuanhæ gr. j.; Ext. Hyosciami gr. iij.—vj.; Syrup. Papaveris q. s. M. Fiant Pilulæ iv., quarum capiat binas statim, et alteras post horam, vel omnes horâ decubitûs.

No. 37. ℞ Camphoræ rasæ gr. j.—iij.; Antimonii Tartariz. gr. ss.; Potassæ Nitratis gr. v.—viij.; Moschi gr. ij.; Extr. Opii gr. ij.—iv. (vel Ext. Lactucæ gr. iij.—v.); Olei Anisi q. s. ut fiant Pilulæ iv., quarum capiat binas statim, et alteras post horam, vel sumat omnes horâ somni.

78. *b. Assafœtida, castor, musk, valerian, myrrh, ammonia,* the *balsams,* the *oxide of bismuth,* the preparations of *zinc,* and the *æthers,* may be severally exhibited in the same states of the disease. They are more beneficial in the nervous and spasmodic varieties, when unassociated with inflammatory irritation, particularly in chronic cases, in the debilitated or aged; and in the third variety, occurring in persons of a relaxed and leucophlegmatic habit of body, — a conclusion which is conformable to the experience

of Millar, Renard, Schlegel, Wolff, Dover, Reidlin, Bang, Schmidtmann, Wichmann, Lentin, Kretschmar, Loebel, Hufeland, and Bernhard, and which will be justified by future observation, notwithstanding the doubts of their efficacy which have been entertained by some writers, who consider asthma as merely a form of inflammation of the mucous surface of the air-passages. They may be conjoined with one another, or with narcotics; and may be advantageously administered, particularly assafœtida and valerian, in the form of clyster.

79. Although these antispasmodics are indicated chiefly in the forms of the disease above alluded to, they need not be restricted to them entirely. When combined judiciously, as either with *antimonials*, or with *colchicum*, *opium*, *digitalis*, *nitrate of potash*, *camphor*, *ipecacuanha*, *hyosciamus*, *conium*, &c., and given in suitable doses, according to the peculiarities of the case, they will be productive of much benefit, in other states of asthma, both in the paroxysm and in the intervals. The external application of them, especially of camphor, assafœtida, galbanum, ammoniacum, &c., in the form of plaster, and particularly in conjunction with opium or with belladonna, will sometimes prove of much service. (See F. 112, 113.)

No. 38. ℞ Extr. Opii, Camphoræ, āā ℈ ij.; Emplast. Galbani Comp. ʒ iijss.—ʒ ss. Fiat Emplastrum secundum artem, scuto pectori admovendum.

80. *c.* Besides the beneficial effects produced by it as an emetic, *ipecacuanha* is, when used with this or other intentions, one of the best medicines that can be resorted to in asthma, as being suited to all the states of the disease, particularly when judiciously combined with other substances. It may be associated with nitre, or colchicum, or digitalis, or with antimony, camphor, and narcotics, in the more febrile and catarrhal states of the disease (see F. 39. 394.); and with assafœtida, or with castor, benzoin, the spirits or oil of aniseed, valerian, opium, &c. in the more nervous or spasmodic varieties. (See F. 857. 900.)

81. *d.* The distilled *laurel water*, or the *prussic acid*, particularly the latter, is often productive of much benefit in the paroxysm. I have found it of great advantage when given in from two to four drops at the accession of the paroxysm, and in small doses in the intervals, particularly when the disease is attended with much irritability of the stomach and flatulence. It may be conjoined with camphor, ipecacuanha, æther, &c., or, indeed, with any of the medicines already mentioned. (See F. 344.)

82. *e.* Of the *narcotics*, *opium*, *hyosciamus*, *conium*, *stramonium*, and *belladonna*, are the most commonly used. The best preparation of opium in this malady is the compound tincture (see F. 729.); and it is most advantageously combined with camphor, aniseed, any of the æthers, or the wine of antimony or of ipecacuanha, according to the circumstances of the case. I have tried the *acetate of morphine* in this disease, as a substitute for opium, but with no benefit, unless when combined with stimulating antispasmodics; in which form, either the *sulphate* or the *muriate* of *morphine* may occasionally be employed. *Hyosciamus* and *conium* are often uncertain remedies; but when their preparations are genuine, they are very useful adjuvants, particularly the former; and, if judiciously prescribed, applicable to every state of the disease. The combination of *hyosciamus* with the *infusion of valerian* has been much praised by Loebel in the spasmodic form of asthma.

83. *f.* *Belladonna* has been found serviceable when combined with stimulating antispasmodics, particularly camphor, valerian, or assafœtida; but it requires caution. In conjunction with ammonia, galbanum, or assafœtida, &c. in the form of plaster (§ 79.), it will sometimes be productive of much benefit. The *lactuca virosa* will be also employed with advantage, under similar circumstances to those in which the above narcotics are beneficial. Schlesinger and Wolff advise two or three grains of its extract to be given, either alone, or with half a grain of digitalis, every two hours.

84. It may be observed generally, that narcotics can seldom be productive of any effect under a certain space of time, which will vary with the susceptibility of the patient. In many cases they will have no marked influence under two, or even three or four hours, at which time the severity of the fit will often subside without medicine. When given by the stomach, therefore, this circumstance should be kept in recollection; and should induce the practitioner to ascertain the period of accession or aggravation of the paroxysm, and to regulate the periods at which these, as well as other remedies, are to be exhibited, in such a manner as that their anticipated action may be contemporaneous with the commencement of the fit. As the attack consists generally of a series of paroxysms or exacerbations, medicines should be continued in suitable doses, and with reference to this circumstance, until it terminates. It will be found always advantageous to prescribe a full dose of the narcotic at once, in order that its effects may be secured as soon as possible. When any one or more of the stimulating antispasmodics, particularly camphor, ammonia, or musk, are combined with narcotics, a very large dose of the latter may be exhibited. Narcotics are most quick in their operation, when their vapour or smoke is inhaled into the lungs. Their effects are longest delayed when they are applied to the external surface; unless the cuticle has been previously removed, as in the "*endermic*" method of medication. The inhalation of the vapour of certain of this class of remedies, either alone or in conjunction with some volatile vapours, is one of the most certain and quick modes of obtaining relief in the asthmatic paroxysm.

85. *g.* *Stramonium* is one of the best remedies that can be prescribed in the spasmodic form of asthma. It is principally used by smoking it as tobacco. During this process, the patient may either draw a portion of the smoke into the lungs, or swallow some of it, or the saliva which has become impregnated with it. Stramonium is very advantageously smoked along with *aniseed*, or with a small portion of *tobacco*. It may also be employed internally during the asthmatic paroxysm, as follows:—

No. 39. ℞ Pulv. Fol. Stramonii gr. j.—iij.; Sodæ Subcarbon. exsic. gr. vj.; Olei Anisi q. s. ut fiant Pilulæ ij. statim sumendæ.

No. 40. ℞ Succi Inspissati Stramonii gr. ss.—gr. j.; Potassæ Sub-carb. gr. vij.; Olei Cajeputi q. s. M. Fiant Pilulæ ij. pro dose sumendæ.

86. The smoking of *tobacco* is one of the most generally employed and efficacious remedies we possess for this disease; but it is productive of marked benefit only when it excites a free expectoration. The tobacco may be used in this manner along with *aniseed*, or with *stramonium*, or *both*. The internal use of preparations of tobacco, as of its infusion, tincture, wine, &c., so as to excite nausea, has also been recommended in the paroxysms of asthma by Ettmuller, Michaelis, and several German writers.

87. *h. Lobelia inflata*, or Indian tobacco, has been much employed in America in asthmatic cases. It is nearly allied in its operation to stramonium and tobacco; and often succeeds in checking the paroxysm, when given at its invasion, or very shortly before. It sometimes, however, fails of having any good effect, unless it be taken to the extent of producing nausea and vomiting. From six to fifteen or twenty grains of its powder may be prescribed for a dose, or from half a drachm to two drachms of a saturated tincture of its leaves (℥j. to O ss.).

88. *i. Inhalation of emollient and medicated vapours, gases*, &c. — Next and, perhaps, equal to smoking is the inhalation of simply emollient, or of medicated vapours into the lungs. This method of treatment was recommended by Cælius Aurelianus, Alberti, Mudge, Beddoes, Thilenius, Zallony, Hufeland, Crichton, Forbes, Gannal, Scudamore, and Murray. It is chiefly indicated during the paroxysm, or shortly before its accession. The vapours arising from pouring boiling water upon camphor, any one of the narcotic extracts or tinctures, or the balsams, are of great advantage when properly managed. Thus the vapour from a pint of boiling water poured upon half an ounce of balsam of tolu; or that from a solution of camphor, balsam of tolu, and extract of lettuce, or of conium, in sulphuric æther; or the fumes proceeding from camphor, hyosciamus, and aromatic vinegar, mixed together, and quickened by the addition of some boiling water, may be employed. A solution of balsam of tolu in sulphuric æther, the vapour of boiling tar diffused in the air of the patient's chamber, chlorine gas much dilated with common air, and various other medicated vapours, may be tried; but these act chiefly by removing the viscid phlegm which collects in the bronchi, and by exciting the extreme exhaling vessels. I have prescribed the vapour of the *sulphuret of iodine* in two cases: in one of spasmodic asthma, with no benefit; and in one of humoral asthma, with only temporary advantage. Sir C. Scudamore recommends this formula for the inhalation of iodine — (℞ Iodinæ gr. viij.; Potassæ Hydriodatis gr. v.; Alcoholis ʒss.; Aquæ Destil. ʒvss. M. Fiat Mistura). To this he adds tincture of conium. But his directions as to quantity and mode of inhalation are, notwithstanding several attempts to unravel them, perfectly beyond my powers. I believe, however, that portions only of the above mixture should be employed for each inhalation. But the observing practitioner will generally be able to apportion the quantity, as well as to direct the particular materials, for inhalation, according to the peculiarities of the case; bearing in recollection that the combination of narcotic and anodyne vapours with volatile fumes and gases will generally be of more service in asthma than the use of individual substances belonging to one only of these classes of medicines; and that the more irritating substances of this description, such as iodine, chlorine, and tar vapour, should be ventured upon only in a very weak or dilute state.

89. *C. To remove viscid phlegm, and to prevent its formation.* — *a. By expectorants, &c. Squills* are amongst the most frequently prescribed medicines for this purpose, in asthmatic attacks; but they are certainly not applicable to all its states, although they, as well as *ammoniacum*, *inula Helenium*, and *senega*, are very generally recommended by some of the best medical writers. The good effects of these medicines in certain manifestations of asthma cannot be doubted; but I have seen them productive of much mischief in several cases in which they had been employed. It should be kept in recollection, that they are amongst the most active excitants of the respiratory mucous surfaces we possess, and are extremely apt to change active congestion of the bronchial lining into inflammatory action, especially in young, plethoric, or robust subjects; and, by their effect upon the expectoration — particularly by increasing it, rendering it thinner, less viscid, and more readily expectorated — to occasion a deceptive appearance of benefit, even when they are increasing morbid action, with all its ill effects. In relaxed and leucophlegmatic habits, however, or when the expectoration is viscid, and excreted with difficulty; the skin cool, soft, and moist; the pulse soft, slow, or weak, and the urine scanty; these medicines may be given with great benefit (see F. 66, 67. 74. 350.): but when the pulse is either hard, quick, or full; or the expectoration at all puriform; they cannot be exhibited without risk. They will often, doubtless, even in cases of active congestion of the respiratory mucous surfaces, afford real benefit, by exciting the capillaries to secretion, and thereby unloading them; but they may as readily kindle up inflammatory action. When combined, however, with antimonials, refrigerants, diuretics, or anodynes, the risk of mischief from them in doubtful cases is much reduced. Alberti, Floyer, Wagner, Schulze, Lentin, and Bree advise squills in the pituitous form of the disease, and found them most serviceable when they produced nausea or vomiting, — the benefit being, perhaps, more to be attributed to this operation, than to the medicine which occasioned it. Under the circumstances in which I have admitted the use of ammoniacum, squills, inula Helenium, benzoin, and senega, — namely, in the chronic pituitous asthma, — the Formulæ in the Appendix above referred to, or the subjoined, may be prescribed: —

No. 41. ℞ Scillæ exsic. gr. xij.; Myrrhæ ℈ij.; Extr. Hyosciami ʒss.; Olei Anisi q. s. M. Fiant Pilulæ xviij., e quibus sumantur binæ quartis vel sextis horis.

No. 42. ℞ Scillæ Pulv. gr. vj.; Pulv. Ipecacuanhæ gr. vj.; Camphoræ rasæ gr. xv.—℈j.; Pulv. Antimonialis gr. xij.; Extr. Hyosciami ʒss.; Syrup. Tolutan. q. s. Fiat massa æqualis, et divide in Pilulas xviij., quarum capiat binas tertiis vel quartis horis ex cyatho decocti Althææ.

No. 43. ℞ Tinct. Scillæ ♏xij.—℈j.; Acidi Nitrici dil. ♏viij.—♏xxiv.; Aquæ Pulegii ℥jss.; Spirit. Æther. Nit. ʒss.—j.; Spirit. Pulegii ʒj.; Extr. Hyoscyami (vel Conii) gr. iij.; Syrup. Tolutan. ʒj. M. Fiat Haustus tertiis vel quartis horis capiendus.

No. 44. ℞ Mist. Ammoniaci ℥ivss.; Liq. Antimonii Tart. ʒiv.; Tinct. Camphoræ Comp. ℥ss.; Syrup. Tolutan. ʒj. M. Capiat cochleare unum pro re nata.

No. 45. ℞ Mist. Ammoniaci, Aquæ Destil. Lauro-Cerasi, āā ℥ ijss.; Tinct. Castorei ʒ iij.; Tinct. Opii Co. (F. 729.) ʒ ss.; Syr. Tolutan. ℥ j. Fiat Mist., cujus sumat cochleare unum amplum subinde.

No 46. ℞ Balsam. Tolutan. ʒ jss.—ij.; Mucilag. Acaciæ ℥ j.; tere benè et adde, miscendo, Tinct. Benzoini Comp., Tinct. Opii Camphoratæ Prist., āā ʒ iij.; Olei Anisi ♏ xx.; Aquæ Pulegii et Aq. Anethi āā ℥ iij.; Syrup. Simp. ʒ ij. M. Capiat coch. ampla duo quater in die.

90. *b. Emetics* are amongst the most promptly beneficial remedies that can be resorted to during the paroxysm, with the intention of removing both phlegm and spasm; and they have been justly recognised as such by Cælius Aurelianus, Horstius, Mayerne, Floyer, Akenside, Bang, Kerbs, Hufeland, Wedel, Stoll, Bree, Loeffler, and Schmidtmann. *Ipecacuan* is, upon the whole, the best medicine that can be employed to produce this effect. The philosophical Akenside recommended a scruple of it to be given at the commencement of the paroxysm, and five grains every morning during the intervals, for some time, so as to occasion nausea. When the paroxysm is excited by an overloaded or deranged state of the stomach, emetics are particularly indicated. It is in such cases that Schmidtmann, one of the most practical and experienced of modern writers, recommends them; whilst Stoll and Loeffler advise them principally in the humoral form of the disease. In the asthma to which several classes of artisans, particularly pearl-turners, &c. (see Arts, and *the Causes of Disease*,) are liable, emetics have been found the most successful remedy in the paroxysm. But, besides this operation, ipecacuanha has an especially beneficial effect in asthma, as I have already particularly noticed. Next to it, and even superior to it in the very humid states of the disease, are the preparations of zinc, particularly the sulphate, in suitable doses and forms of combination (see F. 582—587.).

91. *c.* Nearly allied to emetics are *nauseants* and *diaphoretics*. These are sometimes of service, either at the commencement, or shortly before the fit. The substances that may be employed to produce this effect are ipecacuanha, and the different preparations of antimony, particularly the tartar emetic and kermes. These latter are praised by Bang, Vicat, and Hufeland. Ipecacuanha, in from one to five grains, or the antimonials in full doses, may be combined with nitre, camphor, opium, or hyoscyamus, according to the circumstances of the case (see F. 393. 854.).

92. *d. Refrigerants*. Of this class of medicines the most useful is the *nitrate of potash*, in conjunction with camphor, ipecacuanha, and hyosciamus (F. 279. 431. 436.), particularly in the humoral variety of the disease; in the state described as requiring blood-letting; or when the attack has been induced by, or is complicated with, catarrh. Either of the following draughts may be taken at the commencement of the paroxysm, and repeated in two hours, if necessary: —

No. 47. ℞ Potassæ Nitratis gr. x.—xx.; Spirit. Æther. Nit. ʒj.; Vini Ipecacuanhæ ʒj.; Tinct. Hyosciami ʒj.; Mist. Camphoræ ℥j.; Syrup. Tolutan. ʒj. M. Fiat Haustus statim sumendus.

No. 48. ℞ Potassæ Nitratis gr. x.—xvj.; Vini Ipecacuanhæ, Tinct. Hyosciami, āā ʒj.; Liquor. Ammon. Acetat. ʒiij.; Mist. Camphoræ ʒvj; Syr. Tolutan. ʒj. M. Fiat Haustus statim capiendus.

93. Besides the internal use of refrigerants, Loeffler recommends cold epithems to be placed on the chest, in the spasmodic form of the disease: and several Continental writers advise clysters of cold water to be administered when asthma seems to be connected with hysteria. In such cases, clysters of assafœtida or of infusion of valerian are preferable. Refrigerants act both by diminishing inordinate secretion, and by allaying spasm; and, when the disease is connected with active congestion, or excitement, are, with depletion, the safest measures that can be employed to remove, or to prevent the formation of phlegm.

94. *D. To transfer irritation to other parts*, or to recall the disease to its original seat, when it has arisen from the metastasis of gout, rheumatism, or the suppression of discharges, is often an important indication. The usual means of *revulsion* and *derivation*, or counter-irritation, particularly those which produce this effect with the greatest celerity, as *sinapisms, stimulating pediluvia*, and the *vapour bath*, are the chief revulsants that are admissible under such circumstances and at this period. They may be accompanied with diaphoretics, aperients, diuretics, or even emmenagogues, in particular cases. They have also occasionally been found successful in preventing the accession of the fit; particularly if employed when the premonitory signs first appear; and if internal derivatives, especially a purgative combined with antispasmodics and carminatives, have preceded them, and if they have been followed by gentle diaphoretics.

95. *E. To remove flatulence, by means of gentle aperients combined with carminatives*, is often necessary during the course of the paroxysm. I have observed much benefit derived from the exhibition of a purgative, combined with antispasmodics and carminatives, shortly before the expected accession of the attack, particularly when the premonitory signs begin to appear, and the digestive organs evince disorder — such disorder often acting as the efficient cause of the seizure. (See F. 28. 181. 266. 379.) The combination of diuretics, also, with the medicines prescribed during the paroxysms, or of carminatives, in order to relieve the distressing flatulence with which they are very generally accompanied or preceded, will be often found of service.

96. *F.* Besides the means noticed above, there are several which have been recommended in the fit — some of them most deservedly, others in a very indiscriminating, and hence not a very beneficial manner. Of the former of these, *warm coffee* is the most important. This dietetic remedy was used by Floyer in this disease, and more recently by Thilenius, Percival, and Bree. It generally affords much relief when made sufficiently strong; and it seems to resemble the stimulating antispasmodics, particularly camphor, in its action. I have also observed the paroxysm checked by strong *green tea*.

97. My limits oblige me merely to enumerate the other medicines which may be resorted to in the paroxysms of asthma. The chief of these are, dry cupping between the shoulders, a weak solution of phosphorus in æther, the oxides of *bismuth* and *zinc*, *nux vomica*, &c. by several Continental writers; *galvanism*, as recommended by Dr. W. Philip; electricity, by M. Sigaud Lafond; the chenopodium ambrosioides, by Hufeland; the infusion or spirits of juniper, by Bekker; guaiacum, by Aaskow, particularly when the

attack occurs in the gouty or rheumatic diathesis; cajeput oil, in the spasmodic form of the disease, by Wickmann; the veratrum album, by Müller; the muriate of ammonia, by Martius; and the external application of garlic, by Portal.

98. 2d. *Treatment during the interval.* — Our chief object during the interval is to prevent the accession of the attack, by avoiding the remote causes, and removing the morbid state of the digestive and respiratory organs which dispose to it, and whatever disorder of function or of structure with which the disease may have become associated. We should, therefore, endeavour to form a correct opinion respecting the state of the bronchial mucous surface, the morbid associations of the affection, and the consecutive lesions which may have already supervened to it. The state of the digestive functions, of the alvine secretions and excretions, should receive the utmost attention; and the means which may be most appropriately used for their promotion, in particular cases, ought to be assiduously employed.

99. *A. Evacuations, &c.* — Under this head I will briefly consider blood-letting, emetics, purgatives, blisters, issues, and diaphoretics. *a. Bleeding* is seldom of service in the uncomplicated state of the disease. But when it is accompanied with vascular plethora, or pulmonary congestion; or when the attack seems to have been produced by the suppression of an accustomed discharge, whether sanguineous or of any other description; a moderate blood-letting, or cupping between the shoulders, will be of advantage.

100. *b. Emetics* during the intervals are only required when the disease is characterised by congestion of the mucous surface of the lungs, obstruction of the bronchi by a viscid secretion, or torpid and loaded state of the liver and biliary apparatus. When prescribed shortly before the expected fit, they often succeed in preventing its accession.

101. *c. Purgatives* are often necessary; but they may also be detrimental. Those substances which irritate the digestive mucous surface, without producing a full feculent evacuation, are always prejudicial. Purgatives also are hurtful when they are employed so frequently as to lower the vital energies, and carry off a portion of the chyle which should be absorbed into the circulation. On the other hand, stomachic aperients and purgatives exhibited in combination with tonics and antispasmodics, and to the extent merely of promoting the digestive, assimilating, secreting, and excreting functions, are particularly beneficial. Either of Formulæ 266. 450. to 456. 462., contained in the Appendix, or the following, may be prescribed: —

No. 49. ℞ Aloës Socot. gr. iv.; tere benè cum Gum. Mastich. gr. ij.; et adde Extr. Gentianæ Comp. et Mass. Pilul. Galban. Comp. āā gr. iij.; Olei Anisi q. s. Fiant Pilulæ iij. hora somni quotidiè sumendæ.

102. *d. Diaphoretics* in small doses, in conjunction with anodynes, deobstruents, or antispasmodics, are of service merely in as far as they may preserve a regular state of an important function, and prevent the determinations to internal organs which frequently follow any interruption to it. But profuse perspirations and *warm bathing* are more generally prejudicial than otherwise. Indeed, whatever relaxes the cutaneous surfaces beyond a certain degree has an injurious effect upon affections of the lungs which are not acutely inflammatory, and particularly in the pituitous chronic asthma. When the paroxysm is associated with the dry catarrh, diaphoretics may be carried further with advantage; and when combined with expectorants and antispasmodics (§ 91.), they are more generally applicable.

103. *B. Expectorants, alterants, attenuants,* and *deobstruents*, or substances supposed to have some one or more of these effects, have been very generally recommended in asthma. Several of these have little or no effect, and others may even be injurious. *a.* The *expectorants* most frequently employed are those already noticed; but I believe that they are seldom productive of much advantage, given in the interval. When the disease is complicated, as it not infrequently is, with dry catarrh, or irritation of the bronchial mucous surface, those substances which have the effect of soothing irritation, relaxing spasm, and softening the pulse, as James's powder, kermes, ipecacuanha, camphor, antimonial wine, are in fact the best expectorants; inasmuch as they tend more to render the bronchial secretion less tenacious, where it is glutinous and obstructing the bronchi, and to diminish its quantity when too copious, than those which are of a heating or stimulating kind.

104. *b.* Amongst those medicines which are considered as attenuants, deobstruents, and alterants, there are none which possess greater claims to consideration in this disease than the pure *alkalies* and their carbonates, or their combination with oils, and antispasmodic or narcotic substances. However the propriety of applying the above terms to certain medicines in this disease may be cavilled at, there cannot be the smallest doubt, in the minds of those who closely observe the operation of remedies, that certain substances produce effects, on the respiratory surfaces and on their secretions, that justify the use of these terms. The *alkalies* in various forms of combination, but particularly with *oils*, have been much praised by Wolff, Bache, Sarcone, Mascagni, and Laennec. Either in the pure state or in that of sub-carbonates, combined with the oils of *aniseed* or of *almonds*, with ipecacuanha, small doses of blue pill, and hyosciamus, the *fixed alkalies* are amongst the best remedies to which we can have recourse, particularly in the catarrhal or bronchial complications, and when the disease is connected, as it very often is, with irritability or other disorder of the digestive organs. I have experienced the greatest service, in practice, from the following, and from Formulæ No. 348. 457.

No. 50. ℞ Sodæ Sub-carbon. exsic. ℈ ij.; Pulv. Ipecacuanhæ gr. vj.; Pilul. Hydrarg. gr. vj.; Olei Anisi ♏ xij. vel q. s. ut fiant Pilulæ xviij., quarum sumantur binæ bis terve quotidiè.

No. 51. ℞ Potassæ Sub-carbon. ℈ ij.; Pilul. Hydrarg. gr. iv.; Extr. Hyosciami (vel Extr. Papaveris Albi) ℈ j.; Olei Amydal. Dulc. q. s. ut fiant Pilulæ xviij., quarum capiat binas ter quotidiè.

105. Under this head, I may make further mention of the balsams, combined with small doses of rhubarb, or with the addition of magnesia; of a combination of assafœtida, or myrrh, with galbanum, ipecacuanha, and soap, or the fixed alkalies (F. 503—510.); frictions with stimulating or antispasmodic liniments in the course of the spine (see the Liniments in the *Appendix*); the nitro-muriatic acid wash, in a tepid state, over the chest, night and morning, or either the one or other only; warm clothing, &c.

106. C. *Blisters, issues, and artificial eruptions* are often extremely beneficial, particularly when asthma has supervened to suppressed discharges, to exanthematous diseases, or in the gouty and rheumatic diathesis. A large blister, applied between the shoulders or on the chest, a smaller one kept open, and issues and setons, have been recommended by the majority of writers. Zacutus Lusitanus and Severinus advise the actual or potential cautery to the nape of the neck. The production of artificial eruptions over the chest by the tartar emetic ointment appears to me, from considerable experience of its effects for many years (see *Lond. Med. Repository*, vol. xvii. p. 302.), preferable to any other mode of counter-irritation in asthma, particularly when the use of the ointment is commenced during the interval.

107. D. *Tonics and astringents.*—*a.* The use of the preparations of *bark* during the intervals has the support of the best writers on the disease. Amongst these I may notice Floyer, Bang, Chapman, Heberden, Feldmann, Ranoë, Frank, Withers, Ryan, Bree, and Laennec. The states of the disease in which they recommend it, are, 1st, When the disease assumes a periodic type, or when it is connected with malaria; 2d, In the pituitous form of the disease, when the habit is relaxed and leucophlegmatic; and, 3d, When the stomach is much debilitated. There can be no doubt of the *preparations of bark* or the *sulphate of quinine* being indicated in such cases. Indeed, wherever the powers of the constitution require to be rallied, and where there exists no inflammatory irritation to contra-indicate it, bark and other tonics are frequently beneficial. In these cases, the *decoction* or the infusion may be given, with the liquor ammoniæ acetatis, and vini ipecacuanhæ, or with the subcarbonates of the alkalies.

108. *b.* I have derived great service from the *sulphate* and *oxide* of *zinc* in the humoral form of asthma, particularly under the circumstances now described. Either of these preparations may be combined with ipecacuanha, camphor, myrrh, hyoscyamus, conium, opium, &c., according to the peculiarities of the case. Where it is desirable to produce a nauseating or emetic operation during the fit, or in anticipation of it, the sulphate of zinc is the next best medicine to ipecacuenha that can be employed.

109. *c.* The preparations of *iron* have met with the approbation of Bree and Stanger, particularly the *sulphate*. It may be employed in similar cases to those for which bark and the sulphate of zinc are prescribed. I can only allude to the recommendation of the *mineral acids* with opium, by Floyer, &c.; of the *sulphate of barytes*, by Keck and Hufeland; of *arsenical fumes*, by the Arabian physicians, and Ettmuller; of *Fowler's solution*, by Alexander; of the *nitrate of silver*, by Zallony; and of a solution of *phosphorus in æther*, by several German writers. These very active medicines are admissible only in the most obstinate cases, particularly when occurring in relaxed or debilitated habits, and when other active tonics and antispasmodics are indicated. *Saint Ignatius's bean*, and the *extract of nux vomica*, have also been mentioned by Stein and Hahnemann. *Strychnine*, the active constituent of these substances, seems deserving of a fair trial in asthmatic cases.

110. *d. Sulphur*, and *its preparations*, have been advised by Diemerbroeck, Gasser, Martins, and Bang; and from a few opportunities which have presented themselves of trying them, I consider them, particularly the *balsamum sulphuris*, — a combination of sulphur with the oils of aniseed, &c. (see F. 21. and 22.),—and the *sulphurets of potash* and *soda*, as medicines of no mean efficacy in several states of the disease. The sulphur precipitatum or sublimatum, taken in the form of an electuary (see F. 82. and 89.), is one of the best aperients to which we can resort in cases of asthma or continued dyspnœa. It may be also taken as follows: —

No. 52. ℞ Sulphur. Præcip. ʒss.; Semin. Anisi contus. ʒijss.; Confect. Sennæ et Syr. Tolut. āā ʒvj. M. Capiat coch. ij. minima pro dose.

111. There are various medicines which have been recommended in the paroxysm, which may also be occasionally employed in the interval, particularly shortly before the expected accession of attack, and upon the first intimation of its approach. Of these, the most important are the antispasmodics and narcotics already mentioned (§ 75.), with the smoking of tobacco, stramonium, and aniseed, and the inhalation of the vapours of narcotic substances, and certain gases (§ 85. 88.).

112. *Flatulence* is a very frequent attendant upon asthmatic cases, chiefly before the invasion of, and during, the attack. It seems connected with irritation of the digestive mucous surface, and deficient vital power. The relief of this symptom is often a matter of importance. For this purpose I have sometimes prescribed the following: —

No. 53. ℞ Olei Anisi ♏ viij.—xij.; Sodæ Sub-carbon. gr. xv.; Sacchari Albi, Magnesiæ Ustæ, āā ℈j.; tere et adde Tinct. Castorei ʒj.; Tinct. Sennæ ʒij.; Aquæ Menth. Virid. et Mist. Camphoræ āā ʒv.; Syrup. Tolutan. ʒss. M. Fiat Haustus, 3tiis vel 4tis horis ad tertiam aut quartam vicem sumendus.

113. 3d. *Of the treatment of the various symptomatic and complicated states of the disease.*— But little is required from me on this subject, after the detailed account of the treatment now given. When the disease is associated with either of the usual forms of *catarrh*, diaphoretics, consisting chiefly of ipecacuanha, antimonials, &c., combined with narcotics or anodynes, are chiefly indicated; and, if inflammatory irritation seems to exist in the bronchial lining, local depletions, colchicum, or digitalis, counter-irritants and revulsants, gentle aperients, and the inhalation of the vapour of warm water, in which a little camphor has been thrown, may be added to the above.

114. In the frequent complications of inflammatory irritation of the *digestive mucous surface*, and disorder of the *biliary apparatus*, or of derangement of the functions of the heart, it will generally be advisable to commence the treatment with five grains of blue pill on alternate nights, for three or four times, and with an aperient draught on the following morning. By these the secretions will be excited, and the bowels evacuated. Afterwards the healthy state of action of the capillaries of the mucous surfaces generally will be promoted by exhibiting half a grain of blue pill, three or four times in the twenty-four hours, combined with two or three grains of the extract of hyosciamus, or of extract of hop; vegetable tonics, with the fixed alkalies, or

other stomachic medicines, being taken through the day. If we have reason to suspect the existence of organic change within the chest, particularly inflammatory congestion in the lungs, enlargement of the structure of the heart, &c., the insertion of issues, or keeping up an abundant eruption on the external surface of the chest by the tartar emetic ointment, should be added to the above means. This treatment ought, with occasional variation according to the circumstances of the case, to be perseveringly continued for weeks, or even months; and it will often succeed, even in the most unfavourable complications. The *oxide of bismuth*, combined with tonic or bitter extracts, will also be found of service in the gastric associations of the disease.

115. When the disease is associated with affection of the head, or curvature of the spinal column, setons, issues, or moxas in the nape of the neck, or in the course of the spine, may be tried. If it be attended with disease of the liver, external irritation, the nitro-muriatic acid bath or lotion, small doses of mercury, and the plaster, Form. 117., may be prescribed. Organic lesions of the heart and large vessels, and dropsical effusions, require a combination of these measures with the use of alkalies, digitalis, opiates, &c. When hysteria, and generally increased sensibility and susceptibility, attend the asthmatic affection, tonics with antispasmodics are principally indicated. In the other complications of asthma, the treatment recommended in DYSPNŒA will be generally appropriate.

116. 4th. *Of the regimenal treatment.*— Much advantage will be derived in asthma from strict attention to diet and regimen, — comprising bathing, exercise, air, and climate, the use of mineral waters, &c. *A. Cold sponging the surface of the chest, and cold bathing,* are amongst the most approved means that can be resorted to during the intervals of asthma. They tend both to diminish the sensibility and susceptibility of the patient to the impression of cold, — one of the most frequent exciting causes of the attack; and to give a salutary tone to the respiratory mucous surfaces and vessels ramified in them; and hence they prove the best means which can be resorted to for the prevention not only of the asthmatic attacks, but of catarrhs, and all other affections and diseases of the respiratory organs. The patient should commence this practice with the following lotion, with which the whole of the chest and upper part of the abdomen should be sponged, or rubbed with a towel or piece of flannel wetted with it, and afterwards be dried, using smart friction at the time : —

No. 54. ℞ Acidi Acetici Pyrolignei vel Vini Albi, Liq. Ammoniæ Acetatis, āā ℥ ijss.; Aq. Rosarum ℥ v.; Spirit. Vini Tenuioris ℥ ij. M. Fiat Lotio.

This should be used every morning upon getting out of bed; and if the patient commence with it during the winter, a fire may be kept in the dressing-room, and the chill taken off it for the first few days of using it. Instead of the above lotion, a solution of common salt in water, in the proportion of two table spoonsful to a pint, or one part of vinegar to two of water, may be employed. After these have been continued for some time, or as long as the patient may please, and the system has been thus prepared for it, the shower bath may be substituted with advantage, particularly if the patient be in that state of health which will allow him to bear the shock without risk. Sea or salt water bathing may also be resorted to all the summer and autumn; and the shower bath, or at least cold sponging the surface of the trunk of the body, all the winter and spring; for it will generally be advisable not to discontinue this practice for any considerable time after it has been fully adopted and found of service. In addition to the cold bath, the patient should have recourse to regular exercise in the open air; and attend to the state of his digestive organs, and the regular functions of the bowels.

117. If along with the asthmatic affection the patient have complained of palpitations, irregularity of the action of the heart, œdema of the ancles, severe dyspeptic symptoms, and disorder of the liver or bowels, these ought to be removed, before commencing with cold sponging and bathing, by local depletions when they are indicated; by very small doses of blue pill, or the hydrargyrum cum creta, with the sub-carbonates of the fixed alkalies, and hyosciamus given at bed-time, a gentle aperient draught the following morning, and bitter tonics, with the alkalies through the day. The recommendation of cold bathing in asthma may startle some; but when all associated disorder of an inflammatory kind has been removed by appropriate treatment, and the means now specified, and when the system has been duly prepared for it, cold bathing is actually one of the most salutary measures, and the most permanently beneficial, that can be prescribed. It has, moreover, received the sanction of CÆLIUS AURELIANUS, FLOYER, WITHERS, MILLAR, RYAN, BREE, and HUFELAND,—names which should claim our respect for whatever they recommend, even if our own experience did not altogether confirm their opinions, which, however, is in accordance with theirs as to this practice.

118. *B. Mineral waters.* — The waters in this country, which are best suited to asthma, are those of Cheltenham and Leamington; and of Buxton and Bath, to some of its complications, particularly the arthritic. Dr. J. CLARK very justly remarks (*The Influence of Climate, &c.* 2d ed. Lond. 1830, p. 371. *et seq.*), that when asthma is accompanied with chronic irritation of the bronchial membrane, or with disorder of the digestive organs, and an unhealthy state of the skin, a course of warm mineral waters will often prove of benefit. The springs of Ems on the Rhine, of Carlsbad, of Bonnes and Cauterets in the Pyrenees, and of Mont d'Or in Auvergne, are those chiefly esteemed on the Continent. The great difficulty generally is, that the climate and degree of elevation of these places will often not suit particular asthmatic cases. Where the climate of a valley is likely to suit the patient, Ems and Carlsbad will be preferred; and where an elevated situation is required, the Pyrenees and Mont d'Or will be chosen. The artificial waters of Ems and Carlsbad, prepared at Brighton, are but little inferior to the natural springs. In a case of this disease, where I directed those of Ems, great benefit was obtained from them.

119. *C. Change of air and climate.* — It is impossible to point out the particular climate or locality which will best suit the asthmatic patient; for the state of air or climate which will suit one,

will distress another, and without any very evident cause to explain the different effect. In nearly all cases, however, changes of air are beneficial, chiefly as respects the general health of the patient, and the disorders with which asthma is associated. Upon the whole, a temperate, equable, and moderately moist state of the the air is best borne: but even in this, there is is much uncertainty. The physician must be guided in his choice by the kind of asthma with which the patient is afflicted, and by the ascertained effects of certain seasons and localities in his particular case. In general, a moist and warm, or mild climate, as the south-west extremity of this island, will suit the spasmodic or dry form of the disease, and that most commonly associated with the dry catarrh, much better than any other in this country; whilst the pituitous or humid variety, occurring in the debilitated or aged, and in those of a relaxed and leucophlegmatic habit, and attended with much expectoration, will require a dry and a somewhat bracing state of the air.

120. *D. Diet.* — Very little is required to be stated on this topic. The food should be always light, digestible, in small quantity, and chiefly farinaceous; particularly in those cases which indicate general or local plethora, inflammatory irritation, and disorder of the digestive organs. Floyer particularly insisted upon abstinence, as to both eating and drinking; and later writers, and experience, have confirmed the justice of his injunction. When the disease is accompanied with lowered energies of the powers of life generally, the diet should not be so poor as to furnish insufficient means whence the mischief may be repaired; but it ought, notwithstanding, to be light or digestible, and not exceeding the powers of the digestive organs to manage with facility.

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ATROPHY. — (From the privative α, and τροφὴ, nutrition, or τροφέω, I nourish.) Pathology — *Morbid Structure.* — Syn. *Atrophie, Consomption*, Fr. *Ungedeiben, Schwindsucht, Auszehrung*, Ger. *Voedeloosheit*, Dut. *Atrofia, Somma Magrezza*, Ital. *Wasting*, Eng.

1. Defin. *Deficient nutrition of a part or of the whole frame, owing to which its natural dimensions are necessarily reduced.*

2. The healthy proportions of the various parts of the frame are preserved by their vital endowment, and are intimately dependent upon the conditions of this influence. When it preserves its due relations throughout the frame, a continued vital attraction of molecules from the blood takes place, to an extent sufficient to supply the place of those particles, which, having lost their vital affinity, are removed by absorption. This slow process, by which animal particles are taken away, for a time, from the current of the circulation, assimilated in the various tissues, afterwards detached from them when they no longer are suited to the purposes of the structure, and carried back to the circulating current to be partly eliminated from the frame, and partly changed into different conditions, is not infrequently liable to be disturbed in some one of its parts or steps. Thus, when the vital influence of an organ, or of the whole frame, is in a state of activity, the attraction of molecules from the blood, similar to those constituting the different tissues, is energetic, and extended to a greater number of such molecules, — they are held in closer affinity, and the bulk of the part is increased. But when the state of the vital endowment is reversed, when it is weak or depressed, this attraction proceeds slowly and languidly, and, the existing affinity being also weak, the molecules composing the tissues are sooner removed by the process of absorption than in health, and the part thus circumstanced is wasted, from a more rapid loss of its molecules than can be supplied by the low state of vital affinity. Thus, as in the former case, a double condition of the organisation, but of opposite natures, actually obtains; namely, the attraction is extended to fewer molecules, and the affinity between them is more languidly exerted, they being more rapidly carried,

by the process of absorption, back into the blood, from whence they came, in order to be partly changed and partly eliminated from it; and the part thus affected, instead of retaining its healthy proportions, becomes wasted, deficient in its constituent molecules, or atrophied. Thus we perceive that there is a continued circulation of nutritious particles in the very tissues which they compose; that this circulation, and the affinity which preserves them in their spheres, is vital, influenced by, and fluctuating with, the various conditions of the vital endowment of the frame, the nutrition and bulk of a part being intimately dependent upon it.

3. Nutrition being, then, the result of a vital attraction exerted between the molecules of matter constituting the elementary tissues, and those which are similar to them in the blood, and being co-ordinate with the strength of that attraction, atrophy necessarily proceeds from a diminution of this affinity, and the more rapid transit, consequent upon this diminution, of the particles which have been attracted, back into the current of the circulation. The healthy proportion of the tissues is therefore continued by a due equilibrium being preserved between the attractive influence on the one hand, and the continuance of vital affinity on the other. When either the attraction is active, or its duration long, the bulk of the structures will be increased; but when the former is weak, or the latter of short continuance, atrophy will necessarily result.

4. The truth of these propositions is evident from a due consideration of the various phenomena of health and disease, and by the numerous contingent circumstances which influence the conditions of the different structures of the body. At this place I will briefly describe, *first*, the appearances which atrophied structures assume; *secondly*, the various causes and circumstances which, influenced by the vitality of the frame, produce this change; and, *thirdly*, the treatment that may be employed to remove it. Thus I will confine myself, at this place, entirely to the consideration of atrophy, in its *generic* acceptation; the *species* being treated of under distinct and separate heads.

5. *A. States or appearances of atrophied parts.*— Atrophy may be confined to particular structures; it may affect only a particular constituent tissue of an organ, whilst its associated tissues are hypertrophied, and it may extend to various contiguous structures or unconnected organs. A particular constituent tissue may, however, be wasted, and yet its associated structures may be augmented in bulk, as I have shown occasionally to occur, when describing the morbid states of the liver. When this takes place, either no diminution, or an actual increase of the whole organ, is observed. When a compound organ, or part formed of various elementary tissues, is atrophied in all its constituents, the diminution of volume is then very remarkable; although, in some cases, as when the atrophy consists chiefly of a rarefaction of the internal structure of an organ, as of the lungs and bones, the external surface presents little or no change.

6. The earliest and most essential change in an atrophied part is diminution of the quantity of blood sent to it; and next to this, and chiefly owing to it, is greater paleness of colour. Subsequently the organisation is still more completely changed; so much so, frequently, that all traces of its original conformation are lost, and the part is reduced to the state of cellular or fibro-cellular tissue, generally of small size. In some cases, the part is not only extremely atrophied, but at last disappears altogether. When membranous structures are atrophied, they become much thinner and more diaphanous than natural, or even perforated.

7. The atrophy of certain organs or parts is a natural or healthy change, as respects the fœtus in utero, and the newly-born infant. The parts which experience those changes are too well known to require notice. Several structures, especially muscular parts, sometimes have preternatural quantities of fat deposited on their surfaces during the progress of atrophy. This is often observed in respect of the heart, and appears to result from the same causes; namely, diminished vital energy, occasioning insufficient nutrition or assimilation (§ 2, 3.), and a morbid secretion of fat, which often is as much a consequence of diminished vital energy, as insufficient nutrition of the different structures is the result of this state; both changes being, in some cases, merely grades, in others modifications, of the same vital manifestation.

8. Various parts of the body naturally undergo marked atrophy during advanced age. Of these the most remarkable are the generative organs, particularly the ovaria, mammary glands, testes, the thyroid gland, the bulbs of the hair, adipose tissue, the lungs, and bones. Atrophy of these and other parts has received a more particular notice under their respective heads. I may, however, remark, respecting the atrophy which results from age, that it is very evidently the result of diminished vitality, especially as those parts which first experience a loss or diminution of their functions, either from age or exhaustion, are the first to be atrophied; and that it often differs from other forms of atrophy, in consisting merely of a deficiency of the fluid constituents of the structures — in a condensation and dying of the organs, and not of a loss of the molecules constituting their solid parts.

9. *B. The secondary causes which, under the influence of the vitality of frame, produce atrophy*, are, 1st, Original deficiency of developement, constituting *congenital atrophy*. This state of atrophy may exist in every grade, and may amount to a total absence of an organ or part. When it takes place to this extent, it has evidently arisen from an arrest of the formative process, or of the developement of the tissues, in consequence of disease of the embryo. If the disease affect the nervous centres, the parts supplied with nerves from them are sometimes either much atrophied or altogether wanting, as MM. ROSTAN and SERRES have shown. But this is only an occasional occurrence; for parts of the brain or of the spinal chord have merely consisted of a serous sac, and yet the organs of sense and the limbs have been fully developed; and there have occurred many cases in which both brain and spinal chord have been entirely wanting, and yet the nerves proceeding from them, and the organs which the nerves supply, have been fully formed; evincing the truth of the doctrine stated by the writer many years since (see *London Med. Repos.* vol. xvii for May, 1822;

and *Notes to* Richerand's *Elements of Physiology*, 1st ed. 1824.), that the nerves are first formed, and the cerebro-spinal centres subsequently developed.

10. 2d. A diminution of the influence of those nerves which preside over the circulation of a part, and its assimilative and proper functions, rapidly reduces its volume. It is chiefly owing to this cause that the organs of generation waste in old persons. The ganglia which supply these organs, in both sexes, become, in old age, small and indistinct; and the nerves which issue from them to these parts can scarcely be traced. I have no doubt that a similar result follows injury or change of the ganglia or ganglial nerves in other parts of the body. The paralysis attendant upon painters' colic is generally accompanied with great wasting. In cases of unreduced dislocation, when the head of the bone presses upon the nerves, wasting is a frequent consequence, chiefly owing to the incapability of exerting the voluntary muscles, which are rapidly atrophied when they remain inactive. Injuries of nerves, of whatever description, that interfere with their functions, will, as shown by Bell, Lobstein, and several others, occasion atrophy. But I may add, that whilst injuries of ganglial nerves will produce it directly, by arresting the nutritive actions, injuries of voluntary nerves occasion it indirectly only, and chiefly by depriving the muscles of their contractile powers, and reducing them to that state of inactivity which is more or less rapidly followed by atrophy. This is proved in the numerous instances which come before us of paralysis originating in the brain. The wasting of the paralysed limb in these cases is seldom great, and it is chiefly limited to the muscles; the other structures, particularly the cellular and adipose, being unaffected.

11. 3d. Diminished supply of blood is a very frequent cause of atrophy. This may be local, as in cases of obliteration of a large arterial trunk, and when the functions of an organ cease. In many such cases, however, the obliteration may be the consequence of injury of the ganglial nerves which supply the artery, or of the cessation of the functions of the part. The general state of atrophy which occurs after tubercular formations in the mesenteric glands, or in the lungs, is, generally, partly owing to the diminution of the entire mass of blood, together with lowered vital influence; the nutritious molecules, and the assimilating or attractive power being both deficient. A similar inference may also be extended to the wasting accompanying idiopathic anæmia.

12. 4th. When the functions of a part or organ are arrested, atrophy always results. This is remarkably the case in respect of the voluntary muscles (§ 10.). On the other hand, increased function of an organ contributes to augmented volume. The urinary and generative organs furnish well-known proofs of those positions, and illustrate those with which I commenced, namely, that nutrition, and consequently atrophy, most intimately depend upon the states of vital manifestation of an organ or part. Other organs incapacitated from acting also undergo a marked diminution of their size. Even the lungs, when the principal bronchial tube of one lobe is obstructed, will experience atrophy of that lobe, as MM. Reynaud and Andral have shown. In cases of death from hunger, the stomach and large bowels appear wasted.

13. 5th. Atrophy will also present itself as a conseqence of inflammation; and, in some cases, will amount to obliteration or disappearance of the part. Such changes are not infrequent in blood-vessels and excretory ducts. It is sometimes observed in the spleen, liver, and gall-bladder; the last of which has been observed to be wanting or entirely obliterated from this cause. In the majority of such cases, the atrophy has proceeded from obstruction to an artery or vein having occurred during the disease, probably from the extension of inflammation to them, or from the pressure of some of the usual products of the inflammatory state.

14. C. Treatment *of atrophy.* — In all these circumstances under which atrophy occurs, it will always be observed that the vital energies, in some one or other of its manifestations, are diminished or perverted — most frequently the former. This fact furnishes us with the most rational indication as to the removal of the morbid state which it occasions. Having first ascertained the circumstances and pathological states of the atrophied organ, we are to direct our attention to remove them as far as may be possible. We are next to endeavour to restore the natural vital energy of the organ by exciting its functions, and promoting the constitutional powers. Knowing that, by increasing the natural actions of a part, we thereby increase its nutrition and bulk, we should endeavour to apply this principle to the removal of atrophy, but with a cautious avoidance of fatigue or exhaustion being occasioned by the means we use for this purpose. When the atrophy seems to depend upon the developement of tubercles, or upon engorgements of lacteal glands or tumours pressing upon nerves or large vessels, the preparations of iodine are indicated, on account both of their influence in removing these tumours, and of their excellent tonic powers when judiciously administered. In many cases the functions of the digestive organs — stomach, liver, and bowels — are torpid, and consequently the nutritious fluids are not sufficiently prepared to be assimilated in the different tissues. Healthy chyle is not supplied in the requisite quantity, or, if supplied, is not converted into healthy blood for the nourishment of the structures. In these cases, although the energy of the whole frame is deficient, yet our principal means of medication are to be directed to these organs. (See art. Consumption, Marasmus, Mesenteric Disease, and Tabes Dorsalis.)

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AUSCULTATION. — (From *ausculto*, I listen). Pathology, *Semeiology*. — 1. This term is applied to the methods used to ascertain the seat and nature of disease, by the signs which may be recognised by the sense of hearing. It comprises the study of all sounds indicative of disease, whether heard by the unassisted ear, or through the medium of instruments; and whether arising naturally, or produced artificially. The observations I have to offer upon this mode of investigating disease may be arranged in the following manner; but I shall confine myself at this place to the consideration of the *first* class of signs, and devote to the *second* class a distinct article. (See Percussion.)

2. I. Signs furnished by Sounds produced naturally within the Body.

A. Sounds having their seat in the chest. — *a.* Depending upon the passage of air during respiration. *b.* Proceeding from the action of the vocal organs. *c.* Depending upon the action of the heart.

B. Sounds having their origin in the arteries.

C. Sounds seated within the abdomen. — *a.* Proceeding from air in the digestive tube. *b.* Depending upon the fœtal circulation.

II. Signs furnished by Sounds produced artificially. (See Percussion.)

3. Hippocrates remarked that the existence of fluids in the thoracic cavity might sometimes be ascertained by applying the ear for some time to the side of the chest; and our countryman Hook (*Posthumous Works*, p. 39. &c.), in several very pointed observations, not only stated the importance of attending to the sounds produced by the "internal motions and actions of bodies," but also of rendering them sensible so as to distinguish between them; for the doing of both which, he thinks, "it is not impossible but that in many cases there may be helps found." M. Double, also, was in the habit of applying the ear closely to all parts of the chest, in order to examine the signs furnished by the action of the heart, and by respiration; and published his recommendation to cultivate this means of diagnosis, in his able work on Semeiology, two years before the appearance of M. Laennec's celebrated production. Although, therefore, M. Laennec may not have been the discoverer of the importance of auscultation in the investigation of disease, yet is he clearly entitled to the honour of discovering *mediate* auscultation — of inventing the stethoscope — and not only of bringing both these modes of examination into general use, but also of strongly recommending percussion, and of improving, in a very remarkable manner, our knowledge of the pathology of pectoral diseases.

4. It is unnecessary to occupy my limits with a description of the instrument termed the *stethoscope*, as its construction, with the improvements of M. Piorry, and the acoustic principles on which it assists the sense of hearing, have been frequently described, and are so simple, as to be readily understood, even by those who are not already acquainted with it. I may remark at this place, that auscultation, like every other method of investigation, requires practice for its perfection. The young practitioner should therefore early commence the study of the sounds of respiration and of circulation, at first with the unaided ear upon the healthy subject, and preferably on children, from five to twelve years of age, as in them all these sounds are distinct, and seldom modified by organic disease. Having made himself familiar with these sounds, by frequent recourse to this practice, he may provide himself with the cylindrical stethoscope in general use, and with the one called Piorry's; and, with their aid, continue his study of the sounds produced within the living body.

5. Having limited myself at this place to the consideration of the Signs furnished by Sounds produced naturally within the Body, whether heard by the unassisted ear, or by the aid of the stethoscope, I proceed, *first*, to notice the *sounds having their seat in the chest and throat*. These sounds are chiefly produced by the natural movements of the parietes of this cavity, and of the organs contained within it, and consist of, 1st, those of respiration; 2d, those of the voice; and, 3d, those of the heart. These will be successively considered.

6. I. Auscultation of Respiration. — *A. Of the healthy and simple respiratory sounds.* The passage of air into, and out of, the lungs occasions a somewhat different sound in various parts of the chest, owing to the difference of size of the tubes through which the air passes. Hence the respiratory sound has one character in the small bronchi and air-cells, another in the large bronchi, and another in the trachea. These sounds have been respectively denominated, by Laennec, Andral, and Williams — the best writers on auscultation — vesicular, bronchial, and tracheal. The *tracheal* sound is heard in the anterior and lateral parts of the neck, the upper portion of the sternum, and the sternal part of the subclavian regions. The *bronchial* respiration is heard in the middle portion of the sternum, and parts of the mammary regions contiguous to it, and in the axillary and interscapular regions. *Vesicular* respiration is perceptible over the remaining parts of the chest in health. These sounds are double; the one being that of inspiration, the other of expiration. The former is much stronger than the latter, which is often scarcely to be heard by the unpractised ear, unless assisted by the stethoscope.

7. It is difficult to describe these sounds with accuracy. The vesicular sound is a dull and diffused murmur, or a feeble breathing, resembling that proceeding from the passage of the air through the nostrils in a healthy and quiet sleep. The bronchial respiration is more tubular and blowing, and is chiefly confined in health to the situation of the largest bronchi. The tracheal sound merely conveys the idea of air passing through a tube of larger calibre, and is more hollow and blowing.

8. The respiratory sounds vary in their intensity, not only in different persons, but also in the same person, at different epochs of life, and at various times. The thickness of the parietes of the chest does not materially diminish their intensity; but the activity of the respiratory function affects them most materially; this function presenting different grades of activity in different persons. Dr. Williams has remarked that they are more distinct after meals and moderate exercise. After excessive exertion they are diminished. Fear, and the depressing passions, have a similar effect.

9. The respiratory sounds are greatly modified by age. From birth to the period of puberty, they are much louder and shriller than in after life, and the whole respiratory function more active. This state of the respiration has been called *puerile* by Laennec; and occurs sometimes in adults, either generally or partially, from momentary excitation, or the presence of disease in a part or parts of the lungs. At puberty the respiration is less noisy; and in a few years becomes much deeper, and assumes the adult character.

10. The vesicular sound being the result of the perfect penetration of the air into the lungs, its equal and simple presence is a sign of the healthy performance of the function. But this sound may vary in degree. It may be feeble in all parts, owing to constitutional peculiarity, or only in particular parts, when we should suspect disease; but it is no proof of disease, unless it be associated with certain peculiarities of sound hereafter to be noticed. The total absence of respiratory sound in a part indicates either the exclusion of the air from the part of the pulmonary tissue underneath, or effusion of fluids, or the introduction of air into the pleura. Here we must have recourse to *percussion*, in order to give precision to the information. (See Percussion.) In some cases the natural vesicular sound is absent, and a bronchial respiration is heard. In these we must infer that the vesicular murmur is suppressed by a condensation of the pulmonary structure, which, owing to this change, becomes so good a conductor of sound, that the bronchial respiration either becomes louder or is heard in unusual places. In other cases, a sound resembling the tracheal is heard in situations where vesicular respiration alone exists in health. This is caused by the passage of air into an ulcerated cavity or cavern communicating with the bronchi, and from this circumstance is called *cavernous* respiration.

11. B. *Of the morbid respiratory sounds.* — The respiratory sounds are not only varied in degree, but also in *kind*, or they are mixed with different *adventitious* sounds. These variations of *kind* are produced, 1st, by changes in the parietes and vicinity of the tubes, and in their secretions; and, 2d, by morbid states exterior to the pulmonary tissue. Under the first of these are ranked the different *varieties of sound produced by the presence of morbid secretions within the air-tubes, and the lesions producing these secretions.* This class of morbid sounds have been variously denominated. By the French they have been named *râle;* by some of our own writers the word *rattle*, and by Dr. Johnson the word *wheeze*, have been used. As we have no English term which so fully expresses the idea, to which this morbid sound gives rise, as the word *rhonchus*, adopted by Dr. Williams, and some French pathologists, I shall use it here.

12. *a. Moist crepitous rhonchus*, the *râle crepitant* of Laennec; the *crepitant rhonchus* of Dr. Williams, has its seat in the air-cells and minute bronchi. It resembes the sound from rubbing a lock of hair between the finger and thumb, when held close to the ear; or the crepitation of a piece of lung distended with air when compressed. It is generally uniform, and continues to the end of inspiration, and seems to arise from diminished calibre of the minute bronchi, owing to interstitial effusion, and the admixture of the respired air with the secreted or effused fluids in the air-cells and tubes. It is characteristic of incipient hepatisation of the lungs from pneumonia, and of its resolution; of œdema and apoplexy of the organ; sometimes of early phthisis, of pulmonary catarrh, and bronchitis. But it is only pathognomonic of the first stage of pneumonia; and the more viscid the mucus that is secreted, the more distinct is the crepitant character of the rhonchus. In the other diseases in which it occurs, the crepitation is less perfect.

13. *b. Dry crepitous rhonchus*, the *craquement* of Laennec, resembles the sound produced by blowing into a dried bladder, and conveys the impression of air distending lungs that have been more or less dried, and whose cells have been unequally, but much dilated. It is only heard during inspiration, and occurs only in pulmonary emphysema.

14. *c. Dry bronchial rhonchus.* — This is either *sibilous*, râle sibilant sec; or *sonorous*, râle sonore sec, of Laennec. The former is a low or loud, shrill or bass, and prolonged *whistle*, such as may be produced by air passing through a small circular aperture, and is owing to some contraction or constriction of the bronchi. The latter is a dull, prolonged, snoring sound; sometimes very loud. It occasionally resembles the bass note of a violoncello, or bassoon, or the buzzing of an insect. It seems to be produced by a flattened contraction in a bronchus of considerable size, leaving very little aperture; and arising from external pressure of the bronchial tube, from local thickening of its mucous lining, or from tenacious mucus within its canal. In a modification of the rhonchus, which Dr. Williams calls the *dry mucous rhonchus*, the sound resembles that of a click-wheel, and is produced by a portion of very adhesive mucus attached to the bronchial lining, which, yielding with a jerking resistance to the air forcing its passage, thereby occasions a ticking sound.

15. *d. The mucous rhonchus*, the *râle muqueux* of Laennec, the *humid rhonchus* of Dr. Williams, takes place in the bronchial tubes, and is produced by the passage of air through a thickish fluid, giving rise to a kind of *bubbling* within the air-tubes. It is most frequent in bronchitis and pulmonary catarrh, accompanied with mucous secretion; in hæmoptysis, in phthisis, in pneumonia, and in other diseases which are attended at any period with expectoration. This rhonchus is more gurgling, loud, irregular, and coarse, the larger the bronchi in which it is seated, the bubbles being there larger and more unequal. In the trachea, these characters are particularly marked, and have been denominated *tracheal* from this circumstance, by M. Laennec. In the smaller bronchi, on the other hand, this rhonchus is more equal, and its characters less remarkable, the bubbles being of much smaller size. The bubbles producing the mucous rhonchus must necessarily vary in their characters with the varying fluidity of the secretion, and thus the rhonchi will differ accordingly. If the fluid be very thin, the bubbles will be numerous, readily formed, and rapidly break: but if it be viscid, they will be fewer in number, and will often pass along the tubes for some way before they break, the sound being diffused, more regular, and rare. Also the continuance of the rhonchus will be an indication of the quantity of liquid present in the bronchi, as justly remarked by Dr. Williams. If this rhonchus accompany only the first part of inspiration and the end of expiration, the secretion must be scanty. But if the whole of the respiratory act be attended with this sound, then we may conclude that the quantity of fluid is considerable, and extends to the smaller bronchi.

16. *e.* The *cavernous rhonchus*, or *gargouille-*

ment, the *mucous rhonchus of morbid excavations* in the lungs, occurs when these cavities contain a fluid, and communicate with the bronchi. It generally exists in the advanced stage of tubercular phthisis, in abscess, and partial gangrene of the lungs. This rhonchus is characterised by a strongly marked mucous gurgling or bubbling sound, confined to a small spot and determinate situation, and is particularly marked upon the patient taking a full inspiration, or after coughing.

17. It may be remarked that this *class* of morbid respiratory sounds — proceeding from changes in the parietes of the tubes, and in their secretions — will sometimes be more or less obscurely heard through effusions in the pleura, when not very large. I proceed to consider the *second class* of morbid sounds, or *those arising from lesions exterior to the pulmonary tissue.*

18. *a. Metallic resonance,* tintement *metallique* of Laennec, is observed only when a quantity of air is accumulated in the pleural cavity, as in pneumothorax; or rarely in cases where very large tuberculous excavations are formed in the lungs. It is most commonly heard when both air and fluid are effused in the pleural cavity, and when there is a communication between this cavity and the bronchi. It is most distinctly heard upon coughing. Laennec has distinguished two varieties of this sound, namely, *metallic tinkling,* and *amphoric buzzing or resonance.* These sounds are occasioned by the impulse given to the air accumulated in the pleura, by the vibrations of air rushing through a fistulous opening in the pulmonary pleura, or striking against a condensed part of the pulmonary tissue, or of the pleura itself.

19. *b. Rubbing sound,* the *sound of friction,* the *bruit de frottement ascendant et descendant* of Laennec. This sound has been particularly investigated by MM. Honoré and Reynaud. It is an obscure, dull sound, perfectly distinct from the respiratory sounds, but synchronous with the motions of the parietes of the chest during inspiration and expiration, and resembling that produced by the rubbing of two soft and somewhat rough bodies on each other. It is loudest, or only heard, during inspiration. It is sometimes present in interlobular emphysema, but is more frequently and sensibly heard in pleuritis, with partial albuminous exudation, and with little or no effusion of serum.

20. II. Auscultation of the Voice. — The voice, although produced chiefly in the larynx, has its sound partially propagated inwards by the air in the trachea and bronchi, occasioning, in the smaller ramifications of the latter, a vibratory sensation or fremitus, rather than a distinct sound to the ear through the stethoscope; but, in persons with a large chest and strong voice, a more distinct vocal resonance. When the instrument is applied in the situation of the larger bronchi, as between the scapulæ and under the axillæ, the voice is heard much more distinctly, and the articulation may even be distinguished; but the sound does not seem to enter the cylinder, or to traverse its tube. If we place the stethoscope on the trachea or larynx, when the patient is speaking, we hear the whole of the words, loudly and articulately, and as if passing through the instrument to the ear. These sounds have been called, from their site, *bronchophony* and *laryngophony;* and arise from the vibrations propagated through the air contained in the trachea and bronchi, and which become weaker as they extend in the direction of the air-cells.

21. The degree of vocal resonance in the chest differs in different persons. It is loudest and most extensive in those who are thin, and have a strong, sharp, treble voice; so that natural bronchophony will extend further in young subjects and in females, particularly through the upper regions of the chest. In fat persons with a deep voice, the natural bronchophony is confined and obscure, especially during the deeper notes. In all the lower parts of the thorax, particularly during the deep tones of the voice, there is either no resonance, or merely a slight thrill or vibratory fremitus, which may likewise be felt upon applying the hand to its parietes. Such are the healthy sounds of the voice in different parts of the chest; but in certain states of disease they are very materially altered, and both the *bronchial* and *laryngeal* sounds are developed in places where they never exist in health. Of the various manifestations of these sounds in disease, I now proceed to take a brief notice.

22. *a. Bronchophony* is developed in disease by the same causes that render the bronchial respiration audible, viz. condensation of the substance of the lungs in the vicinity of large bronchial tubes, without diminishing their calibres, as in hepatisation or induration, from the formation of tubercular matter. From this circumstance bronchophony is an important symptom in pneumonia and phthisis. When the condensation is seated near the surface of the upper portions of the lung, and near a large bronchus, the sound may nearly approach laryngophony. The bronchial respiration is generally present with bronchophony, excepting when the hepatisation is extensive.

23. *b. Ægophony* (from *αἴξ, αἰγὸς*, a goat, the sound resembling the cry of this animal,) is merely a modification of bronchophony; and occurs when, with the circumstances which produce it, there are superadded the existence of a thin layer of fluid between the surface of the lungs and the pleura costalis. The bleating sound of the voice to which the term ægophony has been applied is variously modified in different persons, according to the natural tone of their voice, and the different modifications of the diseases which produce it: thus it will resemble the squeaking of Punch; or possess a shriller or sharper key, and sound more like the echo of the patient's voice than the voice itself. Ægophony only exists in pleurisy or slight hydrothorax, when the quantity of fluid effused is no more than forms a thin layer between the lungs and parietes of the chest. Laennec states that he has found this symptom present in almost every case of pleurisy; and considers it to be owing to the natural resonance of the voice in the bronchial tubes, rendered more distinct by the compression of the pulmonary texture, and modified by its transmission through a thin layer of fluid in a state of vibration. Dr. Williams ascribes it to "the successive undulations of the liquid, the result of an irregular transmission of the sonorous vibrations." Ægophony often co-exists with bronchophony, and the one passes into the other.

24. *c. Pectorilogy.*—The existence, in disease, of vocal resonance in any part of the chest, to the extent of laryngophony, has been termed *pectorilogy* by Laennec. It may be either *imperfect* or *perfect*. It is the result of a morbid cavity, formed in the substance of the lungs, and communicating with the bronchi; to which cavity the sound of the voice, or vibrations of the air in the tubes, is propagated. When the stethoscope is applied to a part of the chest, under which one of these cavities is situated, the words which the patient utters seem to proceed from that spot; and hence the term *pectorilogy*. "The distinction between perfect and imperfect pectorilogy is, as in the case of natural resonance, whether the voice seems to traverse the tube, or remain at the end; and the physical difference producing the two modifications consists in the size and situation of the cavity. The most perfect pectorilogy is produced in cavities of moderate size, which are situated near the surface of the lung, and freely communicate with a large bronchial tube. If the cavity be deep-seated, or if its communication with the bronchi be imperfect, the resonance of the voice will not amount to perfect pectorilogy. True pectorilogy produced by a cavity, is generally abruptly circumscribed, so that its limits can be distinctly traced."—(Williams's *Rational Exposition, &c.* p. 43.). Andral appears to be correct in considering perfect pectorilogy as not common, and that the imperfect state of this sound, or bronchophony, is very frequently mistaken for it. When present in any part of the chest where there is naturally no bronchial resonance, it may be considered as a certain indication of the existence of a morbid cavity, generally tubercular; and when heard in situations of natural bronchial resonance, although more doubtful, yet if it be perfect, distinctly circumscribed, and heard on one side only, the same conclusion must be come to. It may be further added, that an empty state of the cavity, its rounded and regular shape, and natural sharpness of the voice, particularly in women and children, tend to render pectorilogy perfect.

25. III. Auscultation of the Heart.—*A. In its healthy state.* I have always viewed Laennec's explanation of the sounds proceeding from the heart's contractions as the most defective part of the exposition of his system; and a similar opinion seems to have been entertained by Mr. Turner, Dr. Williams, and several others. The observations of Mr. Turner, and of Drs. Stokes and Corrigan, first shook the stability of the views of Laennec on this subject; and the recently published researches of Dr. Hope have almost altogether overthrown them. As I consider the exposition of the actions and sounds of the heart, given in Dr. Hope's work, to be the most accurate, I shall follow it on this occasion.

26. 1st. *Of the Contractions of the Heart in the order of their occurrence, &c.*—The first motion of the heart following the interval of repose, is the systole of the auricle. It is a very brief and slight contractile movement, most considerable in the auricular appendix, and propagated toward the ventricle, in the systole of which it terminates, by a nearly a continuous action. The systole of the ventricle commences suddenly, and diminishes considerably the volume of the organ. "Synchronous with the systole are the first sound, the impulse of the apex against the ribs, and the pulse of the vessels near the heart;" the pulse at the radial arteries following at a barely appreciable interval. The diastole of the ventricles follows their systole; and these compartments return, by an instantaneous expansive movement, to the same state as during the previous interval of repose. The diastole is accompanied with the second sound, with a rush of blood from the auricle, by a contractile motion of this cavity most observable at its sinus, and by a retrocession of the apex of the heart from the ribs. "Next succeeds the interval of repose, during which the ventricles remain at rest in a state of fulness, though not of distension, through the whole period intervening between the second and the first sounds; but the auricle remains at rest during the first portion only of that period, the remainder being occupied by its next contraction, with which recommences the series of actions described."—(Hope *on the Dis. of the Heart, &c.* p. 40.)

27. The *rhythm* of the heart, or the duration of the several parts of this series of actions, constituting what may be called a beat, is the same as described by Laennec:—1st, The ventricular systole occupies half the time of a whole beat; 2d, The ventricular diastole occupies a fourth, or at most a third; 3d, The interval of ventricular repose occupies a fourth, or rather less, during the latter half of which the auricular systole takes place.

28. 2d. *Causes and mechanism of the motion.*—The auricles, being always in a state of fulness, arrive, during the first half of the period of repose of the ventricles, at a state of distension, on which they react and propel a small additional quantity of blood into the full but not yet distended ventricles, in order to bring them to this state, and to cause them to react, and thus expel a greater or less portion of their contents. During the expulsion of the contents of the ventricles, Dr. Hope considers that the apex of the heart is tilted upwards and forwards, and occasions the impulse against the ribs, in consequence of the retraction of the ventricles upon their base, and on the auricles, which, being in a state of extreme distension, serve as a fulcrum beneath them. The *diastole* of the ventricles appears to be occasioned, 1st, by the relaxation of the principal part of their muscular structure, assisted by an elastic property; 2d, by the distension of the auricles, which has arrived at its height, and brings into action certain layers of ventricular fibres having a powerful influence in distending these cavities; 3d, by the width of the auriculo-ventricular opening, which allows the blood to rush instantaneously, and with facility, from the auricles into the ventricles. The blood expelled from the former cavities into the latter being instantly replaced from the venæ cavæ, distension of the auricles immediately recurs, and the same series of actions is continued.

29. 3d. *Causes of the sounds.*—There can be no doubt that the sounds of the heart's actions are not produced by the mere contraction of its muscular structure. To what other cause can we impute them? I conceive that they can only be referred to the action of the parietes of the cavities on the fluid circulating through them, and to the motions of this fluid. According to this view, which has been very diligently investi-

gated by Dr. HOPE, the systole of the ventricle is the cause of the first sound, by the impulse it communicates to the blood, and the diastole of the ventricle is the cause of the second sound; owing, in the opinion of this writer, to the rush of blood from the auricles, produced as already explained (§ 26.), and the succession of the stream against the walls of the ventricle, when abruptly arrested by the completion of the diastole.

30. I consider that it is clearly made out, 1st, That the impulse, the pulse, and the first sound, coincide; 2d, That the ventricle is concerned in the production of the second sound, although the exact manner, in which the motions of the ventricle and this sound are connected, has not yet been conclusively ascertained; and, 3d, That the actions of the auricles are insufficient to produce either impulse or sound, and that neither the one nor the other result from them. With respect to the production of the second sound, I think that the opinions of Mr. TURNER, Dr. CORRIGAN, and Dr. WILLIAMS, are untenable, and therefore may not be stated; and that the explanation of Dr. HOPE requires further confirmation. From the third of these facts I believe that it may be legitimately inferred, that the physical signs of disease of the auricles are very imperfect, and therefore uncertain.

31. B. *Auscultation of the morbid sounds and impulse of the heart.* — 1st, *Of the impulse of the heart.* Although, strictly speaking, the sounds of this organ are the only objects of auscultation, yet, as the impulse or shock it communicates to a part of the chest is usually made a matter of enquiry, although by a different sense, during the time that auscultation is being performed, I will briefly notice it at this place. The impulse necessarily varies, even in health, in different persons, with the state of the heart's action, and the habit of body. It is also greatly modified by mental emotions, and by various affections of the digestive and other organs. It is always synchronous with the first sound of the heart; but, in rare cases, a slight second impulse also accompanies the second sound; but this is felt deeper in the chest; is more of an obscure tremor, much slighter in degree than the chief impulse or shock, and is only met with in cases of hypertrophy with dilatation.

32. When the impulse is prolonged, strong, and characterised by an extensive heaving movement, thickening of the walls of the ventricles may be inferred. It should, however, be recollected, that whatever excites the feelings of the mind, or hurries the circulation, will occasion a strong impulse; but, in such cases, the actions of the heart are also unusually frequent. *Morbid* impulse of the heart is present in the states of both mental and corporeal repose; and is often unconnected with increased frequency, as in hypertrophy of the ventricles.

33. The impulse may be diminished, even in health, as by the depressing passions. It is often constitutionally so small in amount as scarcely to be felt. It is also lowered by diseases of remote organs, as diarrhœa, &c., and by abstinence and blood-letting, and whatever depresses the energies of the system. It is generally weak in congestion of the cavities of the heart, in cases of thinning of their parietes, in the asthmatic paroxysm, in congestion of the lungs, in some cases of pneumonia, and in the advanced states of various diseases; and it may even, although very rarely, accompany certain states of hypertrophy of the heart, particularly during the operation of debilitating causes.

34. In health, the impulse is usually limited to the immediate region of the heart, and chiefly in the situation of the cartilages of the fourth, fifth, sixth, and seventh ribs. Its sphere is extended by increased action of the organ, whether the result of mental or corporeal excitement or of disease; by hypertrophy, and by certain organic changes of organs in the immediate vicinity. When the muscular parietes of the heart are increased without any dilatation of the cavities, the sphere of impulse is not extended far beyond its healthy site; but when dilatation is combined with hypertrophy, the impulse may often be felt on the right side of the sternum, below the clavicles, and even on the back. Diseases of adjoining organs, as hepatisation of parts of the lungs in the vicinity, effusions of fluids in the pleural or or pericardic cavities, tumours in the mediastinum, close adhesions of the lungs to the costal pleura, adhesion of the pericardium to the heart, displacement of the heart, and even an enlarged liver or spleen — when rising into the thoracic cavity, and pressing the diaphragm upon the pericardium — will extend, often to a considerable distance, the impulse of the heart, owing to the increased density of parts which receive the shock. Much discussion has arisen as to the manner in which the heart's shock is produced. Further than that it is occasioned by the muscular actions of the organ, I believe that the phenomenon has not been satisfactorily explained, at least in such a way as accords with the various conditions it presents in health and disease. The explanation given by Dr. HOPE has been already stated (§28.).

35. 2d. *Of the changes produced in the natural sounds of the heart by disease.* — The sounds of the heart vary in different persons, even in health. In some they are loud and distinct; in others, the reverse: they may also be dull or clear, in respect of their key. They are generally distinctly heard by the unaided ear; but more accurately with the stethoscope. The impulse and sound are never both present in health, to a great degree, as they depend upon opposite conditions of the ventricles; the impulse being great in proportion to the thickness of the parietes of the ventricles, the sound to their thinness. The sounds of the left side of the heart are strongest at the junction of the cartilages of the left fourth, fifth, sixth, and seventh ribs, with the sternum: those of the right side, under the sternum and towards its right edge. The sphere of the heart's sounds is, in a very few persons, nearly limited to the sphere of impulse; but it is generally far more extended, even in health. It should not be overlooked, that the sphere of sound is much larger in children and young persons, in females, in the lean, and in those who have narrow or small chests; whereas, in persons whose thoracic cavity is large, and its parietes thick, muscular, or fat, the sound is heard much less extensively.

36. The sphere and loudness of the heart's sounds are increased by the same moral, physical, and morbid causes, which have been stated to

augment its impulse (§ 31.). Therefore, when frequency of pulse accompanies increase of sound, no actual disease may exist; but when a natural or slow state of the pulse is attended with an augmented range of sound, disease may be much more certainly anticipated. The circumstance of the sphere of sound being extended by the organic lesions already noticed as conveying the impulse of the heart (§ 34.), and by tuberculous excavations in the lungs, should not be overlooked. In taking account of the heart's sounds, we should also be aware that the sounds of respiration will occasionally mask them, as the heaving of the chest during inspiration will, in a slight degree, mask some of the shocks of the heart. Generally, the sounds of the heart are strongest in the left anterior part of the chest; and progressively weaker in the sternal, in the right anterior, the left posterior, and in the right posterior parts successively. If this succession be deviated from, or in any way altered, disease exists; and the degree, state, and order of deviation, become signs of some importance. It has been remarked by LAENNEC, that, when the sounds are heard beyond the healthy sphere, in persons with the chest well formed, and presenting none of the causes alluded to as giving rise to such extensive range, these persons will be found to be subject to palpitations, to shortness of breath upon the slightest exertion, to attacks of asthma, and to congestions of the internal viscera.

37. 3d. *Of the adventitious sounds of the heart.* — The sounds of the heart may not only be changed in degree, in extent of sphere, and in the succession of intensity, but entirely new sounds may be superadded. The most common of these are the bellows sound (*bruit de soufflet*), the saw sound (*bruit de scie*), and the rasp sound (*bruit de râpe*). These may either take the place of the natural sounds, or may be conjoined or superadded to them; and they may be present with either the first or second sound, or with both. The bellows sound resembles the puffing of a pair of bellows, and conveys the idea of smoothness. The saw and rasp sounds are so named from their similarity to the sounds occasioned by the sawing or rasping of wood, and convey the idea of roughness. But the bellows sound may insensibly pass into the others; and they all vary greatly in loudness. They may occupy the place of the first or the second of the heart's natural sounds, but more frequently that of the first than of the second. The saw and rasp sounds are generally louder, and present a wider range of intensity, than the bellows sound, which is more closely limited to the part which occasions it. They may all be heard in arteries at a distance from the heart, more particularly the bellows sound; and often when they do not exist in the region of the heart. When the saw-sound proceeds from the heart, it may generally be traced along the arch of the aorta to the subclavian and carotid arteries.

38. The causes of these sounds, and the exact site of the changes which produce them, are obviously the important considerations attached to them. They have been accounted for in various ways, even by their eminent discoverer; and, in general terms, they may be said to arise from unnatural or morbid motions induced in the current of blood circulating through the heart, instead of those natural motions which contribute to the healthy sounds of the organ. Hence, whatever produces the morbid change of the motions of the fluid, will occasion the adventitious sounds; and we have reason to infer that such change is produced either by a permanent alteration of the apertures and canals through which the blood is propelled, or by a spasmodic or nervous state of the same parts.

39. The simple bellows sound is more common, and arises from slighter changes than the saw or rasp sounds, and is less to be depended upon in diagnosis. Pressure on an artery will occasion it; and when present in the heart, it will sometimes be removed by blood-letting. When even existing permanently, although it is a very strong indication of organic change in the heart, it cannot be implicitly relied on; but when only occasionally present, although such change may be its cause, yet it deserves no reliance. The saw or rasp sounds are much less frequent than the other; are much more constantly found in connection with contracted orifices of the heart; and are very frequently indications of an increased degree of the same cause that produces the bellows sound. It may, however, be generally inferred, 1st, That these sounds arise from some change in the orifices of the heart's cavities, produced by nervous or temporary causes, or by alteration of structure; more frequently the latter. 2d, That these sounds, therefore, although they indicate the existence of organic disease, are not conclusive evidence of it, as they sometimes arise from other causes. 3d, That in proportion as these sounds possess more of the rasping character, the greater is the probability of organic change. 4th, If the sounds disappear after depletions, upon repose, or without sufficient reason, their dependence upon functional disturbance may be inferred, although not implicitly relied on; their continued absence, however, strengthening the conclusion. 5th, The continuance of these sounds, notwithstanding the means now mentioned, or their diminution merely, is nearly conclusive of organic change. 6th, Intensity of the sounds is no indication of the degree of valvular disease, or extent of the contraction of an orifice; as they may be weak, when these organic changes are extreme. A moderate contraction and size of current seem to be requisite to their full production. The relation of these sounds to the particular changes which occasion them is considered in connection with these changes. (See HEART — *Diseases of.*)

40. The rasp and saw sounds are often accompanied with a phenomenon resembling a species of impulse, and which can be estimated by the sense of touch only. This is the *thrill* or *purring tremor*, termed "*bruissement*" by CORVISART, and "*frémissement cataire*" by LAENNEC, which is felt when the fingers are placed upon the heart, or on an artery. When existing in the heart, the feeling excited upon applying the hand to the region of this organ, is analogous to the sensation occasioned by the saw or rasp sounds. The fact is, that the same pathological condition gives rise merely to modified sensations as perceived by the medium of different organs, the object exciting the sensations being one and the same; the only difference being, that a stronger current is required to produce the pur-

ring tremor, than is necessary to the production of the sounds. It is owing to this circumstance that it is strongest in hypertrophy of the ventricle, or when the circulation is hurried. A firm pressure of the hand on the region of the heart is necessary to feel it well; and a moderate pressure to feel it in the arteries.

41. The last adventitious sound that I have to notice is that which Laennec has termed the "*cri du cuir*," and which resembles the creaking of the leather of a new saddle. It seems to be chiefly observed in cases of pericarditis, when the opposing surfaces of the pericardium lose their lubricity, and when they are rendered rough by the exudation of coagulable albumen, or are in an unusual state of dryness; and to be occasioned either by their friction whilst in this state, or by the motions produced in that part of the pericardium reflected over the heart during the systoles and diastoles of the ventricles.

It is unnecessary to add any thing at this place, to what has been stated respecting the auscultatory signs in *diseases of arteries*, and particularly of the *aorta*. The employment of *auscultation of the abdomen*, in order to ascertain the existence of pregnancy, is comprised in the article Pregnancy.

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BARBIERS.

Classif. 4. *Class*, Nervous Diseases; 3. *Order*, Affecting the Muscles (*Good*). I. Class, IV. Order (*Author*).

1. Defin. *Tremor, with pricking, formicating pain; numbness of the extremities, principally of the lower, followed by contractions and paralysis of the limbs, inarticulation or hoarseness of voice, emaciation, and sinking of all the vital powers.*

2. This disease has been described by various authors since the appearance of the work of Bontius. But we have had no satisfactory account of it until Mr. Marshall furnished it in his interesting work on the diseases of Ceylon, and distinguished it from *Beriberi*, with which it had been confounded by Bontius, and recently by Dr. Good. Dr. J. Clark had, however, noticed it briefly as a distinct disease, many years previously; and the definitions of it given by Sauvages, Linnæus, Sagar, and Aikin, seem to indicate that they were not altogether unacquainted with its nature. I shall here follow the accounts of it by Dr. Clark and Mr. Marshall, as they seem to be the most precise, and to have been the result of much experience.

3. Symptoms.—The disease generally commences with a formicative pricking pain in the muscles of the lower extremities, with numbness, tremors, and an imperfect command of the powers of locomotion. Both lower limbs are always equally affected. In some cases the forearms and hands, and the powers of articulation, are subsequently similarly seized. As the disease advances, the patient is unable to walk steadily. Standing or walking aggravates the uneasiness of the limbs, and either is impossible without support. The superior extremities become incapable of performing their usual offices; and want of sound sleep, great sluggishness, and inactivity, are complained of. The limbs afterwards are deprived of all feeling, and lose their natural temperature; the extensor muscles become quite paralytic, and the limbs contracted. Loss of appetite, indigestion, emaciation, &c. soon follow; and the pulse gradually sinks to a frequent, thready, or fluttering state; all the vital powers become depressed, and death supervenes. As respects its *duration*, it may be protracted for many months, and it may present various grades of severity. Its forms are frequently more mild, the above description applying to the severer cases. The *diagnosis* of barbiers is described in the article Beriberi, with which disease it has often been confounded.

4. Mr. Marshall observed many cases of this disease, in 1812, amongst the Caffres composing the 4th Ceylon Regiment. He never noticed it amongst the indigenous inhabitants of this island; and, from every information he could collect, it was only known amongst Africans who had arrived in the island; and he believed that late comers were more disposed to it than acclimated residenters. Mr. Marshall also met with it in Europeans in Ceylon: and he has observed an analogous affection in horses and dogs; from which, however, he never knew them to recover.

5. Dr. Lind states that barbiers is a species of palsy frequent in India, affecting chiefly the lower classes of Europeans, who frequently sleep, when intoxicated, in the open air, exposed to the land winds; and that its attack is sudden, depriving the limbs of motion, &c. It appears also to prevail in Java. Dr. Bostock has described a case which seems to be nearly allied to this affection: and I have, for several years, been occasionally consulted by a patient, whose complaints are very nearly the same as those now described; and who had been previously seen by several medical men, and by some since he was under my care.

6. The remote Causes of this affection are cold and moisture applied to the body; intoxication, irregularities, and excesses consequent upon inebriety; violent exercise in the sun; lying down in the open air during the heat of the day; exposure to the cold chilling dews of the night, or sleeping when thus exposed; suddenly obstructed perspiration, by currents of air; long fasting, and whatever exhausts the energies of life. The translator of Bontius's work states that barbiers is frequent on the Malabar coast, where it attacks those who unwarily sleep exposed to the land winds, particularly in the months of January, February, and March; and that it is seldom cured till after the shifting of the monsoon, unless the patient changes the climate.

7. Treatment. — This affection appears to originate in depressing and debilitating causes; to be characterised by a gradual and chronic sinking of the nervous energy; and therefore to require

a tonic, restorative, and stimulating treatment. Frictions, with stimulating liniments along the course of the spine, and on the limbs; attention to the due performance of the secreting and excreting functions; tonics, combined with warm cardiacs, gentle aperients, and antispasmodics; vesication; stinging with nettles; electricity; the internal use of the extract of nux vomica, or of strychnine; the application of external warmth, and the use of warm clothing; a nourishing and digestible diet; regular habits, and change to a healthy air or locality; are the chief means of cure. Dr. John Clark states, that the few Europeans whom he saw ill with this disease were cured by a change of climate, and a sea voyage. In other respects, the treatment is the same as that recommended in the article Palsy, particularly palsy from lead. (See Colic —*from Lead*, and Palsy.)

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BERIBERI.

Syn. *Beriberia*, *Synclonus Beriberia*, Good. *Hydrops Asthmaticus*, Rogers.

Classif. 4. *Class*, Diseases of the Nervous Function; 3. *Order*, Affecting the Muscles (*Good*). I. Class, V. Order (*Author*).

1. Defin. *Oppressed breathing; paralytic weakness, numbness, and stiffness of the lower extremities; general œdema, with a swollen and bloated countenance.*

2. Symptoms.—The attack is in some cases gradual; in others sudden and severe. When it is the former, which is more commonly the case, the patient complains for several days of weakness, and inability or unwillingness to exert himself. To these feelings, pain, numbness, and stiffness of the lower extremities, accompanied with œdema; muscular weakness, and dyspnœa, particularly upon motion; a feeling of numbness, fulness, oppression, and weight at the scrobiculus cordis; extension of the œdema over the body, and leucophlegmatic tumescence of the countenance, supervene. As the disease advances, the dyspnœa increases, and the face is more swollen and bloated. The lips, which were at first pale, become bluish and livid; and the lower extremities more numb and feeble, or even paralytic. The stomach is often irritable, especially in the advanced stages of the disease, when it often rejects all ingesta; the bowels constipated; the urine scanty, high-coloured, and sometimes almost suppressed: the pulse is at first either more or less quick, small, and hard, or but little affected; subsequently irregular or intermittent; and the dyspnœa at last becomes distressing and attended with great anxiety, and sometimes with a peculiar fluttering about the heart, and sinking or leipothymia, succeeded by palpitations. In the more advanced stages of the disease the patient cannot lie down; his sleep is uneasy, interrupted, and always unsound; and the recumbent posture induces violent palpitations, sense of suffocation, and anxiety. The oppression at the præcordia and weight at the scrobiculus cordis increase, and are attended with spasms of the muscles of the thorax and abdomen; the countenance becomes livid, and the extremities cold; vomiting is either frequent or nearly incessant; the pulse sinks, and the patient dies nearly in a state of suffocation.

3. In this, the most common form of the disease, it usually runs its course in about three weeks or a month; but sometimes, in slighter cases, the patient experiences several relapses, and is at last carried off unexpectedly, when the anasarcous symptoms have nearly disappeared, and he has been judged convalescent. In some of the milder attacks, several of the above symptoms are extremely slight, and the disease is altogether of much longer duration, or consists apparently of several distinct seizures. Such seem to have been the form of the majority of cases which Mr. Marshall has given in his work. In the most sudden and severe attacks, however, the pain, numbness, stiffness, and œdema of the lower extremities; the dyspnœa and anxiety, and all the more urgent symptoms, are either present from nearly the commencement, or they rapidly supervene to each other, and the patient dies in a few hours, or in a day or two. Such cases appear to be not so frequent as those which are more mild.

4. Remote Causes.—This disease is nearly peculiar to India, and is most prevalent in various part of Ceylon, on the Malabar coast, and in that tract of country which extends from Madras to Ganjam; being, according to Mr. Hamilton, confined to these parts, and extending no further inland than forty miles. It is most prevalent during the decline of one monsoon and the setting in of another, when the air is damp, cold, and loaded with vapours, and the vicissitudes of temperature greatest. Captain Percival, in his "History of Ceylon," ascribes it to low diet and bad water, and partly to the dampness of the climate. Mr. Ridley, however, states that the worst cases he had of it at Trincomalee, where it was remarkably prevalent, occurred during the change from wet to dry weather, when a strong and hot land wind prevailed; and that its severest prevalence at Pulitoopané was during dry weather. In the Indian peninsula it seldom extends further inland than sixty miles; but in Ceylon, particularly at Kandy, it has prevailed under very different circumstances, as respects season, states of atmosphere, and topography. It seems to have been much more prevalent in particular districts, where it may be said to be endemic, in one year than in another; and to have assumed, at distant periods, a nearly epidemic form. Dr. Christie states, that a residence of several months in the district where it prevails is necessary to its production; and Dr. Rogers never observed it in any person who had not resided six months or upwards in Ceylon. Dr. Hunter has met with it also in Indian seamen, particularly Lascars, after exposure to a moist and variable atmosphere and privations of food.

5. Opinions respecting both the remote and proximate causes of the disease differ very materially among those who have had opportunities of observing it. Mr. Dick found it most prevalent amongst soldiers who had taken much mercury for venereal complaints, and who were addicted to spirituous liquors. He never met with it in the officers. Mr. Ridley, on the other hand, states,

that, in 1804, "both officers and privates fell victims to it." Drs. CHRISTIE and ROGERS view it as a consequence of deficient and poor diet, impure and moist air, and of prolonged exposure to marsh exhalations; and consequently as a disease of debility, — an opinion which is in accordance with that of Mr. DICK and Mr. RIDLEY. Mr. COLQUHOUN found it to prevail notwithstanding prophylactic measures founded on these views; and Mr. MARSHALL did not observe it to occur amongst the troops in Ceylon, when exposed to the causes to which Drs. CHRISTIE and ROGERS impute it; and from that circumstance, as well as from the effects of medicines, thinks it a disease of increased vascular action; in which opinion Mr. HAMILTON agrees with him.

6. *Appearances on dissection.*—There is always a leucophlegmatic appearance of the surface, with œdematous effusion to a greater or less extent in the sub-cutaneous cellular tissue, and paleness of the muscles; sometimes with a watery obesity and deposition of fat in the abdominal regions. Occasionally there is fluid effused between the membranes of the brain, and in the ventricles; with vascularity of the encephalon, and slight appearances of congestion in the spinal canal. Serum is always found effused in the pleural cavity, and very frequently in the pericardium. The lungs are gorged with dark blood, and their structure more or less œdematous. Old cellular adhesions are sometimes found connecting the opposite surfaces of the pleuræ. The heart is generally soft, enlarged, and flabby. The peritoneal sac often contains much serum; and the liver is always found engorged with dark blood, is unusually large, and of a very deep colour. The spleen is generally very soft, large, and is, as well as the large veins, loaded with black blood. Sometimes inflammatory appearances are observed in the diaphragm and serous surfaces; but these are only occasionally and very loosely noticed. (CHRISTIE, ROGERS, MARSHALL, and HAMILTON.)

7. *Nature of the disease.* — It is evident that the nature of this disease can be inferred only from what is known of its exciting causes, and the appearances presented after death. Of the former we have very imperfect, loose, and conflicting information: of the latter no precise and minute account. It is difficult to explain the early occurrence of the paralytic symptoms. The spinal chord, brain, and nerves supplying the lower extremities, have not been sufficiently investigated to warrant a positive opinion as to the particular state of these parts, to which these symptoms may be referred. They may, however, depend upon congestion of the veins and effusion of fluid within the spinal canal. The dyspnœa is evidently owing to congestion of the lungs, and œdema of their structure; and the feeble and irregular action of the heart may be imputed to the weakened vital energy and structure of the organ, in connection with effusion of serum in some cases into the pericardium. The effusion of fluid within the serous cavities may, like other effusions, depend upon very different states of the vessels and serous membranes. By Mr. MARSHALL and Mr. HAMILTON it has been viewed as the result of inflammatory action. But where there is merely an effusion of a limpid serum, without either albuminous flocculi or adhesions, there evidently can exist no actual inflammation. Viewing the antecedent symptoms in relation to the post mortem appearances, as far as both have been described, it may be inferred that the disease is more dependent upon active congestion of the lungs, liver, and spinal chord, than upon any of the usual states of inflammatory action; and that this congestion is intimately connected with weakened power of the nervous and circulating systems; manifested chiefly in the heart and extreme capillaries of the cellular and serous structures, with imperfect function of the liver and lungs, and with effusion of serum to a greater or less extent into the shut cavities and cellular structures of the body; giving rise to a nearly universal acute dropsy, and complicated with more or less of paralysis of the lower extremities.

8. DIAGNOSIS. —The paralytic symptoms, constant dyspnœa, universal œdema, and leucophlegmatic intumescence of the countenance, characterise this disease sufficiently, and distinguish it from the *cachexia Africana*, with which it has been considered as being allied (see CACHEXY — *African*.). It has been, however, more commonly confounded with *barbiers*; but the history of both diseases show a very obvious difference between them. Barbiers is a very chronic disease, in which the paralytic symptoms, tremors, spasms, and contractions of the limbs, and emaciation, are the most remarkable symptoms; whilst the present malady is extremely acute, often of very short duration, and is characterised by general œdema, dyspnœa, the suddenness of its fatal termination, and the frequency of its occurrence. The former is, in fact, a species of *paralysis*; whilst the latter is a form of *acute dropsy*, very generally diffused throughout the body, and complicated with slight paralytic symptoms.

9. TREATMENT. — According to this view of the disease, the discordant accounts given of the success of treatment will be readily accounted for. When the disease prevailed very generally in the Carnatic, during 1782 and 1783, Mr. DICK, who appears to have treated a very great number of cases, found most advantage, during the former of these two seasons, from a pill, containing a quarter of a grain of extract of elaterium combined with extract of gentian, given every hour, until copious watery evacuations were procured; and this plan was repeated every third or fourth day, till a cure was accomplished. In the following season this treatment was not so successful. He found most advantage from large doses of spirit of nitre, antimonial wine, frictions with warm camphorated oil, aperient medicines, and wine to support the strength. Bleeding and mercury were tried without benefit. Dr. CHRISTIE recommended mercury, to excite ptyalism, combined with squills; cordial liquors, consisting chiefly of gin punch; stimulating pediluvia, with warm liniments; and when the patient was convalescent, tonics, composed of bark, wine, and porter. In more urgent cases, he prescribed blisters to the chest, and brandy, æther, and laudanum, to relieve the vomiting, dyspnœa, and spasms. He found digitalis of no service. Mr. HAMILTON's first cases terminated fatally under the plan recommended by Dr. CHRISTIE; and Mr. COLQUHOUN trusted to mercury, but found that many of the patients who

died in hospital of the disease were in a state of salivation from this medicine.

10. This want of success led later writers on the disease to have recourse to other means. Dr. HUNTER had tried blood-letting in one case, without any apparent effect either one way or another. Dr. ROGERS stated, in his thesis on the disease, that blood-letting hastened the fatal termination: but, according to Mr. HAMILTON, he has since prescribed it successfully. Mr. MARSHALL appears to have been the first to employ blood-letting in a decided and successful manner in the treatment of beriberi; and the same practice was adopted by Dr. PATERSON (MARSHALL, *on Ceylon, &c.* p. 161.), and by Mr. HAMILTON. The bleeding was large, and repeated; and followed with the internal and external use of mercury, laudanum, and the vapour bath. To these were added purgatives of calomel and camboge.

11. The practice of Mr. RIDLEY, who experienced, himself, two very severe attacks; and who, excepting only Mr. DICK, has had the most extensive experience as respects this disease, having treated almost a hundred cases in one year (1814); recommends a nearly similar treatment to that advised by Mr. DICK. In the early stage, he directs purgatives of calomel, jalap, and crystals of tartar; the lower extremities to be well bathed, afterwards rubbed with camphor and oil of turpentine, or with the mercurial liniment, and then rolled in flannel bandages. He subsequently prescribes a pill, composed of one or two grains of calomel and two or three of powdered squills, every third hour; and a solution of crystals of tartar, as common drink, or made into punch with geneva or arrack. In the more advanced stages, he advises blisters to the back of the neck, or to the seat of pain and tightness; the warm-bath; frequent fomentations of the legs and abdomen, followed by frictions with mercurial ointment, camphor, and oil of turpentine; and clysters with æther, and purgatives. When the dyspnœa, spasms, and vomiting are urgent, he states, that he has given large doses of opium, æther, and brandy, with stimulating diuretics. When they could be retained on the stomach, small and repeated doses of camboge were also exhibited.

12. From the above statements, as well as from the varying character of the disease in Europeans and natives, in different seasons, as observed by Mr. DICK, and in various localities;—judging also from the nature and combination of the remote causes, and from the *post mortem* appearances;—I should infer, that a depletory treatment may sometimes be required amongst Europeans; and that the means of cure should be modified according to the characters of the malady and the state of the vital energies; that, on some occasions, general blood-letting — in others, cupping in the course of the spine; blisters; free purging with calomel, camboge, jalap, elaterium, &c.; antispasmodics, consisting of opium, æthers, brandy in some cases, camphor, &c.; diuretics, such as squills, cream of tartar, juniper, terebinthinate preparations, &c.; the vapour bath, or fomentations, followed by frictions with stimulating liniments, mercurial or camphorated liniments, with oil of turpentine, camphorated oils, along the spine and lower extremities; expectorants, consisting of ammoniacum, ipecacuanha, camphor, &c.; constitute the chief means that are likely to remove the internal congestions, to reduce the circulating fluid to a nearer equality with the vital power, to restrain effusion, and to restore the various secretions and excretions of the body. After these means have been judiciously administered according to the peculiarities of the case, or when circumstances seem to require it earlier in the treatment, stimulating and restorative medicines may either be conjoined with the above, or be exhibited on such occasions as may require them.

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BLOOD. SYN. *Αἷμα*, Gr. *Sanguis*, Lat. *Sang*, Fr. *Das Blut*, *Geblut*, Ger. *Sangue*, Ital.

CLASSIF. GENERAL PATHOLOGY—*Ætiology*, *Semeiology*.— GENERAL THERAPEUTICS.

I. STATES OF THE BLOOD IN HEALTH.— 1. *A. Of the states of the chyle.* In order to acquire accurate ideas respecting the blood in disease, it is necessary to be acquainted with the varying conditions and appearances of the chyle, according to the food, from which it is chiefly elaborated. To these, however, I can only briefly refer. This fluid, when removed from the thoracic duct, is usually of an opaque white or opalescent appearance, and separates into a serous portion, and more or less firm clot. The former resembles the serum of the blood, the latter consists chiefly of fibrine. If the animal have been fed with fat animal food, the chyle at the time of coagulation assumes a rose colour, and, in addition to the separation of the clot, which falls to the bottom of the vessel, a thin liquid oily layer forms on the surface of the serum. In animals fed on vegetable food, the chyle is generally opaline and nearly transparent, and separates into a serous fluid and a small fibrinous clot only. According to MM. PREVOST and DUMAS the chyle contains globules, similar to those contained in the blood, but of a smaller size. The fibrinous coagulum seems to be formed from their aggregation. The serum of the chyle also contains albumen, and the saline ingredients found in the serum of the blood.

2. *B. The globules of the blood*, particularly in respect of their relation to the other constituents of this fluid, and the changes they experience when removed from the blood-vessels, excite the utmost interest in the mind of the pathologist. It is evident that they are suspended in the serum by means of the vital influence which the blood derives from the vessels and organs in which it circulates. According to the microscopic researches of Sir E. HOME, Mr. BAUER, and of MM. PREVOST and DUMAS, they consist of a central colourless spheroid; and of a species of membranous sac of a red colour, surrounding this spheroid, from which it readily separates after death. The central bodies are transparent and spherical in the mammalia; and, when deprived of their coloured envelopes, are generally disposed

to assume ranges or fibrous meshes. The coloured portion appears to be a kind of jelly, easily divisible; but insoluble in water, from which it may be separated by repose. It is likewise transparent; but much less so than the central corpuscle: and the fragments arising from its division are not susceptible of regular aggregation.

3. C. *State of the blood in the vessels.* — According to the observations of Kolk, Treviranus, and others, the globules of the blood possess a rotatory motion during life, independently of the motion arising from the impulse of the heart; and this motion continues till coagulation takes place. More recently, this subject has been investigated by Professor Schultz, of Berlin, who has confirmed the fact respecting the intestine motion of the globules, by virtue of which they move on by themselves, surrounded by envelopes of colouring matter, and keeping at a distance from one another. This force, with which the globules of the blood are endowed whilst circulating in the vessels, I have, in my physiological notes, imputed to the influence exerted by the ganglial nerves on the interior of the vessels, which they every where so abundantly supply, as stated in the article on the pathology of the Arteries. But, besides this force of mutual repulsion, to which the fluidity of the blood is evidently owing, under the vital influence exerted by the organic nerves on the vessels, there is evidently another force also in action, by which the globules are attracted by the tissues, when they are brought more intimately in contact with them during their circulation in the minute vessels. Whilst, then, the former force keeps the globules in a state of constant motion and repulsion, and is exerted in the stream of the circulation, the latter tends to bring the globules to a state of repose, and is exerted in the organic structures themselves, at the point of contact of the solids and the globules. This latter force, which was first very minutely examined by Professor Schultz, and briefly stated by M. Andral, in his Pathological Anatomy, without acknowledgment, may be compared to a vortex, whence globules constantly pass from the arterial or terminal capillaries, and are lost in the different tissues. So that, although the vital endowment of the blood is manifested by its fluidity in the vessels, it assumes an opposite manifestation in the capillaries, where this fluid is brought within the sphere of the vitality of the different structures; each one attracting from it those constituents of which itself is formed, and which are always present in healthy blood.

4. Thus we see organisation commencing in the chyle, advancing further in the blood, and reaching its acme in the vital attraction of the constituents of the tissues from the blood circulating in the capillaries which supply them. At this part of the circle, where the arterial capillaries, with the fluid circulating through them, become, as it were, confounded with the tissues in which they are distributed, there appears, according to Professor Schultz, to be not only a constant attraction of particles by the tissues from the blood, but also an equal extrication of other particles from them into the blood received by the radicles of the veins. Thus it appears, that as the proximate constituents of the different tissues exist in the blood, as was first shown by Dr. Prout, and subsequently insisted on by Majendie and Andral; and as these become identified for a time with them, are afterwards detached, and flow back into the current of the circulation; the intimate connection and mutual dependence of the blood and the different solids, both in health and disease, ought not to be overlooked. But it is at the same time manifest that these constituents are kept in solution during circulation, and attracted during nutrition, by the vital influence; that the various parts into which the blood separates on removal from the vessels are only indications of its condition when circulating through the frame; that no such separation occurs in the healthy body, and never, excepting very partially, in disease; that this change proceeds from the loss of vitality sustained by the blood when removed from the frame, and that the phenomena connected with it have an intimate relation to the vital endowment of this fluid, derived from the vessels and the nerves supplying them.

5. D. *Coagulation of the blood.* — This process is modified by numerous circumstances, and by various diseases. Generally, however, the blood soon separates into two portions — the serum, and the coagulum or clot; and in this separation the red globules are principally concerned; it being chiefly the result of the loss of the vital motion which these globules possess in the vessels, and of the attraction existing between the colouring envelopes and central bodies. As the vital attraction, which keeps the red substance fixed around the whitish corpuscles, ceases soon after the removal of the blood from the vein, these bodies can then obey the force which tends to unite them, and they then form a net-work, in whose meshes the liberated red particles are entangled, and thus produce the phenomena of coagulation. If the coagulum be exposed to a stream of water, the colouring matter is washed away, while the aggregates formed by the colourless corpuscles remain in the form of filaments, in which may be recognised an analogous structure to muscular fibre, and constitute the fibrine of the blood.

6. It seems extremely probable, that the colourless globules observed in the chyle form the central corpuscles, and, when they have acquired their coloured envelopes in the progress of sanguifaction, constitute the red globules. And it appears equally reasonable to infer, that both the suspension of the globules in the serum, and the attraction between their coloured envelopes and colourless corpuscles, are entirely vital, inasmuch as both phenomena cease soon after the blood is removed from its source of vital endowment: and that vital manifestations become first apparent in the chyle, and still more so in the blood; coagulation being the result of the loss of this endowment, and taking place with a celerity in proportion to the rapidity of its departure. In cases where the vital energy, or that manifestation of it exerted by the organic nerves on the vascular system, is unexhausted, or is in a state of healthy excitement, coagulation is perfect and somewhat slow; but where it is depressed or exhausted, this process is quicker, but much less complete. Besides these, it presents various other phenomena, which are intimately connected with the nature of morbid actions, and which I shall notice immediately.

7. E. *Chemical relations of the blood in health.*—The analysis of the blood given by M. Le Canu, who obtained the prize given by the Académie Royale de Médécine of Paris, is extremely minute; and, as respects the principal ingredients, agrees very closely with the results stated by Berzelius and Marcet. The oily matter first detected in the blood by Dr. Trail, and subsequently found by Drs. Christison and Babington, has likewise been recognised by him as constantly present in the *serum*. The results of the analysis of the *serum* by Le Canu, Berzelius, and Marcet, are as follow:—

	Le Canu.		Berz.	Mar.
	1st Anal.	2d Anal.		
Water - -	906·00	901·00	905	900·00
Albumen - -	78·00	81·20	80	86·80
* Animal matter sol. in water and alco.	1·69	2·05	—	—
Albumen, combined with soda -	2·10	2·55	—	—
Crystallisable fatty matter - -	1·20	2·10	—	—
Oily matter -	1·00	1·30	—	—
*Muco-extractive mat.	—	—	—	4·00
*Extractive mat. sol. in alcoh. and acetate of soda - -	—	—	4	—
Hydrochlorate of soda and potash - -	6·00	5·32	6	6·60
Sub-carb. and phosph. of soda and sulph. potassæ - -	2·10	2·00	3	2·00
Phosph. of lime, magn., and iron, with sub-carb. of lime and mag.	0·91	0·87	—	0·60
Loss - -	1·00	1·61	1	—
	1000·00	1000·00	1000	1000·00

8. The *blood*, according to M. Le Canu, consists of the following constituents:—

Water - - - - -	780·145	786 590
Fibrine - - - - - -	2·100	3·565
Albumen - - - - -	65·090	69·415
Colouring matter - - -	133·000	119·626
Crystallisable fatty matter - -	2·430	4·300
Oily matter - - - -	1·310	2·270
Extractive mat. soluble in alcohol and water - - - -	1·790	1·920
Albumen combined with soda - -	1·265	2·010
Chloruret of sodium and potassium, alkaline phosphate, sulphate, and subcarbonates - - - - -	8·370	7·304
Subcarbonate of lime and magnesia, phosphates of lime, magnesia, and iron, peroxide of iron - -	2·100	1·414
Loss - - - -	2·400	2.586
	1000·000	1000·000

According to some chemists the blood also contains carbonic acid (Vogel and others); a yellow colouring matter, resembling that of the bile and the urine (Chevreul, Lassaigne, &c.); and a substance analogous to urea (Prevost, Dumas, Vauquelin, and Segalas). Vauquelin and Chevreul consider the fatty matter to be similar to that of the brain and nerves.

9. *a.* The quantity of *water* in the blood of a healthy person varies, according to M. Le Canu, in 1000 parts, from 853·135, the maximum, to 778·625, the minimum. He found the medium quantity in males to be 791·944, and of females 821·764. The quantity also appears to vary with the temperament; as the *lymphatic* temperament in the male furnished 830·566, of the female 803·716; and the *sanguineous* in the male 786·584, in the female 793·007.

10. *b.* The *albumen* contained in 1000 parts of blood varies from 78·270, the maximum, to 57·890, the minimum. It is nearly the same in the male as in the female, being only about one part more in the former. The difference in the quantity appears to have no relation to the temperament, nor to the age of the subject, from twenty to sixty years.

11. *c.* The quantity of *fibrine* contained in the coagulum varies extremely. According to Berzelius it is only ·75 for 1000 of the blood. M. Lassaigne states, that the fibrine of the blood of a young vigorous man is only $\frac{17}{10000}$ of its weight. In the researches of M. Le Canu, who has investigated the subject more closely than his predecessors, the quantity of dry fibrine contained in 1000 parts of blood varies from 1·360 to 7·236—the medium of twenty-two experiments being 4·298. It appeared to be greatest in the young or middle-aged of the sanguine temperament, and in the inflammatory state; and least in the lymphatic constitution, the aged, and those suffering under congestion or hæmorrhage.

12. *d.* The proportion of *globules* varies much more remarkably in the blood of a healthy person, than that of the albumen; the maximum being 148·450, the minimum 68·349., and the medium 108·399, in 1000 parts of blood. The medium quantity in males was 132·150, and in females 99·169. The periods of life intervening between twenty and sixty years had no influence on its quantity; but it was found to vary with the temperament. The medium quantity in the *lymphatic* temperament was 117·300 among females, and 116·667 among males; and in the *sanguineous* temperament, 126·174 in females, and 136·497 in males; giving 19·830 more globules to the sanguine temperament in 1000 parts of blood. M. Le Canu found the globules of blood greatly diminished in females subject to a copious flow of the menses. The quantity of globules is also, relatively to the other constituents of the blood, greatly diminished by blood-letting, whilst the albumen is not sensibly affected. Thus, a first bleeding furnished in 1000 parts of blood 792·897 of water, 70·210 of albumen, 9·163 soluble salts and animal extractive matters, and 127·73 of globules; but a third bleeding a few days afterwards in the same patient (a female), gave 834·053 of water, 71·111 of albumen, 7·329 of soluble salts and extractive matters, and 87·510 of globules.

Bibliog. and Refer.—*Marcet*, in Transact. of Medico-Chir. Society of Lond. vol. ii. p. 365.—*Berzelius* and *Marcet*, in Ibid. vol. iii. pp. 199. 231.—*Prout*, Inquiry into the Origin and Properties of the Blood, in the Annals of Med. and Surg. vol. i. pp. 10. 133. et 277.—*Home* and *Bauer*, Philos. Trans. for 1820.—*Home*, in Ibid. for 1826, p. 189.—*Prevost* et *Dumas*, Mémoires de la Soc. de Physiq. et d'Hist. Nat. de Génève, t. i., et Bibliothèque Univers. Juillet, 1821.—*Author*, Appendix to M. *Richerand's* Elements of Physiol. 2d edit. p. 637.—*Scudamore*, Essay on the Blood, &c. 8vo. Lond. 1824.—*Schultz*, Révue Médicale, t. i. 1825, p. 136., et Journ. de Prog. des Sc. Méd. t. v.—*Bostock*, in Edin. Med. and Surg. Journ. vol. xxxi. p. 114.—*Adelon*, Physiol. de l'Homme, t. iii. p. 110, *et seq.*—*Le Canu*, Nouvelles Récherches sur le Sang, in Journ. de Pharmacie, Sept. et Oct. 1831.

II. Exuberance of Blood, *Plethora* (πληθώρη, *repletion*). Syn. *Polyæmia* (Auct. Var.). *Hyperæmia*, *pléthore*, Fr. *Die Vollblütigheit*, Germ. *Pletora*, Ital. *Excessive Fulness of Blood.*

Classif. Pathology—*Ætiology*. IV. Class, II. Order (*Author*, see *Classif.* in *Preface*).

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[*] Probably the same constituents, differently named, and more minutely examined, by M. Le Canu.

13. **Defin.** *Greater fulness of the vascular system than is compatible with the continuance of health; or repletion of this system.*

14. The importance of attending to the varying states of the circulating system, in respect of both *exuberance* and *deficiency* of the fluid contained in it, has been acknowledged since the time of Galen. After the doctrine of nervous influence had superseded the humoral pathology, the state of the blood in disease experienced a more general neglect, than the part actually performed by this fluid in the causation and perpetuation of morbid actions ought to have procured for it. Yet have there always been a succession of able observers and writers, who have never lost sight of the influence of the *quantity* as well as *quality* of the blood in producing, as well as in modifying, disease; and more recently the subject has deservedly received an increased and an increasing attention. *Plethora* is the opposite of *anæmia:* both may be, to a certain extent, compatible with health; but both predispose more or less to disorder, and, beyond certain limits, constitute distinct and opposite states of disease.

15. *A. General plethora.*— Galen, Baillou, Fernel, Rivière, and others, considered plethora to be of two kinds; to which subsequent writers added two more. As these distinctions are still, in several respects, founded in truth, notwithstanding the neglect into which they had long fallen, I will here briefly notice them. 1st, True or absolute plethora—*plethora ad vasa;* 2d, Apparent or false plethora—*plethora ad volumen;* 3d, Plethora relative to space—*plethora ad spatium;* 4th, Plethora in relation to vital power — *plethora ad vires.* It will be observed that the first and second of these, the species recognised by the earliest writers, are still upon the whole the most important. In the *first,* the blood is permanently increased beyond the wants of the system. In the *second,* plethora is merely a passing occurrence, arising from temporary causes, as the general turgescence occasioned by sudden or high ranges of temperature, &c. In the *third,* the blood may not be increased, but its relative quantity may be too great, as is observed after amputations of one or two limbs. In the *fourth,* the quantity may not be too great, if this fluid were actuated by a healthy state of the vital energy: but it may be excessive in respect of the influence by which it is circulated in all parts of the body. Now, those distinctions are actually founded in nature; and although they may all be resolved into one pathological proposition, viz. greater repletion of the vascular system than the wants and conditions of the economy require, still they must have become matters of experience to every one whose range of observation has been such as entitle his opinions to respect. I shall merely remark upon such of them as admit of dispute.

16. False plethora is very generally observed to occur in persons suddenly exposed to elevations of temperature, and depends more upon the effect of heat in exciting the vital turgescence of the capillary vessels, whereby a craving for fluid is created, and a larger quantity is absorbed, than upon the expansion of the fluids themselves, owing to the increase of temperature. A state of false plethora is very frequently occasioned,— and is often productive of more serious consequences than have generally been imputed to it, — by *ingurgitation* and increased temperature conjoined; and it should not be overlooked, that these combined influences not infrequently affect those who are already permanently plethoric. This will be more forcibly and truly shown by what must have fallen under the observation of many. A red faced, full veined, and robust looking person, of from forty to sixty, sits down to dinner with a good appetite. He eats three times as much as his body requires, and he excites the stomach to digest it by drinking stimulating fluids to six times the quantity that is necessary. All this, moreover, is done in a close and overheated apartment. The vital turgescence and expansibility of the capillaries and veins are excited to the utmost; the whole surface is full and plump, and the extremities even swollen. Now, a person thus circumstanced, particularly from four to eight or more hours after such ingurgitation, actually has the quantity of his circulating fluids increased from one sixth to one third, at a moderate calculation: but the increase is generally soon diminished by the pulmonary exhalation; the urinary, the perspiratory, and intestinal secretions; which are all greatly augmented, and are thus the safety valves of the circulation. But how often, notwithstanding, do we observe the vessels at last yield before the mass which distends or overloads them, and apoplexy, and various other hæmorrhages and congestions, result; particularly when any one of these safety valves are obstructed or tardy in their action — when the nervous or vital influence is either depressed or much exhausted by the previous excitement, and the vessels are irritated, or their actions otherwise changed by the state of their contents.

17. That plethora is a not infrequent result of amputations cannot be disputed, although the privation of sufficient exercise, which is thereby occasioned, will partly account for the occurrence; at the same time we generally observe that the same quantity of food is taken, and the same quantity of blood is prepared for the body, when deprived of one fourth part of the structures requiring support, as was provided for its nourishment when it was in a state of integrity.

18. That plethora may exist in conjunction with deficient vital or nervous power, and that, although the quantity of blood in the system may not exceed that of health, and yet be too great for this power to control, cannot be doubted. We are constantly observing such pathological conditions, both at the commencement and in the progress of disease; and frequently remark their influence in its advanced states and terminations. (See article Congestion.)

19. The *causes* of plethora are so manifest as scarcely to require enumeration. They may operate either singly or in conjunction. They consist, 1st, Of the introduction into the vascular system of a greater quantity of the nutritious elements than is necessary to the support of the organisation; and, 2d, Of the retention in the blood of those parts which are usually removed by the secreting and excreting organs. It must be evident that the former is owing to excess of nourishment and stimulating fluids; whilst the latter proceeds most commonly from insufficient exercise, suppressed natural secretions and excretions, or accustomed morbid discharges. How remarkably the habits, indulgences, luxuries, and

refinement of modern life contribute to these, is sufficiently apparent. At the same time it should not be overlooked that there are certain constitutions, and particularly those of a lax fibre, more disposed to plethora than others, even independently of temperament; that this disposition is often hereditary; and that it is frequently so strong, notwithstanding precautions to overcome it, as to constitute a distinct diathesis. Plethora, particularly in conjunction with a rich state of the blood, is generally most remarkable in those who live highly, drink much, and are very often out in the open air, without taking active exercise.

20. There are also certain epochs of life at which it is most apt to occur, particularly when the energies of life are beginning to wane, and when the balance between sanguifaction and secretion preponderates in favour of the former. (See article Age.) Plethora is also more frequent in females than in males, owing to their more sedentary occupations, and to the wants of the female economy, particularly during the period of utero-gestation, and subsequently to the cessation of the menses. It is justly remarked by various writers, that the plethora of early life is generally arterial and capillary; that of advanced age altogether venous.

21. Plethora has been too generally considered as always existing in fat persons, and as occurring at least in them most commonly. But obesity is no sure criterion of plethora; it may even coexist with a deficiency of blood. I have known the supposition, that obesity indicated at least a sufficiency of this fluid, lead to dangerous results. Indeed, the opinion entertained by several of the older writers, that fat persons do not bear depletion, is quite as well founded as its opposite. There are other circumstances besides this which must be taken into consideration, when we estimate either the simple existence of plethora or its extent. This state of the vascular system is sometimes associated with leanness; but when this is the case, the pulse is also full and strong, and the veins very large, full, and rapidly filled upon being emptied by friction. It is more generally observed in persons passing middle age, who, with a ruddy, flesh-like, or lively surface, are beginning to assume greater fulness of the frame without loss of firmness; and in whom the pulse is full and the veins well marked.

22. *Symptoms.* — Plethora, in its slightest grades, is generally productive of little inconvenience. There are usually observed merely a greater disposition to sleep than in health; less quickness and aptitude to mental or corporeal exertion; and a more marked disposition to suffer from and to be affected by the more energetic causes of disease. In an advanced degree it occasions lassitude, indolence, vertigo, or weight or pain of the head; heavy, snoring, dreamy, and often unrefreshing sleep; turgescence of the countenance, suffusion of the eyes; fulness of the veins, and of the pulse; occasionally palpitations of the heart, and slight amaurosis. Such are the usual signs of plethora, short of actual disease, at least of such as may alarm the patient. When it proceeds further, it assumes either the features of inflammatory fever, with excess of action in some organ or part, or passes into general visceral congestion, according to the states of vital action and power. It may moreover occasion, or *terminate* in, hæmorrhage, visceral inflammations, congestions, and obstructions, active dropsy, morbidly increased secretions, convulsions, spasmodic diseases, morbid states of the vessels, &c.

23. *B. Local plethora.* — The vessels of an organ or part may be loaded with blood, and yet the state of their vital action may be neither generally or locally exalted to the pitch of active determination, nor reduced so low as that of passive congestion. There are, perhaps, few such cases that are entirely independent of some degree of excitement, arising either from the condition of the nerves of the organ, or from an irritating cause of some description influencing the state of the capillaries. The best exemplifications of this state are the plethoric states of the ovaria and uterus previous to the menstrual discharge; of the generative organs during the venereal orgasm; of secreting glands and parts when their functions are unusually active; of the brain during the exciting passions and emotions (see *Local determinations of Blood*), and various internal viscera, particularly the spleen, during the cold stage of an ague, &c. These last, however, more nearly approach to congestion than to simple local plethora. It should not be overlooked, that whatever excites the nerves and irritates the tissues of a part, will occasion turgescence of the capillaries, increased flux of blood through the arteries supplying them, and a quicker return of this fluid through the veins. If the part thus excited perform secreting functions, these will be augmented; and thus increased flux and local plethora will both exist, and constitute local determination of blood, — a state which will be considered hereafter. But still this is not inflammation; for as soon as the cause of excitement ceases, this state disappears, without terminating in any of the ways in which inflammatory action terminates, and without having assumed any part of the formative process which in some state or other follows upon inflammation occurring in a previously sound frame. It cannot, however, be denied, that although local plethora does not constitute either inflammation or passive congestion, it will often favour the production, not only of these, but also of hæmorrhages, convulsions, &c., according to its seat and extent, the state of vital power, the nature of the exciting causes, and other contingent circumstances. It is evident that local plethora may occur either with or without general plethora. It may even coexist with insufficiency of blood (§ 34.).

24. *C.* The *treatment* of general and local plethora consists almost entirely of avoiding its causes. Simple plethora does not require, and is seldom permanently benefited by, vascular depletion alone; indeed, it is more generally increased after a time by this practice, unless more efficient measures be also employed. Abstinence, and a free state of the secretions and excretions; active and regular exercise; abridging the period of repose; early rising; a moderate use of diluents, and abstaining entirely from malt and spirituous liquors; cooling and acidulous beverages, when thirst requires to be quenched; are the chief means both of prevention and cure.

Bibliog. and Refer. — *Galen*, De Plenitudine, *vide* Opera. *Fischer*, De Plethora Mult. Morb. Causa. Erf. 1723. — *Hoffmann*, De Plethora Insufficiente Morborum Causa, Opp. sup. ii. pp. 1. 506. — *Stahl*, Theoria Medica Vera,

Juncker's ed. Halæ, 1737. pp. 303. 483, &c.; et De Plethora. Erf. 1736. — *Juncker*, Conspectus Medicinæ. Halæ, 1724, p. 7. *et seq* — *Nicolai*, De Singular. quibusd. ad Polyæmiam Spectantibus. Jenæ, 1790. — *Rudolsteller*, De Morb. ex Abundantia Sanguinis oriundis. Helms. 1777. — *Weickard*, Vermischte Schriften, b. iii. p. 89. — *Gregory*, Conspect. Med. Theoret. ed. vi. p. 152. — *Horn*, Beiträge zur Medic. Klinik. vol. ii. p. 88. — *Calemard Lafayette*, Essai sur la Plethore ou Polyémie, 4to. Paris, 1809. — *Vaidy*, Dict. des Sciences Méd. t. xliii. p. 178. — *Parry*, Elements of Pathology, 2d ed. p. 30. sp. — *Rochoux*, Dict. de Méd. t. xvii. p. 123.

III. LOCAL DETERMINATION OF BLOOD.

SYN. *Afflux of Blood; increased Momentum of Blood. Fluxion*, Fr.

CLASSIF. PATHOLOGY. THERAPEUTICS — (*Derivation, Revulsion*).

25. *The determination of a larger proportion of the circulating fluid to an organ or part, than is usually sent to it in health*, not infrequently takes place independently of inflammation. This state of the local circulation has been, singularly enough, doubted by some writers, and too much insisted on by others, more particularly by Dr. PARRY, who assigned to it a greater importance in pathology than it is entitled to, and overlooked the fact that it is a part only or link in the chain of morbid causation.

26. i. PATHOLOGICAL DOCTRINE. — *Determination of blood* is intermediate between inflammation and local plethora. *Inflammation* is an actively morbid state of the capillaries; *congestion* a passive condition of both them and the veins; whilst *determination* is a simply active or excited, but not otherwise diseased, state of both the arterial branches and the capillaries, the veins being unaffected, and readily returning the blood conveyed by the arteries. More or less determination of this fluid accompanies acute and sub-acute inflammations, and hæmorrhages; but it never attends congestion, unless this state pass into either of the former diseases, or be followed by augmented secretion from the congested organ. *Local plethora* (§ 23.) is a lower grade of local determination, or rather an intermediate state of the vascular system between determination of blood and congestion. In other words, (*a*), *Congestion* of blood is repletion of the veins, attended by depressed vital power — (*b*) *Local plethora*, increased fulness of the vessels generally, with integrity of vital power — (*c*) *Local determination*, augmented circulation and vital functions of the vessels — and (*d*) *Inflammation*, an actively morbid state of the vessels, and organic nerves supplying them, tending to change of structure and to disorganisation. As these pathological states are often referred to, and are sometimes improperly confounded, it is therefore necessary to attend to the distinctions now drawn.

27. That determinations of blood actually occur, and may even be excited at pleasure for a short time, are matters of daily observation even in health; and that such changes in the circulation of a part are occasioned by the influence of the nerves, particularly of the organic nerves supplying the vessels, seems an equally well established fact. When these nerves are excited, whether by heat, stimuli, friction, or irritating bodies, the capillaries experience a degree of expansion, — a property with which they are naturally, or rather vitally endowed. The erythism, expansibility, or slight erectility, which is evinced by the capillaries of certain organs in a very remarkable manner, exists more or less throughout the frame, especially in mucous or cellular parts. When, therefore, this property is influenced by any agent possessed of the power, the diameter of the capillaries running between the arteries and commencement of the veins being increased, an enlarged stream of blood will necessarily pass through them, and a correspondent demand will be made upon the arteries supplying them, owing to the less resistance opposed to the current, and freer circulation in the part thus circumstanced, provided that the return of blood by the veins be not impeded. If the circulation be thus increased as respects the volume of blood passing through the vessels, and continue thus facilitated, the demand thereby made upon the larger vessels and the heart will ultimately tend also to accelerate it; and hence will result augmented volume and quickened circulation — the states constituting determinations of blood.

28. The circulation of an organ or part may long remain in this state, particularly if its vital manifestations do not become exhausted, and if its nervous power continue excited by the agent or cause which first occasioned this condition, or by other influences operating in a similar manner. But if the vital or nervous power become depressed, or otherwise changed, either congestion, or some form of inflammation, will generally ensue, or even hæmorrhage may take place, — a result which is not infrequent when the determination takes place to membranous viscera or parts, and to mucous surfaces. These being, therefore, not unusual terminations of simple determination of blood, means should generally be employed to remedy this state. The agent or cause exciting the vessels should be removed, and other measures directed that may equalise the circulation and diminish its fulness, when the determination is connected with plethora, as it not infrequently is.

29. Determinations of blood to an organ are very frequently occasioned by whatever rouses its natural actions. If the part thus excited perform secreting functions, the increased secretion, in addition to whatever excitement of the vessels may be produced, will of itself determine a greater flow of blood to it. Numerous proofs of this are furnished us by the progress of various diseases, and the appearances presented by others after death; and, endeavouring to follow nature, we attempt to remove determination or inflammations in vital organs, by inducing artificially an afflux of blood to parts and surfaces where it cannot be injurious, as to the skin, mucous digestive surface, extremities, &c., with the view of assisting other agents in soliciting or recalling it from the seat of disease. The exercise, also, of organs which possess not secreting functions, will likewise favour an augmented flow of blood to them. Thus, exertion of the mental faculties and the passions determine an afflux of blood to the brain; and of the muscular organs, to the spinal chord, muscles, and heart. It is of importance to be aware that the irregular distribution of the blood, whether of this or of other kinds, may take place either when this fluid is more abundant and richer than natural, or when it is deficient as well as poor; and that the change from the healthy state of the circulation is to be imputed primarily to the state of influence exerted by the organic class of nerves distributed to the vessels, which, thus influenced,

control the volume of the blood circulating through them (§ 27.), as well as modify its states and the rapidity of its circulation. The particular determinations of blood are noticed in their respective articles.

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30. ii. THERAPEUTICAL DOCTRINE. — *Derivation* — *Revulsion*. The doctrine of determination of blood sufficiently indicates the propriety of having recourse to means in the cure of various diseases, calculated to solicit a flow of blood to parts where this may be done safely, and thus to diminish the quantity sent to the seat of disease. This mode of practice was well understood, and very generally employed by the older physicians, upon the well-known pathological principle that "*ubi irritatio, ibi fluxus*." It must not, however, be overlooked that *irritation* will not always procure afflux of blood; and that it is therefore not altogether identical with *derivation*, either in a pathological or a therapeutical point of view. It does not come within my limits to point out the difference; but they are so far alike, that, in order to produce the latter, we frequently have recourse to the former. At the same time we must recollect that irritation will sometimes be of service even independently of any afflux of blood that may accompany it, or even although it should fail of producing this effect.

31. It is almost unnecessary to enumerate the means, which we occasionally have recourse to in order to occasion a local determination of blood, and thus derive it from the seat of disease. These consist of numerous agents: — *a*, Such as increase the circulation in the rete mucosum, as rubefacients, sinapisms, external heat, &c.: *b*, Those which, in addition to augmented circulation, procure a discharge from the surface or part to which they are applied, as scalding water, blisters, irritating ointment, &c., purgatives and cathartics, &c.: *c*. Those which, by procuring a flow of the natural secretions, solicit an afflux of blood to the secreting organs, as certain purgatives, diuretics, and diaphoretics: *d*. Those which evacuate the viscera, increase the discharges from their mucous surface, and augment the secretions in adjoining organs, as emetics, cholagogue purgatives: *e*. Those which influence the circulation in the limbs and extremities, as frictions, the semicupium, various forms of pediluvia and manuluvia; abstraction of blood from the *feet* or *hands*, by venesection, leeches, or cupping; stimulating or scalding pediluvia, &c.: and, *f*. Those which permanently irritate and procure a continued discharge, as deep scarifications, incisions, setons, issues; caustic applications, as the alkalies, the inner bark of mezereon, moxas, &c.

32. All these occasion, in the first place, irritation in the part to which they are applied, and, consequent to this, an afflux of the circulating fluid. Some of them produce the primary, more remarkably than the secondary effect; and when this is the case, the pain which is felt is often an index of the extent of the former. This is the case with blisters, rubefacient epithems, sinapisms, and scalding applications; and therefore much advantage is obtained from them in various diseases, independently of their secondary operation, particularly when we wish to rouse the torpid or oppressed functions of an adjoining or subjacent organ. When derivation is, however, our principal object, they cannot always be depended upon, particularly in irritable habits, and in the early stages of acute diseases. They ought never to be employed in the stage of excitement in fever, unless this stage be irregular, imperfectly developed, or inefficient; nor in inflammations, until acute action is subdued by depletions, evacuations, and other means, — when only artificial derivation can be expected to have any influence in diminishing the remaining disorder, and lessening the risk of effusion. This caution is especially deserving of attention in respect of blisters, — the cantharides of which, particularly if improperly allowed to remain too long on a place as they often are in diseases of excitement, being often absorbed into the circulation, thereby increasing the general as well as local vascular action. These applications, also, ought not to be directed to the vicinity of parts suffering from vascular excitement. I have often seen mischief produced by blisters having been directed to the head and throat in acute diseases of the subjacent parts.

33. The means usually employed in order to derive the flux of blood from diseased parts are variously combined, and much discrimination is requisite both in the choice and in the combination of them, appropriately to the state and nature of the diseased action at the time. The scope and limits of this work preclude my entering upon this important branch of the subject; but it has received attention when discussing the treatment of those diseases in which the various means of derivation are required: and the appropriation of those means to the different states of vascular action is there attempted with some degree of precision.

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IV. DEFICIENCY OF BLOOD. SYN. *Anæmia* (from the privative *α*, and *αἷμα*, blood). *Bloodlessness*. *Anémie*, Fr. *Der Blutmangel*, Ger. *Dyspepsia Anæmia* (Young). *Marasmus Anhæmia* (Good).

CLASSIF. 3. *Class*, Diseases of the Sanguineous Functions; 4. *Order*, Cachexies (*Good*). I. CLASS, V. ORDER (*Author*).

34. DEFIN. *A deficiency of blood in the whole*

body or in some important organ, not proceeding from natural or artificial hæmorrhage, giving rise to a waxy, bloodless state of the countenance and surface, emaciation, feeble quick pulse, and great languor and debility.

35. Defect of blood, bloodlessness, or anæmia, althought not of frequent occurrence, is yet occasionally met with, particularly in its less remarkable, or local forms. In connection with *chlorosis* it is oftener observed. Cases of anæmia have been recorded by REISELIUS, SWHENKE, and others; and the disease fully described by BECKER, ALBERT, JANSON, HOFFMANN, DE HAEN, ISENFLAMM, LIEUTAUD, HALLÉ, ANDRAL, and several pathologists and practical writers of the present day. I shall first offer a few general observations on local anæmia; and afterwards describe more fully general anæmia and its complications. The deficiency of blood, occasioned by natural or artificial losses of it, is considered under a distinct head.

36. i. PATHOLOGY OF ANÆMIA. — 1st, *Local anæmia.* Deficiency of blood in an organ or part is evidently the result of one or more of the following pre-existing lesions: — *a*, Of diminished influence of that portion of the ganglial or organic class of nerves which supplies the blood-vessels of the organ; *b*, Of defective vital expansion of its capillaries, probably owing to the depressed state of the influence exerted on the vessels by the nerves supplying them; *c*, Of mechanical impediments in the way of a sufficient supply of blood; *d*, Of imperfect developement, or diminished calibre of the arteries by which blood is conveyed to the organ; *e*, Of disease of the organ or part, or an imperfect exercise of its functions; and, *f*, Of unusual flux of blood to other quarters, causing a proportionate diminution of it in others. It is evident that these states are merely local, and are capable of co-existing with other changes affecting the whole mass of the circulating fluid, as respects both its quantity and its quality; and that various disorders of function, according to the particular state on which the anæmia depends, and the extent to which it may exist, will be the consequence.

37. The organs most subject to this condition of their circulation are, according to M. ANDRAL, the lungs, the brain, the liver, the substance of the heart, the stomach and alimentary canal, and some of the voluntary muscles. To these I would add, the spleen, the ovaria, and the generative organs of the male. In many of these, as in other parts, atrophy is associated with the anæmia; and may be considered, in the majority of cases, as the consequence of it. The *symptoms* of local anæmia are not always manifested during life; but they frequently are, as I shall have occasion to point out, when considering the morbid conditions of those organs most subject to this change. Thus, in the completest of all the states of local anæmia, as when the obliteration of an artery cuts off all supply of blood to the organ, gangrene will result; frequently, when anæmia is seated on the brain, a form of convulsion is the consequence, with other symptoms stated in the article on this subject (see BRAIN — *Anæmia of.*); and when the ovaria, at the period of puberty, is not supplied with the requisite quantity of blood, owing to deficient influence of the ganglial nerves distributed to the organs of generation, chlorosis, sometimes with more or less of general anæmia, is the constant effect.

38. 2d. *General anæmia.* — The blood circulating through the body may be most remarkably deficient, in respect both of its quantity, and of the relative proportion of red particles. In many cases in which the absolute quantity of blood in the body is diminished, the globules are still more remarkably deficient, they being insufficient to give the blood its usual deep colour. General anæmia presents itself in practice, 1st, as a primary disease; 2d, as a consequence of pre-existing lesions of some one of those organs which are concerned in conveying the nutritious fluids into the blood, or in the processes of sanguifaction; 3d, associated with other diseases, resulting equally with it from some antecedent affection, the nature of which cannot, perhaps, be readily recognised.

39. *A.* The *primary forms* of anæmia, when closely analysed, seem to proceed, 1st, from deficient nourishment; 2d, from deficient vital power, — from a torpid or depressed state of the influence of the organic class of nerves on the digestive, assimilating, sanguifying, and circulating organs which they supply. — *a*. The influence of deficient supply of nourishment in producing anæmia may be readily imagined, and instances showing it are numerous; I will merely allude to one: — M. GASPARD, whose researches have tended much to advance the state of the pathology of the fluids, has illustrated this part of the subject by observing the remarkable degree of anæmia which existed in a large proportion of the inhabitants of a district devastated by famine, who lived upon grass. A more common and less expected form of general anæmia is that which arises from the injudicious restriction of diet and regimen, during convalescence from acute diseases, particularly those which have required large depletions. Several instances of this state of disease have come before me, and would, I am confident, have terminated in dropsical effusions (§ 44.) or in death, if a different system had not been adopted.

40. *b*. A torpid state of the organic class of nerves, in one of the most influential, if not the most frequent, antecedent affections to which we can impute this state of the circulating fluid. It is extremely probable that those instances of its occurrence from being shut out from the sun's influence, and the constant respiration of an unwholesome air, arise from the continued privation of salutary stimuli to this important class of nerves, upon which the sanguifying processes depend.

41. The influence of the *sun's rays* in promoting all the vital actions, particularly those of organic life, probably from modifying the electromotive state of the frame, must be evident to all. The good effects of light and air are shown in the vegetable kingdom, the circulating fluids of which cannot be duly formed without exposure to both. The sun's rays diffuse a genial influence through the frames of the aged, and excite the organic and generative functions of the young. It has been observed that those persons who are entirely excluded from the light of the sun, and breathe the *close air of mines*, are particularly subject to general anæmia. M. CHOMEL has given a very interesting account of the disease which

affected the workmen employed in a coal mine at Auzain. It commenced with colicky pains, meteorismus, blackish green stools, dyspnœa, palpitations, great prostration of strength, followed, in ten or twelve days, by a yellowish or waxy and bloodless appearance of the countenance. The capillary vessels disappeared from the conjunctiva and mucous surface of the mouth; and the pulsation of the arteries could scarcely be felt. The patients complained of palpitations, anxiety, oppression and suffocation on exertion, paroxysms of fever, profuse perspirations, œdema of the countenance, and rapid emaciation. This state continued for six months or a year; and in some cases terminated fatally, with the reappearance of the invading symptoms. Four of these patients were sent to Paris for treatment, and were ordered light nutritious diet, bitter infusions, &c. One of them died; and on dissection, the arteries and veins were found almost void of blood, containing merely a little sanguineous serum; and little or no blood flowed from the parts divided during the inspection. The appearances in this case led Mr. Hallé to prescribe iron filings in the dose of a drachm daily, with tonics and opium; and, under this treatment, all the symptoms gradually vanished, the capillary vessels reappearing on the surface.

42. *B.* It is probable that general anæmia will not take place, unless *consecutively* of remarkable torpor of the vital influence, or of some other morbid condition of one or more of the organs which contribute to the formation of blood. Where the digestive powers and the functions of the liver are weakened, anæmia to a slight degree is not infrequent. Its connection with chlorosis is merely that of an associated effect of pre-existing depression of the influence of the sytem of organic nerves. (See Chlorosis.) The lungs have been considered by some authors as the organ which is chiefly concerned in the production of anæmia, and consequently have been viewed by them as the seat of hæmatosis, or at least the place where this process is completed. Without disputing that such is the case to a certain extent, I am disposed to view the liver as being equally, if not more, concerned in this function, — an opinion long since contended for in my Physiological Notes (see *Appendix to* M. Richerand's *Elements of Physiology*); and consequently as being in many cases very influential in the production of general anæmia. It is probable, however, that other viscera or parts may also give rise to it. Thus it may be admitted that total obstruction of the thoracic duct will occasion it; and I have repeatedly observed it in children affected with various chronic diseases of the viscera of organic life; being here, as in most cases, one of the results of imperfect digestion and sanguifaction, as well as of obstruction to the passage of chyle into the blood. One of the most remarkable cases of general anæmia was recorded by Dr. Combe. In it all the viscera were found nearly bloodless, excepting the spleen; but not diseased in other respects, at least not to the extent of impeding their functions. The thoracic duct and absorbent system were not examined.

43. The *symptoms of anæmia* have been nearly all alluded to in the foregoing remarks. I may, however, enumerate them briefly at this place. They consist of a pale, waxy, or blanched appearance of the countenance and integuments, in which the cutaneous veins are scarcely seen; and those which appear are pale, apparently empty, do not fill quickly, or scarcely at all, upon pressure made upon them; and, when emptied, fill very slowly. The conjunctiva has lost its red vessels; the lips, tongue, and inside of the mouth are pale; the pulse feeble, small, irregular, and readily made still quicker or fluttering upon mental emotion; the patient is languid and very weak; complains of flatulence, borborigmi, and an irregular state of the bowels, with want of appetite, and an occasional nausea; a sense of sinking and syncope, particularly upon assuming the erect posture, followed by palpitations; oppressed, short, hurried, and sometimes gasping respiration; irregular convulsive or spasmodic movements; tremors; œdema of the ancles; and in some cases the more severe symptoms described as following sinking after large depletions (§ 54.) In the more unfavourable cases the patient may be carried off by a fit of syncope upon assuming quickly the erect posture; or by a convulsion; or sink with the symptoms of exhaustion, or with those of effusion on the brain, or in the pleural or pericardial cavities. It most commonly runs into one or more of the complications about to be noticed.

44. 3d, *Complicated anæmia.* — Deficiency of blood, as respects both its diminished *quantity* and its *poor* quality, or the defect of red globules, is often associated with visceral disease, of which it is generally the consequence; but it also may give rise to various affections, both functional and organic. That anæmia should be complicated with certain chronic diseases of the liver, mesenteric glands, and absorbent system, chlorosis, &c. may be expected; but that it should give rise to diarrhœa, and to dropsical effusions in various parts, particularly in the shut cavities and cellular tissue, without any alteration of the solids, may not appear so obvious, although admitting of explanation. M. Andral states, that he has observed anæmia in the bodies of persons who had died dropsical; and in persons who had complained of diarrhœa, profuse perspirations; and very justly considers both the dropsical effusions into the shut cavities and into the cellular tissue, and the exhalation from the digestive mucous surface and skin, as perfectly independent of any local congestion or irritation, and to be analogous to the profuse diarrhœa and perspirations which occur in persons who are brought near to dissolution by long protracted disease. In all such cases, whether attended with effusion into shut cavities or cellular tissue, or with increased exhalation from mucous surfaces, we may consider nearly the same pathological conditions to exist as their principal sources, viz. diminished tone of the exhaling orifices, with lessened vital cohesion of the tissues in which they open; a poor and thin state of the blood, the crasis of which is much lowered; and a more rapid circulation of the remaining fluid.

45. Anæmia, when existing even in a moderate degree, will often give rise to various functional disorders, which are, however, of no constant character, but differing with the temperament, habit of body, &c. The chief of these are hysterical and epileptic convulsions, palpitations, leipothymia or syncope and palpitations alternately, irregular or anomalous convulsions and spasms,

chorea, and various nervous tremors resembling chorea, dyspnœa, sickness or vomiting, œdema of the ancles, diarrhœa, headach, &c., with weak, small, quick pulse; pale, waxy, or doughy state of the countenance; listlessness, flatulent state of the abdomen, gastralgia, colic pains, very weak digestion, vermination, and irregularity of the fæcal and urinal evacuations. It will also be followed by atrophy and softening of several of the internal viscera, and general emaciation.

46. In cases where general anæmia is not excessive, it may be admitted that both inflammation and hæmorrhages may still occur, particularly the latter, from the causes usually producing them; and that they will have a remarkable tendency to terminate unfavourably, owing to the state of the system causing the deficiency of blood, to this defect itself, and to the want of vital resistance, as well as to the incompatibility of most of the means of cure with the state of the constitutional powers and of local action.

47. Causes.—Several of the causes of anæmia have been already alluded to (§ 39—42.). There may be others which have not yet been ascertained. I may state, however, briefly and generally, those which have been usually acknowledged. They consist of insufficient and poor food; excessive secretions and evacuations; masturbation practised early in life, and long continued; long exclusion of the body from the direct influence of solar light and rays; protracted confinement in crowded apartments, in the stagnant and impure air of manufactories, especially when affecting children or very young persons; and the constant respiration of a moist, impure, and miasmal atmosphere, from which the sun's rays are shut out. All these exhaust or depress the vital and nervous powers; whilst some also either cut off the necessary supply to the circulating fluid, or waste its richer constituents. To these causes may be added certain malignant organic diseases, as carcinoma, &c., which, in the latter stages, is always attended with more or less of anæmia; impeded developement of organs, particularly those belonging to the generative functions, whose perfect evolution is requisite to the salutary excitement of all the organic actions, especially those of digestion and sanguifaction; and lesions which either impede these latter functions, and interrupt the passage of chyle into the blood, or vitiate these fluids.

48. Treatment.—The most rational and the most successful means that can be employed consist of such as are calculated gently to excite and permanently to promote the organic functions. Of these, the most appropriate appear to be the various preparations of iron, bark, sulphate of quinine, camphor, ammonia, small doses of iodine, æther, &c. combined occasionally with opium, hyosciamus, extract of hops, conium, &c. when the disease is attended with colicky pains. Conjoined with these, the chalybeate mineral waters, stimulating frictions of the surface, light and digestible food, gentle exercise in the open air, particularly on horseback, and change of air, will be found of much service. During the employment of tonics, due attention should be paid to the state of the secretions and excretions; and, when the bowels are constipated, the more tonic and less irritating aperients be resorted to. Of these, perhaps, the best are rhubarb, and aloes, the aloes and myrrh pill, the compound iron pill, &c.

49. When the state of the system is attended with hysterical, convulsive, and other nervous affections, a combination of tonics and chalybeates, with antispasmodics, as the preparations of valerian, ammonia, zinc, myrrh, extract of hops, galbanum, æther, strychnine, and various others, is indicated. If we have reason to suspect that the anæmia is a consequence of obstruction or of torpor, combined with an enlargement of some organ or part concerned in the formation of blood, the preparations of iodine, the liquor potassæ alone or combined with tonics, the subcarbonate of soda, the boracic acid, and sub-borate of soda, are the best medicines with which I am acquainted.

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V. Morbid Effects of Loss of Blood.—50. This is a subject of greater practical importance than has generally been attached to it; and one which I have had numerous occasions to contemplate, particularly from the years 1816 to 1828,—an epoch during which blood-letting was either more generally adopted, or carried further, than the nature of several diseases, and the constitutions of many patients, warranted. The effects of large depletions have been well illustrated by the experiments of Dr. Seeds, which have shown, what indeed might have been anticipated from the physical condition of the circulation within the cranium, viz. that we can never hope by depletion alone to materially diminish the quantity of blood in the vessels of the brain. Dr. M. Hall, and the Author, have also shown that several morbid states may be occasioned by large losses of blood, or by too large a proportion of this fluid circulating in the head, relatively to the rest of the body, as a consequence of large blood-letting; and M. Piorry has illustrated the same subject by numerous experiments, and has offered many instructive and practical observations on it, particularly in relation to diagnosis.

51. The *morbid effects* of loss of blood may be advantageously considered in relation, *first*, to a person previously in health, or not affected by dangerous disease; and, *secondly*, to persons labouring under different diseases in which loss of blood may occur, either naturally or from injudicious practice. My observations on both these branches of the subject must necessarily be brief, more particularly on the latter, as the topic is not overlooked in the consideration of the treatment of those diseases in which such losses are most likely to be met with.

52. i. Morbid Effects of Loss of Blood in persons not previously affected with serious disease.—These effects will naturally vary with the suddenness or rapidity of the loss, the extent to which it has proceeded, and the habit of the person, especially as regards vascular plethora, at

the time when it occurred. It is evident that an evacuation which has been rapid will have a more marked and serious effect, than the same quantity removed at several times, or in a slower manner; and that, when blood is discharged at intervals, a much larger quantity may be lost without producing the morbid effects often resulting from the sudden loss of a smaller quantity; or, if they occur, they may be of a different kind from those which follow rapid discharges. The subjects, therefore, which chiefly require consideration are, 1st, The immediate effects of large loss of blood; 2d, The more remote consequences; and, 3d, The slow and insidious effects supervening on repeated losses, each occurring to a small or moderate extent.

53. *A. Of the immediate effects of large losses of blood.* — These are, vertigo, leipothymia or a sense of sinking, syncope; feeble and slow, or sometimes quick fluttering pulse; slow or apparently suspended respiration for short periods, interrupted by deep sighs; eructations from, and sometimes sickness of, stomach; a cold, pale, and bedewed countenance and general surface; irregular sighing and yawning, generally followed by a return of the pulse and of consciousness; and, if the hæmorrhage is not renewed upon the restoration of the circulation, recovery soon follows. Where, however, the loss of blood is greater, the above symptoms are more marked; the syncope is more profound; the respiration, which is carried on during this state entirely by the diaphragm, is nearly imperceptible, until it suddenly returns at intervals, with deep sighs: sickness and vomiting occurs, and restores consciousness for a time, but the patient again relapses into syncope, which is broken in a similar manner; and, if the loss of blood has ceased, a more permanent restoration follows the sighing and sickness, and recovery slowly takes place.

54. When, however, the loss is still greater either absolutely or relatively to the energies of the patient, or if it continue after the above effects supervene, the return of consciousness is often attended with some degree of delirium; a difficult stertorous breathing; dyspnœa; gaspings for breath; occasionally retchings, and discharge of the contents of the large bowels; an irregular, intermittent, feeble, or imperceptible pulse; loss of animal heat; great restlessness, violent shudderings, or general tremors, and jactitation, sometimes so violent as to shake the bed upon which the patient lies; a sense of sinking through the floor; convulsions, or tetanic spasms, and contractions; terrible gaspings for breath, and death.

55. Such is the common grouping of the morbid effects; but some of them are more marked than others. Thus, when the loss of blood is very large, the patient may suddenly and unexpectedly expire in one of the fits of syncope which occur, or he may sink more gradually, without any appearance of delirium or convulsion, sometimes with the faculties entire to the last. The former may occur after excessive blood-letting or hæmorrhage, when the patient has been incautiously raised up, or when he has not been instantly placed in the recumbent posture when syncope occurred: the latter has taken place unexpectedly when blood-letting has been carried too far, or too often repeated, in the recumbent posture.

56. *Convulsions* are often the most marked effect, either of excessive hæmorrhage or of large and repeated venæsection in the recumbent position; particularly if it be carried to leipothymia or syncope in this position, which ought always to be avoided. This symptom is very common after puerperal hæmorrhagy, or any large losses of blood occurring in females, particularly those of an epileptic or hysterical diathesis, and in children or young subjects.

57. *Delirium* is another prominent effect of excessive evacuation of the vascular system; but it usually presents something peculiar. The carotids are often neither full nor strong, the countenance is pale, and the head cool, — symptoms indicating, with the character of the delirium, impaired vital energy of the brain. In some cases the delirium is associated with convulsions, and both may ultimately be followed by coma or lethargy. Delirium more rarely occurs in children or young subjects from excessive loss of blood, than in adult or advanced age; but coma, as will be shown hereafter, is not infrequent in the former, particularly when the loss of blood has occasioned convulsions, which in them usually terminate in coma.

58. *B. Of the more remote effects of large loss of blood.* — When the patient is not carried off by the more immediate effects of excessive loss of blood, reaction generally supervenes, and often becomes excessive. It usually commences with palpitations, and throbbings through the body, but particularly in the carotids and arteries of the head, giving rise to the peculiar noises, of which patients so often complain after large depletions. The pulse now becomes quick, sharp, and soft; and there is sometimes distressing nervous pulsation of the aorta. In the more marked cases of reaction, the patient complains also of pain of the head; intolerance of light and of noise; a sense of tightness or pressure around the head; hurry of mind, and sometimes delirium, particularly in the night; restlessness, agitated sleep, often accompanied with a sense of sinking or impending dissolution, fearful dreams, &c. The arteries throb; and the pulse ranges from 110 to 140, is jerking, sharp, open, and bounding, but readily compressed. The respiration is hurried, panting, and frequent; often attended with sighing, a desire of fresh air, great restlessness, and in females for aromatic perfumes, or the smelling bottle. The mouth and throat are dry; there is much thirst; and the skin is usually hot, but the extremities, particularly the lower, are generally cold.

59. This state has not infrequently been mistaken for one requiring depletion; and I have met with cases in which the idea of inflammatory action had so taken possession of the mind of the practitioner, as to induce him to employ large or repeated depletion, which had been followed by this state of reaction, for which he was proceeding again to deplete, mistaking the morbid effects of the previous excessive loss of blood for a return of the inflammation. If this state of reaction be not judiciously managed, exhaustion rapidly supervenes; and almost as soon as it occurs death may take place, frequently upon some muscular effort, or upon getting up from the recumbent posture. In some cases, particularly in children and young subjects, the delirium or morbid sensibility of the brain, characterising the reaction,

passes rapidly into a state of lethargy and coma, which on numerous occasions I have seen mistaken for effusion of serum within the cranium, or hydrocephalus, particularly when it has been preceded by convulsions, as is often the case in children. In many such cases, either no effusion is found, or the effusion is to an extent insufficient to account for the comatose symptoms.

60. Under more favourable circumstances the reaction is gradually followed by returning health, or lapses into a state of chronic exhaustion or asthenia, which is variously characterised. In some cases it is attended by somnolency, alternating with slight delirium, &c.: in others, by fits of dyspnœa, palpitations, frequent cough; hurried, laborious breathing; a flatulent, tympanitic state of the abdomen: in several, by pale, emaciated, or discoloured countenance and skin; amaurosis, nervous tremors, or jactitation; delirium, or mania: and in puerperal females by a form of mania which requires to be carefully distinguished, and which is particularly noticed under the article on *Puerperal Mania*. In addition to these functional disorders following reaction after large losses of blood, organic changes may supervene; such as effusion of serum and extravasation of blood upon the brain, effusion into the bronchi and air-cells, dropsical effusions in various parts, and flatulent distension of the stomach and bowels. When recovery takes place, the pulse always continues small and frequent for a long time, owing to the remarkable diminution of the fluid in the vessels.

61. C. *Of the insidious effects produced by small but often repeated losses of blood.* — Loss of blood occurring in this manner produces effects different from those now described. They generally, as may be expected, advance slowly, and often exist either altogether, or a long time, without detection. They are extremely various, according to the age and constitution of the person. They most frequently occasion a pale, leucophlegmatic, and lax appearance of the countenance and surface; a very quick, weak, and irritable pulse; hurried, and oppressed respiration; frequent palpitations, and sense of sinking; borborygmi, and hysterical symptoms; flatulent distension of the colon, and colicky pains; swellings of the ankles, and dropsical effusions in other parts: in females, difficult and scanty menstruation, chlorosis, deviations of the spinal column, epileptic convulsions, pains in the loins, and various anomalous affections of a painful or spasmodic kind; tremors, and irregular action of muscles; chorea; paralysis; dyspeptic disorders, with irregularity of the bowels; a disposition to syncope; amaurosis; and all the symptoms of anæmia, which indeed is the primary or real state of disease produced, and constitutes the chief change detected upon examination after death; together with serous effusion in some situations, and a pale bloodless state of the viscera, and of the heart itself.

62. ii. OF EXCESSIVE LOSS OF BLOOD IN THE COURSE OF VARIOUS DISEASES. — There are two important considerations which should not be overlooked in practice; viz. that in many diseases, apparently attended with excitement, we shall meet with cases in which the actual quantity of blood in the body is much less than usual; and in various others, blood-letting will often not be borne, although seemingly indicated, and although the quantity of blood in the frame be not lessened. In illustration of the former of these, I may state that many years ago I had an opportunity of remarking minutely the appearances on dissection of a man of middle age, and somewhat fat, who had complained of an acute and painful disease, obviously functional, for which he had been blooded only twice on successive days, and on neither occasion to above thirty ounces; and yet the symptoms of excessive loss of blood appeared, from which he died in twenty-four hours after the second depletion. The most careful examination could detect no organic change; excepting the remarkably bloodless and pale state of all the viscera. Even the brain was less vascular than usual. That in various diseases, unattended by diminution of the circulating fluid, depletion will produce marked symptoms of depression and sinking, owing to the state of the vital power being insufficient to accommodate the vessels, by their tonic or vital contraction, to the reduced bulk of the blood, is well known, and has been fully discussed in the articles on *Adynamic Fevers*, *Erysipelas*, and *Puerperal Fevers*; in which, as well as in puerperal mania, and various other acute diseases, large vascular depletion is often most injurious.

63. *A. Of excessive loss of blood in diseases of excitement.* — The morbid effects of large depletions will necessarily vary with the nature of the disease in which they are employed. When carried too far, in cases of excitement, where the nervous or vital power is not depressed, and the blood itself rich or healthy, reaction generally follows each large depletion, and thus often exacerbates or brings back the disease for which it was employed, and which had been relieved by the primary effects of the evacuation. This is more remarkably the case in acute inflammations of internal viscera, particularly of the brain or its membranes. Thus, every observing practitioner must often have noticed, that a large depletion, when carried to deliquium, will have entirely removed the symptoms of acute inflammation when the patient has recovered consciousness; and that he expresses the utmost relief. But it generally happens that the inordinate depression — the very full syncope that is thought essential to the securing of advantage from the depletion — is followed by an equally excessive degree of vascular reaction, with which all the symptoms of inflammation return; and the general reaction is ascribed entirely, but erroneously, to the return of the inflammation, instead of the latter being imputed to the former, which has rekindled or exasperated it, when beginning to subside. The consequence is, that another very large depletion is again prescribed for its removal; and the patient, recollecting the relief it temporarily afforded him, readily consents. Blood is taken to full syncope — again relief is felt — again reaction returns — and again the local symptoms are reproduced: and thus, large depletion, full syncope, reaction, and the supervention on the original malady of some or all of the phenomena described above as the consequence of excessive loss of blood, are brought before the practitioner, and he is astonished at the obstinacy, course, and termination of the disease; which, under such circumstances, generally ends in dropsical effusion in the cavity in

which the affected organ is lodged; or in convulsions, or in delirium running into coma; or in death either from exhaustion or from one of the foregoing states; or, more fortunately, in partial subsidence of the original malady, and protracted convalescence. Such are the consequences which but too often result — which I have seen on numerous occasions to result, when blood-letting has been looked upon as the only or chief means of cure — the "*sheet anchor*" of treatment, as it too frequently has been called and considered during the last twenty years.

64. *B. Of the mode by which excessive loss of blood in disease may be best avoided.— Method of conducting blood-letting.* From the above it will appear obvious, that if blood-letting were better managed, and directed so as to make an impression on the local ailment, but in such a manner as to avoid being so readily followed by the reaction which reproduces the malady for which it was employed, great advantage in practice would result, and much less blood require to be removed even in the most acute cases. *a.* In order to accomplish this, I have long been in the habit, — and have inculcated it in my lectures on the practice of medicine, from 1824, — of directing the following mode of practice when large blood-lettings were required in the treatment of visceral inflammation: — The patient should be either in bed, or on a sofa, and in the sitting or semi-recumbent posture, supported by several pillows. The blood is to be abstracted in a good-sized stream, and the quantity should have some relation to the intensity and seat of the disease, and the habit of body and age of the patient, but chiefly to its effects; it should flow until a marked impression is made upon the pulse, and the countenance begins to change. Further depletion must not now be allowed; but the finger should be placed on the orifice of the vein, the pillows removed from behind the patient, the recumbent posture assumed, and the arm secured. Thus a large quantity of blood may be abstracted, when it is required, without producing full syncope, which should always be avoided; and when a large loss of this fluid is either unnecessary, or might be hurtful, the speedy effect produced upon the pulse and countenance by the abstraction of a small quantity will indicate the impropriety of carrying the practice further. In this manner I have often removed about forty ounces of blood, where large depletion was urgently required, before any effect was produced upon the pulse, but always carefully guarding against syncope; and by the subsequent means used to prevent reaction, no further depletion has been required.

65. *b.* In order, however, to obtain this object, a treatment varying with the nature of the disease is required. Repeated doses of tartarized antimony, either given in small quantities at very short intervals, or in large doses, combined with opium; full doses of calomel, antimony, and opium; of camphor, nitrate of potash, and colchicum; or of ipecacuanha, nitre, and opium, &c., particularly the first of these, exhibited so as to excite nausea, but guarding against retching as being liable to induce reaction; and the individual antiphlogistic remedies, appropriately directed, and combined according to the circumstances of the case, are the chief means which I have employed to prevent the return of increased action after blood-letting conducted as now stated. The particular measures which may follow blood-letting are fully explained in the articles on *Inflammation of the different Organs;* but I may now mention, that when opium is given with the view of preventing the recurrence of reaction, it ought to be exhibited in a large dose at once, (two or three grains,) either with a full dose of James's powder, or any other antimonial, or with two or three of ipecacuanha, conjoined with some one of the other substances above mentioned.

66. It should be kept in recollection, however, that reaction after large depletions is chiefly apt to occur in idiopathic inflammations, and other diseases of excitement, in which the constitutional or vital powers are neither remarkably lowered nor depraved; and when the circulating fluid is not vitiated by the retention of those substances in it which require to be eliminated, nor by the absorption of matters which are foreign to its nature, and injure its purity. Reaction is very apt to follow large losses of blood in acute rheumatism; in inflammations of the membranes of the brain, and, indeed, of all serous or fibro-serous membranes; and by its recurrence to reanimate the local action; so that a person may be blooded to that state which has been described as the extreme result of large loss of blood, (§ 54.) and yet, trusting to this practice alone, the local disease has either not yielded, or has passed into one or other of the unfavourable terminations it is liable to assume, particularly dropsical effusion. In the course of practice I have frequently seen persons who had experienced attacks either of pleuritis, pneumonia, peritonitis, enteritis, or of some other inflammation, and who had recovered with great difficulty, and after a long convalescence. Upon enquiry, I found that they had always been blooded largely, and to syncope, — some of them four, five, or even six times, but scarcely ever less frequently than thrice; and yet, upon a subsequent attack of inflammation in its most acute form, in the same or some other organ, a single depletion, practised as I have recommended above, and followed by the means most likely to prevent the return of reaction afterwards, to subdue the local action, to solicit the flow of blood to other parts, and to equalise its distribution over the body, has been sufficient; or, at most, a single repetition of the venæsection has been all that has been required.

67. *c.* When the chest is dull on percussion, the heart congested, the liver large, and the veins distended; or when the circulation is full and strong, the capillaries injected, the lips and mucous surface red, the muscles firm and large, or the respiration oppressed, blood-letting is generally required, and is well borne. It is also necessary even when the pulse is languid, the external venous circulation difficult, and the surfaces pale, if these symptoms be conjoined with those indicating internal congestion. (See CONGESTION.) On the other hand, persons with an open, soft, full pulse, florid countenance, lax muscles, &c., although they may bear moderate loss of blood, yet suffer more from large depletions than those of a pale, dry, thin, but muscular and rigid habit of body.

68. Under no circumstances ought a patient to

be blooded whilst his head is nearly on the same level with the trunk; and the utmost care should be taken in having recourse to venæsection in cases of dilatation of the cavities of the heart, particularly those of a passive nature. It is seldom necessary in such cases: and if circumstances should arise to require it, the blood should be taken, in the manner I have inculcated (§ 64.), from a small orifice and to a small extent. In the majority of cases, the state of the venous circulation, if duly examined, furnishes some information as to the quantity of blood in the system, and therefore sometimes becomes a valuable guide to blood-letting in some doubtful cases.

69. When the superficial veins are distended, of a deep or dark colour, and the blood flows quickly, and the veins fill rapidly on applying friction and pressure — indicating that their usual state of fulness does not depend upon interrupted circulation about the right side of the heart, or in any part of their course — we may infer that the system is sufficiently supplied with blood. But if the veins are small or pale, the body not being fat; if they swell slowly upon a ligature being applied above them; or are readily emptied by friction, and very slowly refilled; we must infer the existence of a feeble state of the circulation, and a deficient as well as poor state of the blood: and the inference will be further verified if we find this state associated with a pale sickly appearance of the countenance and integuments; a small, feeble, and quick pulse; and paleness of the lips, conjunctiva, tongue, and gums. (See § 43.)

70. C. *Of loss of blood in relation to diseases of depressed vital power, &c.*—There is a numerous class, or rather classes, of diseases, in which blood-letting, either in small quantity, or carried too far, is especially injurious. All those in which the circulating fluid is poorer and thinner, or less pure, than in health, particularly chronic and malignant diseases presenting more or less of the symptoms of anæmia, and disorders occurring in ill-fed and emaciated subjects; those in which the vital endowment of the blood-vessels, or their tonic contractibility, is partly lost, or manifestly reduced, as various forms of fever, puerperal and other diseases in which hurtful matters are apt to pass or to be absorbed into, or not to be eliminated from, the blood; all those in which the vital cohesion of the soft solids is diminished, and the fibrine of the blood is incapable of cohering in the manner necessary to form a tolerably firm coagulum, are injured by large bleedings, or even by depletion to any extent. In the first of these, it is obvious that blood cannot be spared: in the second, although its loss might not be felt in other respects, the vessels cannot accommodate themselves to the state of their contents when any considerable quantity is abstracted: and in the last, as well as in them all, the vital manifestations of the circulating system, and of the solids generally, of which cohesion is one, is so far injured, that the primary morbid condition from which they all proceed is increased by the operation; and, moreover, a greater disposition to the absorption of morbid matters is imparted to the absorbing function, when such matters are within the sphere of its operation, by the vascular depletion.

71. I may, in conclusion, remark, that all diseases essentially spasmodic, and consisting of irregular action of muscular parts, or of altered sensibility of nerves, or of morbid exaltation of their peculiar sensibilities, even when affecting internal organs, or the heart itself, and when no conclusive evidence of inflammation exists, will either be aggravated by loss of blood — in some cases even to a moderate extent — or be readily followed by the effects which have been described as consequent upon an excessive evacuation of this fluid. But I may further add, that, in many cases, where the above reasons for abstaining from large or repeated depletions, or from venæsection, strictly apply, local depletions, under due restrictions, may be resorted to with advantage.

72. iii. TREATMENT OF THE EFFECTS OF LARGE LOSS OF BLOOD. — This will necessarily vary with the particular effect produced, and the state of the patient and of the disease in which excessive loss of blood occurred. The more immediate effects of the loss are the *first* to claim attention; the other morbid conditions, which result from it more remotely, will be considered in succession.

73. *A. Treatment of the primary effects of loss blood.*—The more immediate effects (§ 53.) generally require the recumbent posture, free ventilation, and airy apartments; in the extreme cases, stimulants, sprinkling the face with volatile and fragrant fluids, and even the transfusion of blood. In the worst cases, and particularly when the loss of blood has occurred from the rectum or vagina, the head and shoulders should be placed lower than the pelvis; and care should be taken to ascertain whether or no internal hæmorrhage is going on, as far as this may be accomplished (see *Uterine Hæmorrhage*). In all cases of hæmorrhage, the involuntary discharge of urine and evacuation of the bowels ought to be considered most dangerous symptoms — even more so than the occurrence of convulsions — and the most decided measures should be instantly adopted. Where we have reason to suppose that transfusion will be required, it should not be delayed too long, as the risk from delay is infinitely greater than that from the operation performed by an expert surgeon, and with a proper apparatus. In cases where convulsions or delirium occur, or when these pass into coma or lethargy, it will be necessary to exhibit, internally, stimuli, as æther, spirits of ammonia, and camphor, with a little tincture of hyoscyamus; to sprinkle æther, or lavender water, or eau de Cologne, over the face and head; to apply a blister to the nape of the neck, or on the epigastrium; to support the animal heat in the trunk of the body and extremities; and to administer the lightest and blandest nourishment. Recovery from large loss of blood is usually quick, when the functions of digestion and assimilation have not been greatly injured by it; but when they remain imperfect, or remarkably disordered for some time afterwards, we may dread the formation of visceral disease, and should direct change of air, voyaging, and travelling, with the use of tonic and deobstruent mineral waters, and appropriate internal medicines.

74. *B. Treatment of reaction after large loss of blood.* — Careful reference ought to be had by the inexperienced practitioner to the symptoms indicating this state (§ 58.), so as to distinguish between them and the general excitement consequent upon internal inflammation. This state will require means modified according to the fea-

tures it assumes. But generally the morbid reaction existing in the head, and rendering all the senses remarkably acute, and the system susceptible of impressions, as well as the distressing palpitations of the heart, require the utmost quiet, and small doses of hyoscyamus, or extract of hops, with the preparations of ammonia, and mild nourishment. Where the throbbings or pains in the head are urgent, the surface of the head warm, or delirium exists, cold spirituous lotions, applied over the head, and full doses of hyoscyamus with ammonia, or moderate doses of the acetate or the muriate of morphia, with weak brandy and water, and warmth applied to the lower extremities, will be required.

75. C. *Treatment of consecutive exhaustion, or sinking.* — Here stimulants are required in larger doses; and should be administered by the mouth, in the form of enema, and externally. It is possible that transfusion would also be of service in this state of the system. If coma be present in this stage, large doses of camphor, æther, and ammonia are required, with the tepid effusion on the head; blisters, or mustard cataplasms to the nape of the neck, or epigastrium, or to the feet. In more chronic cases of exhaustion or sinking, gentle nourishment, in small quantities and often; warm tonics, combined with gentle aperients, in order to remove morbid secretions, and relieve flatulence; nutritious enemata, or injections of gruel or mutton broth; and small quantities of weak brandy and water; are the best means that can be adopted.

76. D. *Treatment of certain effects of depletion in relation to disease.* — *a.* Large loss of blood during diseases of excitement (§ 63.) requires a treatment but little modified from that already recommended. When it has occurred during inflammations, a certain degree of irritative action may still continue, notwithstanding the excessive loss of blood, occasioning dropsical effusion into shut cavities; and, when the disease is seated in the lungs, effusions in the bronchi or air-cells, which the powers of life are insufficient to throw off, or to expel. In such cases external derivatives, and a combination of gentle stimuli, with diuretics, anodynes, and diaphoretics, in order to equalise the circulation, and to lower the irritative action in the part affected, often prove of service. When the primary disease is seated in the head, the tepid or cold affusion, cold lotions to the head; external revulsants applied to the nape of the neck, or to the lower extremities; anodynes, camphor, with hyoscyamus, or with acetate of morphine; and the promotion of the alvine and cutaneous secretions and excretions; constitute the principal measures, together with those already enumerated (§74, 75.).

77. *b.* Loss of blood occurring during diseases of vital depression (§ 70.) requires the most energetic means. The objects very generally are to restore, as far as may be, the vital endowment — the tonic contractility, of the vascular system, and to enable it to act with sufficient energy on the fluid circulating through it; to increase the vital cohesion of the soft solids; and to excite the secreting organs to remove the hurtful ingredients that may have passed into, or accumulated in, the remaining fluid, and which tend to vitiate the whole of the structures, and to sink still lower the already depressed powers of life. These ends can be attained only by exhibiting, in frequent doses, the various tonics and stimuli; particularly those which tend to arrest or to counteract the morbid changes going on in the frame, and to rally the powers of life. Of this kind are the preparations of bark, or quinine, combined with camphor, the æthers, particularly muriatic æther, the preparations of serpentaria, spirits of turpentine, wine, opium, and various remedies of the same description, combined according to circumstances, and generally exhibited in small or moderate doses frequently repeated. External stimuli, rubefacient cataplasms and liniments, stimulating and tonic enemata, injections of mulled port wine, with opium and camphor, are often of great benefit. When the secretions require to be carried off, rhubarb and other tonic aperients may be employed. When the disease is attended with *coma*, blisters or sinapisms to the nape of the neck, epigastrium, or the feet, may be employed; and either of the following formula, in the *Appendix*, exhibited (see F. 423. 496. 845. 906.). If low muttering *delirium* be present, the same treatment as is recommended for this state in typhoid fevers is required.

Bibliog. and Refer. — *Moutrin*, Des Effets des Differentes Espèces d'Evacuations Sanguines, &c. Lyons, 1810. — *Seeds*, in Lond. Medical Gazette, vol. v. p. 433. — *M. Hall*, On the Effects of Loss of Blood, in Trans. of Med. and Chirurg. Society, vol. xiii. p. 121.; and Researches relative to the Morbid and Curative Effects of Loss of Blood. 8vo. Lond. 1830. — *The Author*, in London Medical Repository, vol. xx. p. 15. — *Piorry*, Mémoires sur la Circulation, &c. Paris, 1831.

VI. Alterations of the Blood in Disease.

78. It will be necessary to the accurate estimation of the causes and results of the various changes of the blood in disease, briefly to consider the relation in which the different functions of the body stand to the blood. These functions are of the following kinds: viz. of *sanguifaction*, *nutrition*, *depuration*, and *secretion*; one organ performing, or contributing to two, or even three, of these offices. We know that digestion, absorption, arterial circulation, and respiration, are necessary to the formation of the blood, and to the nourishment of the tissues: we also know that absorption, nutrition, secretion, and venous circulation, are concerned in rendering the blood impure, by conveying hurtful ingredients into it, or allowing others to accumulate in it, or by destroying the relative proportion of its constituents; and that various organs, particularly those of secretion and respiration, are actively concerned in eliminating such matters as become injurious by excess, or pass into the circulation from the various sources of impurity which surround it. Hence it must be evident, that changes in the solids, and particularly in those viscera which are concerned in the supply and waste of the blood, as well as in its depuration, must be followed by changes in the state of this fluid; unless when one or two organs merely have their functions interrupted, and others performing analogous actions to these disorders assume a vicarious office. It must be evident, therefore, from this, that the doctrines of solidism and humorism are, to a certain extent, both correct; that, although disorder may originate in either, it cannot be long limited to one or the other, but must extend more or less to both, according to the nature of the causes, and the organs or parts where their impression is made. We observe in the course of practice, that certain morbid or poisonous ingesta make but little im-

pression on the system, until it is absorbed into the circulation, and by its presence there disorders various organs or parts; whilst other substances make an immediate impression on the nervous system, and, through its medium, impedes the functions of secretion and depuration, and thus the blood itself is rendered impure, and the source whence all the frame is more or less vitiated. Various FEVERS furnish most satisfactory illustrations of this position.

79. Having already considered changes in the quantity of the blood, alterations in its qualities are next to be viewed. The facts which have been observed, connected with this subject, are few and deficient in precision; and the majority of those who have directed their attention to it, have merely described chemical conditions and combinations presented by this fluid after it had been for some time removed from the body, and had lost whatever vital endowment it may have received from the vessels and tissues in which it circulated, or had undergone important changes incidental to this state; instead of describing at the same time such vital manifestations as it may have presented upon its removal, and the relation of its chemical states to the pathological conditions of the body.

80. As we have seen that organisation commences in the chyle, and that this fluid is the chief source whence the blood itself is formed, the importance of studying the alterations of the blood, in connection with the state of this fluid, is evident; but the difficulty of the investigation generally precludes many from engaging in it. At the same time it must be admitted, that very important changes may take place, not only in the blood, but also in the fluids which supply it, and are secreted from it, without being made manifest to our senses upon the most careful examination. I shall now, *first*, furnish proofs of important changes in the constituents and state of the blood in various diseases; and next consider the causes of such changes, and the results to which they usually lead.

81. i. PROOFS OF CHANGE. — *A. In the proportion of the chief constituents of the blood. a.* The quantity of *albumen* varies considerably in disease. It is not sensibly diminished by large or repeated blood-letting, unless the quantity of blood, in relation to the bulk of the body, be much diminished. In many inflammatory diseases, and in a large proportion of cases of active dropsy, the relative proportion of albumen is often very much increased. This has been shown by BLACKALL, TRAIL, GENDRIN, BRIGHT, and several authors. I have always found it remarkably increased in most of the exanthemata, particularly before the eruption has come out. GENDRIN shows that, in inflammatory diseases, the serum of the blood often contains twice as much albumen as in the healthy state. When this is the case, the blood feels remarkably viscid to the touch. In diseases of debility, and when the blood is apparently deficient in quantity, and poor in quality, the albumen is generally very much diminished, being sometimes less than half its usual proportion. M. GENDRIN and M. ANDRAL think that it may also be altered in its nature as well as quantity; and I believe, from appearances which I have observed in the advanced stages of several diseases, that their opinion is correct. In these cases, the albumen seems either precipitated to the bottom of the serum, or suspended in it like a cloud, giving it a turbid opacity.

82. *b.* The proportion of the *watery part* of the blood has been shown to vary in health; but it varies still more in disease, and even in different stages of the same malady. This change is not, however, limited to one, or even a few, of the constituents of this fluid; but sometimes is extended to the most of them. Blood-letting, in acute diseases, diminishes the proportion of coagulum; and, if diluents be supplied, increases greatly the proportion of serum, without lessening the quantity of albumen, unless the depletion be carried very far. In several chronic diseases of debility, in the stages of excitement and exhaustion in fevers, and in the last period or decline of the acute exanthemata, the proportion of serum is very considerable, owing to the interruption of the secreting functions; but in acute inflammations, and the early stages of some of the exanthemata, the blood is of a deep colour, and rich in cruor, with an increased proportion of albumen and of fibrine. In the advanced stages of disease, attended with fluid evacuations, the watery part of the blood is diminished. This is remarkably the case in the pestilential cholera, dysentery, and in some forms of dropsy.

83. *c.* The *colouring matter* of the blood evidently undergoes some alteration during febrile and malignant diseases. It has recently been supposed that such change has an intimate connection with the proportion of the saline constituents of this fluid, — a diminution of these rendering the colouring matter dark coloured, whilst an increase of them has an opposite effect; and certainly various facts seem to confirm the opinion. But this alteration is one merely in relation to colour, which is unquestionably rendered much more deep or black in the last stages of the diseases now alluded to. But besides alteration of colour, there are others which may be termed *dynamic*, inasmuch as they relate to the vital endowment of the globules, or, if not of the globules, of the fluid generally. In the diseases referred to, and after the operation of virulent poisons, the condition of the colouring matter is remarkably changed: it separates readily, and almost before dissolution, from the central corpuscles which it surrounds; and, passing through the exhalent vessels of mucous surfaces, with the serous or watery part of the blood, gives rise to the sanious cruor, and the dissolved blood, which we sometimes observe issuing from these parts shortly before or after death; and probably to the black vomit in yellow fever. In cases of infection by animal poisons or morbid secretions, this separation of the colouring matter, and solution in the serum, take place very early, indeed almost immediately after death; and it is evidently owing to this change in the blood, that the interior surface of the blood-vessels becomes so deeply coloured, without any other appearance of inflammation. Indeed, the evidence adduced by M. TROUSSEAU fully proves this to be the case. (*Archives Gén. de Méd.* t. xiv. p. 321.) This further accounts for the coloration of the interior of arteries in fatal cases of adynamic or malignant fevers, — an appearance first particularly noticed by J. P. FRANK, and subsequently by many others, and by some incorrectly ascribed to inflammation.

84. *d.* The *fibrine* varies greatly in its quantity, and as to the states in which it presents itself in the blood removed from the body. Its condition will be somewhat modified by the manner in which blood-letting is performed; but generally it soon separates from the serum, and, with the red particles, forms the crassamentum or clot, which will vary in its appearances with the degree of nervous energy exerted by the organic nerves on the vascular system, and the quantity of fibrine. α. *First*, the fibrine and red globules may be in much greater proportion relatively to the water and albumen, and still the crassamentum formed therefrom will be very different, according to the state of vascular action and nervous energy at the time when the blood was abstracted. If the vascular action be increased, or in a healthy state, and the vital energy unexhausted, the fibrine will contract into a firm and large coagulum. If the fibrine retain its relatively large proportion, and vascular action be exhausted, it will contract so imperfectly or loosely, as to enclose a large portion of the serum, and to leave but little of this fluid surrounding it. In the former case the coagulum possesses much density: in the latter, extremely little; indeed, sometimes not sufficient to separate it sensibly from the serum. In such cases the blood is *rich*, although otherwise very different in appearance, owing to the state of action and vital power.

85. β. In the *second* place, the fibrine may be in small quantity, and yet present a state of firm attraction, forming a small coagulum in the midst of a larger proportion of serum than is usual in health. Or the proportion being still small, the cohesion of the fibrine may be so weak as to form a tolerably large coagulum; whilst, in other cases, it will scarcely separate from the serum, owing either to its diminution, or the weak attraction of its corpuscles. I have met with it in several cases so nearly wanting, and so deficient in attraction in other instances, as not to form any coagulum; the red particles having been, as it were, precipitated to the bottom of the vessel in a dark or blackish sediment, without any cohesion in the form of clot. From this it will be inferred, that the quantity of fibrine cannot be reckoned from the apparent size of the coagulum merely, but from the size in connection with density or degree of cohesion. When the blood is deficient in red globules, and fibrine, it has usually received the appellation of *poor* blood; the degree of cohesion existing between the particles of fibrine in it, as well as in rich blood, being the general index of the degree of nervous power. But there are apparent exceptions to the indications it presents. Thus, in acute rheumatism, after repeated depletions, injudiciously resorted to, — injudiciously, because a frequently injurious, and seldom a beneficial practice — and during the reaction consequent upon repeated blood-letting, the fibrine, although much reduced in quantity, will often still continue to adhere firmly, or even to form, in some cases, a buffy coat, and yet the powers of life are reduced very far beyond what the state of the fibrine would seem to indicate. In these cases, the cohesion of the coagulum, and the formation of the buff, are, as well as in many other circumstances of disease, principally the result of vascular reaction, occasioned by morbid excitement of the nervous influence; and as long as these states exist, this condition of the coagulum will occur, although depletion be carried to the utmost extent.

86. γ. Whilst the blood is still circulating in the body, particularly in the last stages of various chronic diseases, the repulsion existing between its existing globules may be so far destroyed as to admit of the fibrinous corpuscles adhering to each other, in some part of the vascular system, or even in one of the cavities of the heart. The fibrinous concretions thus formed are attributable, 1st, To retarded or obstructed circulation of the blood in the part. Van Swieten and Haller state that flocculent and fibrinous coagula have formed in the blood of the pulmonary artery during syncope and the cold stage of agues; and they, as well as numerous later observers, have found these productions after exposure to extreme cold, and when death has been preceded by a very languid, obstructed, and irregular state of the circulation. 2d, To effusions of a small portion of coagulable lymph from the inside of a part of the vascular lining, during a state of inflammatory irritation; which lymph may have become the nucleus around which the fibrinous particles may have collected, or the bond of cohesion between them in the first instance: and, 3d, Particularly as respects those fibrinous concretions, in the centres of which purulent or tubercular matter has been found, as in the instances adduced by MM. Legroux, Maréchal, and subsequently by others, to the absorption of these matters, or to their passage into the blood from the internal coats of the vessels on which they may have been formed; and from becoming nuclei around which the fibrine has concreted. In some instances, in which these fibrinous masses have been found, little or no connection with the surrounding vessels can be traced. M. Andral supposes that these concretions are possessed of a separate vitality, and that the matter detected in their centres is a product of vessels previously formed in them. This opinion, however, cannot be supported, inasmuch as the matters formed in their centres have no relation to, nor have they been found often surrounded by, blood-vessels; and, when vessels have been detected, the firm attachment of the concretions to the inner surface of the vessels attests the manner of their formation to be identical with that of other productions of a similar kind.

87. δ. But the attraction between the particles of fibrine, which is usually observed when the blood is removed from the sphere of vital endowment, in which it participates, instead of being exerted, as now stated, within some part of the vascular system, may be entirely lost, or be very irregular or imperfect. In such cases, the blood either remains altogether fluid; or its fibrine, and some part of its albumen, form grumous particles, or minute fragments, which are either suspended in the serum or mechanically mixed with it, forming a sanious cruor in the vessels. This latter state is observed sometimes locally, and often generally, immediately after death; as in the veins of the spleen, liver, of the extremities, &c. A thick, dark, and treacle-like state of the venous blood, and a venous appearance of the arterial blood, are not infrequent during life; particularly in pestilential cholera, in asphyxia, hydrophobia, &c.

88. ε. The *buffy coat* observed to form the upper part and surface of the coagulum, most frequently, in cases of inflammation, consists of fibrine,

according to **Deyeux** and **Parmentier**; of fibrine, and especially concrete albumen, in the opinion of **Fourcroy**, **Vauquelin**, and **Thenard**; of fibrine and gelatin, according to **Orfila**; of fibrine, containing serum between its fibres, and albumen, or very albuminous serum, according to **Dowler** and **Gendrin**. **Berzelius** considers that it may contain all the elements of the coagulum. It manifestly is produced by the concretion of the fibrine, which, parting from the colouring matter, forms a whitish yellow, or slightly greenish layer, varying in thickness from a line to one or two inches; and giving rise to the *cupped* appearance of the clot, by the firmness of attraction between its particles. The formation of the buff may be somewhat favoured by the size of the orifice from which the blood has been drawn, the rapidity with which it has flowed, and the form of the vessel in which it has been received; but the buff itself entirely depends upon the state of the fibrine, which, in conjunction with a portion of serum and much albumen, not only chiefly constitutes it, but modifies it in the manner already noticed, according to the state of vital influence and vascular action. (See § 84. and art. **Inflammation**.)

89. *e.* Respecting changes in the *saline constituents* of the blood, we are provided with but little information, and that by no means of a precise character. So much difference has existed amongst chemists respecting the actual saline ingredients of healthy blood, and their state of combination in this fluid, that a standard has not been furnished for comparative observation. According to Dr. **Stevens**, they are very sensibly diminished in the blood of patients affected by the fevers of warm climates; and Dr. **O'Shaughnessy** has shown that the blood of those suffering from pestilential cholera contains much less saline constituents than in health.

90. *f.* The *electrical condition* of the blood may also be changed by disease. **Bellingeri** states the electricity of venous blood to be equivalent to that of antimony; that it is an imperfect conductor of this agent; and that its electricity is diminished in inflammatory diseases. According to **Rossi**, the blood presents, in severe fevers, modifications of its electrical states. That electricity, when acting energetically on the frame, affects the blood (probably through the medium of the nerves supplying its vessels) in a most intense manner, is shown by the dissolution and decomposition of this fluid after death from this agent. The evident effect of light upon the blood, in rendering it both more abundant and rich, may be attributed to the electrical states of the solar rays.

91. *g.* The *temperature* of the blood has been observed to vary, during the course of disease, from 86° to 104°. It has been observed as low as the former grade in pestilential cholera, and the cold stage of ague; and as high as the latter in the stage of excitement in fevers, and visceral inflammations. Its temperature is evidently owing to the degree of nervous power in connection with vascular action.

92. *B. Changes in the intimate nature of the blood, for which mere difference in the proportion of its constituents cannot account; and which are referrible to the state of vital power.*—Important changes of the blood, which are evidently not referrible merely to alteration of the healthy proportion of its constituents, although such alteration may be considered as often co-existing with those other inappreciable modifications upon which its morbid effects chiefly depend, occur in the course of various diseases; and, when once induced, occasion not only violent or fatal effects as respects the individual subject of them, but also similar changes in healthy persons inoculated with this diseased blood. Dr. **Home** communicated measles by means of blood taken from persons affected by them. **Duhamel** records a case of a butcher, who, having put in his mouth the knife with which an over-driven ox had been slaughtered, had his tongue and throat swollen a few hours afterwards, and an eruption of blackish pustules over his body. He died in four days. Another person, having wounded himself in the hand with a bone of the same ox, was seized with inflammation of the arm, followed by mortification and death. Two females experienced also gangrenous inflammation from a few drops of the blood of the same animal having fallen upon the hand of one, and on the cheek of the other. Inoculation with, or even the simple contact of, the blood of diseased animals, may produce in men the malignant pustule. Of this numerous proofs have been furnished. MM. **Dupuy** and **Leuret** introduced into the cellular tissue and veins of a sound horse, blood taken from a horse affected with malignant carbuncle (pustule maligne), and thus produced the disease. The serious effects also observed to follow wounds in dissection, either of recently dead bodies, or of those in which decomposition has commenced; the changes which take place in the blood, either primarily or secondarily, in various maladies; the septic influence of certain animal secretions and poisons on the tissues to which they are applied, on the blood, and on the frame generally; are among the most important phenomena of disease. I shall, therefore, proceed to a more minute examination of this department of pathology than it has recently received. That these changes are of a most important nature; that they may arise from various causes, or from spontaneous alterations taking place in the blood while circulating in the vessels of the animal, even whilst those changes are so slight as to escape detection by our senses; and that the blood, when thus changed, will be the cause of disease presenting a malignant character, when applied to or inserted into the tissues of healthy animals, are facts which the preceding, as well as other evidence about to be adduced, fully demonstrate. The chief of these changes, to which I attach the utmost importance, having observed them to exist more or less in a large proportion of cases where blood has been removed, or escaped from a vessel, in malignant or adynamic diseases, or in the last stages of very acute and dangerous maladies, are the following: —

93. *a.* The blood has generally a somewhat salt *taste* in health, evidently depending chiefly upon the quantity of muriate of soda contained in it. In various maladies, particularly those which are malignant, and in the advanced stages of fevers, this taste is not so remarkable, particularly when the blood assumes a darker hue than natural. *b.* The peculiar *odour* of this fluid upon emission from a vein is also very remarkably changed in these maladies. **Haller** has adduced numerous instances of this in his great

work; and various authors — and amongst these, Van Swieten, Hoffmann, Schwencke, Huxham, Linings, &c. — have noticed a remarkable fœtor of the blood in adynamic fevers and pestilential maladies. I have observed a peculiar odour of the blood in cases of malignant puerperal fever. We are informed by Louis de Castro, that the blood of two plague patients infected the air of their apartment with a fœtid odour; and Zacutus mentions, that three persons were struck dead by the odour exhaled from the blood drawn from the vein of a person infected with plague. Muralt also states that a cadaverous fœtor emanates from the blood of persons affected with this malady; and Baglivi mentions that a nearly similar phenomenon was observed in the blood of patients in the advanced stages of a very fatal epidemic fever. Haller prognosticated a fatal issue, chiefly from this symptom, in a case to which he refers. Zurinus, Alprunner, and Vater, allude to cases where physicians were dangerously infected by the fœtor of the blood, upon its abstraction from the veins of persons in malignant and contagious diseases. Boisseau states, that he has been very disagreeably affected by the odour of the blood just abstracted from the veins of persons attacked by severe disease of the chest or abdomen. Pringle relates, that an individual was seized with dysentery, after inhaling the odour from the blood of a dysenteric patient, kept for a long time. The blood taken from a vein in the arm of a woman in a malignant fever, was, according to Morton, so offensive, that the surgeon and assistants fainted in consequence. It may be therefore inferred that both the odour and the taste of the human blood may be very sensibly changed in the advanced progress of various adynamic, infectious, and malignant maladies.

94. *c.* Softness or firmness of the *coagulum* has been already noticed, in connection with the condition of the fibrine; and stated to be often independent of the quantity of this constituent, and to be chiefly owing to the degree of nervous influence and vascular action. In the class of diseases now alluded to, the coagulum is not only remarkably soft, but, from the want of adhesion, and from the solubility of the colouring matter in the serum, is sometimes readily converted into a reddish fluid by slight agitation with it. In other cases no coagulum forms, the fibrine being suspended in small albuminous-like fragments in the serum, and the colouring matter precipitated to the bottom of the vessel. In several instances, these constituents are not separated from the serum, but seem combined with it; the whole mass remaining more or less fluid, and presenting a reddish, reddish black, or blackish colour, from the time of its emission till it furnishes evidence of decomposition. I have met, in other cases, with the blood changed into two parts: the upper and serous part consisting of a remarkably soft gelatinous mass, sometimes almost fluid, resembling very weak or uncoagulated calves-foot jelly, and forming from two thirds to four fifths of the whole; the colouring matter being spread over the bottom of the vessel, and presenting a dirty, black, and muddy appearance. I have also observed, and very lately, in two cases to which I had been called by neighbouring practitioners, the colouring part of the blood, with a portion of the fibrine and albumen, deposited on the bottom of the vessel, of a colour between a deep brown and dirty dark grey, the serum being very abundant and turbid.

95. *d.* Appearances analogous to the above are also observed whilst the blood is in the veins of the dead body. In many cases, it is either fluid or semifluid, treacly, and of a dark colour. In others it is apparently decomposed and grumous; and in some, either consisting of perfectly fluid blood, or resembling water coloured with a reddish brown matter. In some cases, where the blood has been partially coagulated or separated into a grumous state, the more fluid parts, generally in the form of a bloody or sanious serum, have percolated the tissues, and escaped through the relaxed exhaling pores and extremities, and passed into the shut cavities; but more frequently flowed out on the mucous surfaces, leaving the more consistent parts of the blood in the vessels in larger proportion than in health. In all these cases, the blood, whether that drawn from the veins, or found in them after death, seems not so deficient of fibrine, as that its state is changed owing to exhaustion or annihilation of vitality, by virtue of the possession of which (derived from the influence of the organic nerves on the blood-vessels and internal viscera) its fibrinous corpuscles are aggregated into a coagulum when removed from the veins.

96. ii. Further Proofs of Change in the Blood, and its relation to particular kinds of disease. — *A. The existence of a buff on blood* drawn from a vein has always been regarded by practitioners, as a sign, not only of disease, but also of inflammation. Gendrin (following the path of his predecessors) asserts, that the blood is in a *very inflammatory* state, when it coagulates quickly; is covered by a thick, concave, dense, elastic, buff, of a yellowish white; and separates into a truncated, ovoid, dense, elastic clot, floating in a serum, which bears a proportion to it of one and a half or two to one; is slimy, colourless, slightly turbid at the bottom of the vessel, and without any trace of colouring matter. The clot more rarely is of the shape of a truncated cone; is very dense at its surface, pretty soft at its base; does not float; and is more voluminous than the serum, which is of a pale yellow: in this case the blood is *more than very inflammatory*.

97. He observes that the blood is *inflammatory*, when the buff is thick, diaphanous, of a dull white, and covers a rather dense cylindrical clot, beneath which is the serum, yellowish, and equal at most to twice the volume of the clot, a slight colouring deposit being found at the bottom of the vessel. If there be any buff when the blood is *sub-inflammatory*, the clot does not float, but is suspended in the middle of the liquid, or is precipitated, and is less dense than in inflammatory blood; the serum is slightly tinted with red at the bottom of the vessel, where a layer of colouring matter may be seen. But usually there is no buff; the clot is dense, ovoid, floating, and presenting a red stratum on its surface; the serum is viscous, limpid, somewhat turbid at the bottom of the vessel, where no colouring matter can be observed. The blood in this state coagulates quickly, and yields serum of at least twice the volume of the clot. When the proportion of serum is less than twice that of the clot, and the latter is soft, cylindrical, voluminous, although

floating, the blood is *scarcely sub-inflammatory;* it is so in a slight degree, when the clot is dense, ovoid, and pendent in the middle of the vessel; when, of those two last mentioned coagula, the first occupies the middle, and the second the bottom of the vessel, the blood is *more inflammatory.*

98. This description is tolerably accurate, particularly as respects *inflammations of serous membranes, pneumonia,* and other *visceral inflammations,* when the circulation is free and the pulse not oppressed. But every one must have observed, that there may be very acute inflammation, and yet the blood is not buffed, particularly in children; and, on the other hand, that this appearance often exists to a greater or less extent in *plethoric persons,* in pregnant and *puerperal females,* in those who resort frequently to blood-letting, and *in rheumatism,* even in its least inflammatory forms. M. Gendrin also errs as respects the rapidity with which inflamed blood coagulates. When the powers of life are unimpaired, and the circulation quick, and particularly during acute and general vascular reaction and vital or nervous excitement, coagulation is either longer in taking place, or, if it commences soon, it is much later in being completed than in other cases; but much will depend upon the stream of blood. If this be full, quick, and large, and the temperature of the apartment high, coagulation is delayed, and the buff more readily appears. If the stream be small, slow, and the temperature low, coagulation is rapid, and no buff is formed.

99. In some cases of *intense inflammation,* no buff appears, the blood coagulates slowly, the clot is less dense, and less serum is formed than in health; but the coagulum is very distinct from the serum, into which it does not at all dissolve. This, although another condition of the blood in a state of inflammation, is observed also in cases where the inflammation is not excessive, as every practitioner must have had numerous opportunities of ascertaining. Two superimposed layers of buff are sometimes seen — the one soft or friable, the inferior more dense, more compact, — but not (as is asserted) only when suppuration has taken place in an inflamed organ; still less must we receive as a sign of suppuration the dusky white or opacity of this buff, and the presence of a mucous stratum at the bottom of the serum. In short, it does not always happen that the buff shows itself on the blood in chronic phlegmasia, until the subject has become enfeebled, and the nutrition deteriorated. A repetition of bleeding, and a tendency to syncope, causes either a diminution, or the entire disappearance, of the buff. According to Plenciz, when the blood is not buffed in inflammations, the coagulum is always more firm than natural, — an observation which is tolerably correct in respect of the state of vital power, but not as regards the presence of inflammation. It should not be overlooked, that in many cases of very acute inflammation, particularly in its early stage, the nervous power may be so oppressed, and general vascular action consequently so imperfectly developed, that the coagulum will neither be firm nor exhibit any buff on the first and second blood-lettings; and yet, when this oppression has been removed, a firm and sizy coagulum will be formed by the blood subsequently drawn. This is particularly the case when the respiratory function has been oppressed at the commencement of the attack.

100. Out of four and twenty cases of *peripneumonia* terminating fatally, Louis found the blood of nineteen of these patients covered by a buff, which was firm and thick at each bleeding in fourteen cases; soft, and sometimes infiltrated, in the others. It was cupped only in two fifths of the whole number of patients. The buff was absent in only six cases out of fifty-seven, which recovered. It was very thick, and cupped, in twenty-three of them. The blood was covered by only a slight buff in three cases out of five of *hydrocephalus,* softening of the brain, or *apoplexy;* and in another instance of softening of the brain, the blood remained semi-liquid, without clot or buff.

101. In four cases of *scarlatina, small pox,* and *measles,* which terminated favourably, the blood was covered by a thin and not very consistent buff; in one case of scarlatina it was firm and thick: of the same character in five cases out of seven of *erysipelas* of the face, and in four cases of *angina,* while in a fifth it was soft; in nine tenths of rheumatic patients it was equally firm and thick; in two subjects affected by *zona* it was not present. It was somewhat thick in four cases of *erythema,* where the circulation was considerably accelerated; thin, in four out of fifteen cases of *pulmonary catarrh.* According to Gendrin, the buff never appears on the blood of variolous patients until after the eruptive fever begins; it is more strongly marked when the inflammation is more intense, and lasts even after desiccation has taken place. When buff appears at the very first, Baglivi is of opinion that the eruption will be considerable.

102. *B. Other states of the blood in various diseases.* — M. Boisseau states, that he has seen the venous blood of a lively red — now and then of a *clear rosy red* — and spouting in a transparent thread, in patients afflicted with inflammation of the lungs, and sometimes in those with inflamed joints. Among those with peripneumonia, but who were otherwise of sound constitution, he has noticed it covered by a *greenish buff;* yet the greater part of these patients recovered after repeated bleedings. In a very fine young girl, who had enjoyed good health, but was attacked by pain in the side in consequence of a chill, the blood was of a *dirty grey,* approaching to violet, and like lees of wine: after this bleeding she suffered no more, although her skin continued yellow for some months. M. Boisseau has also seen blood like *turbid wine* in several cases of pulmonary inflammation, which were nevertheless cured, the patient suffering little more in consequence of the unusual appearance in the blood.

103. In fact, the *hæmorrhagic blood,* as also that taken from the veins of subjects attacked by *inflammation,* is not always consistent and buffed; it is sometimes found dissolved, thin, and serous. The latter appearance is, indeed, less common than the former; but sufficiently so to teach us not to attach too much importance to the aspect of the blood in inflammations, and also not to forget that, whatever may be its condition, phlegmasia will develope itself when the causes from which it springs are sufficiently powerful.

104. A *whitish appearance* of the venous blood has been long observed, arising from the presence of white flakes or streaks. This has been ascrib-

to various causes; but with greatest truth to the existence in it of a large portion of unassimilated chyle. The separation of the blood into a soft or natural coagulum, and a milky serum, is much more common. This, as well as the foregoing state of the blood, has been imputed to various causes. Emmert considered that it was owing to a substance analogous to buff. Some have ascribed it to milk; others to albumen; a few pathologists view it as owing to a matter analogous to fibrine; and several, as proceeding from the admixture of liquid fat. Haller imputed it to liquid chyle. Of these opinions, the two last are the most accurate. There can be no doubt that both the milkiness of the serum, and the whitish streaks observed in venous blood, are owing in a great measure to unassimilated chyle; and the more accurate researches of modern chemists, particu- Christison, Babington, Le Canu, &c. have detected in this kind of blood an unusual proportion of oily matter. This state of the serum is occasionally met with in various diseases, functional as well as organic; and seems connected with deficient assimilating power. Sydenham states, that he observed the blood drawn from a young convalescent to resemble pus, — an appearance probably owing to the great quantity of chyle carried during convalescence into the blood, which had been poor and defective, and to the circumstance of this fluid not having then experienced the process of sanguifaction. Nicolas and Gueudeville have noted, that the blood of *diabetic* patients contains an increase of serum, and very little fibrine: this serum contains, according to Rollo, a saccharine matter; about the thirtieth part of what is found in urine, according to Wollaston.

105. During the prevalence of *scurvy* in Admiral Anson's fleet, the blood taken from the veins, after the eruption had appeared, was marked with dark or with vermilion streaks; on first issuing from the veins it was dissolved and very black, but after standing some time it thickened, and assumed a dark colour; no regular separation of its serum took place, and its surface was greenish in several places. When the disease had arrived at its third stage, the blood was as black as ink; and although it was kept several hours in a vessel, its fibrous part precisely resembled wool or hairs floating in a muddy substance. The blood issuing from the mouth, nose, stomach, intestines, or any other part, in the last stage of this malady, was entirely decomposed, black, or yellowish. It was found after death entirely dissolved in the veins, so that by cutting some branch of a rather large vein, it was possible to empty all the neighbouring branches with which it communicated of the yellowish black fluid they contained. The extravasated blood was of the same nature. In a scorbutic patient, opened by order of Cartier, the cavities of the heart were stated to have been entirely filled with corrupted blood.

106. In four cases of scurvy, Rouppe has found the right cavities of the heart filled with black and coagulated blood; and a greenish yellow polypus-like matter filling the left cavities of this organ, the aorta, and the pulmonary artery and vein. Amongst the scorbutic subjects opened at Paris in 1699, by Poupart, it was found that in those who had died suddenly, the auricles of the heart were dilated by coagulated blood, the muscles loaded with black and corrupt blood, and the cellular sub-cutaneous tissue infiltrated by extravasated, black, coagulated, and congealed blood, in some cases, and by red blood in others.

107. Bichat found in a dead body, instead of venous blood, a greenish sanies, which filled all the divisions of the splenetic vein, the trunk of the vena porta, and all its hepatic branches; so that when cutting the liver, he distinguished by the flowing of this sanies all the branches of the vena porta from those of the hepatic vein, which contained blood in a natural state: this body was remarkable for such an excessive obesity, that Bichat never remembered seeing any thing equal to it. Unfortunately he does not give us the symptoms of the disease of which this person died.

108. According to Coyter, Gendrin, and many others, a black pulverised-like substance deposits itself at the bottom of the vessel containing blood taken from persons affected with *typhoid*, malignant, and gangrenous diseases; the clot being often either completely dissolved, or not formed at all. I have seen these appearances, and various modifications of them alluded to above (§ 94.), not only in these diseases, but also in *hæmatemesis*, *dysentery*, severe infectious *erysipelas*, *phlebitis*, the dangerous forms of *puerperal* diseases, puerperal *mania*, and in *purpura hæmorrhagica*.

109. Remarkable fluidity of the blood is always observed after death from severe blows on the epigastrium, and from lightning. J. Hunter states, that he has also found it fluid after death from a violent fit of passion. Morgagni observed it in a similar state after death from hunger; and M. Audouard relates, that that it was uncommonly fluid in a man who died from *coup de soleil*, voiding blood from the mouth and nostrils. In two cases of *hydrophobia* I found the blood black; so fluid in the heart and veins, that it flowed out abundantly from the vessels of the head and neck, presenting an infinite number of oily points or particles on its surface; and, when removed from the vessel, it did not afterwards coagulate. The same appearances were observed in a large proportion of the numerous cases described by M. Trolliet, and other authors on this disease. M. Trolliet states, that in several of his cases, a considerable quantity of gas escaped from the heart and aorta.

110. iii. The Causes of Changes in the healthy state of the Blood.—The causes which occasion morbid changes in the state of the blood, are either such as are confined in their operations to individuals, or such as influence whole classes, or the community generally. They may thus be sporadic, endemic, or epidemic. In respect to their mode of operation, they may be arranged, 1st, Into such as vitiate the fluids from which the blood is formed; 2d, Into those which impede the functions of secretion and depuration; 3d, Those putrid or septic matters which contaminate the tissues and fluids to which they are applied, and act chiefly by absorption; 4th, Those which act upon the vascular system, either directly or indirectly, through the nerves which supply it; and, 5th, The passage into the blood of morbid matters formed in the same body that is the seat of disease.

111. *A. Of vitiation of the blood by the fluids which form it.* — The fluids which supply the waste of the blood are not infrequently vitiated,

and thereby change the state of the circulating mass. The chief sources of this vitiation are hurtful or unwholesome ingesta. Many articles, even of food, will be hurtful when too long continued. The injurious effects of salt provisions on the blood, when exclusively employed, and particularly if depressing causes cooperate with this diet, are evident, and are fully illustrated in the article on SCURVY. The influence of diseased rye, in first changing the condition of the blood, and inducing a state of chronic arteritis, terminating in gangrene of the extremities, is also well known; and the effects of diseased or putrid flesh upon the system have been often noticed, although not always correctly traced to the quarters where the principal changes are produced. M. BERTIN states that a number of negroes in Guadaloupe, having eaten the flesh of some animals dead of an epizooty, were seized with fever, and violent ileus, of which the greater number died: and numerous cases are on record, where persons shut up in besieged towns, having partaken of putrid animal matter, or of the flesh of animals that have died, have been seized with malignant states of disease; and the blood has been found fluid, dissolved, blackish, grumous, &c. upon examination after death. In these, and numerous similar instances which might be adduced, although the state of the blood has been alluded to in general terms, the information has been deficient in precision, and has been furnished incidentally, the attention of the observer having been directed to other quarters.

112. M. MAGENDIE adduces, in his Journal, the instance of a man, who, after a long use of vegetables in which the oxalates abounded, underwent the operation of lithotomy, and a large oxalate of lime calculus was removed from him. We know that a large proportion of both our mineral and vegetable medicines operate by being absorbed into the circulation (see art. ABSORPTION, &c.); and there is every reason to suppose that various morbid or foreign matters may pass with the chyle into the blood, and modify its condition. The excessive or long continued use of alkalies, or of alkaline salts with excess of base, has the effect of diminishing the cohesion and the viscosity of the blood, and of preventing it from coagulating after it has been removed from the vessels; and while these substances thus, as it were, dissolve, or attenuate this fluid, they also diminish the vital cohesion and tonic contractility of the extreme vessels and of the tissues, and create a disposition to extravasation of blood in the parenchyma of the organs, and to exudation of it from the mucous surfaces. On the other hand, the acids — particularly the mineral acids — turpentine, the superacetate of lead, and all the salts—especially those with excess of acid—have the effect of increasing the healthy crasis of the blood, and of producing an opposite change to that now stated. When used in excess, however, or injected into the veins, they have been conclusively shown to give rise to fibrinous concretions in the vessels, to coagulate the albumen of the blood, to darken its colour, and thus to render it grumous and unfitted for circulation through the minute capillary vessels, particularly those of the lungs. The influence of salted provisions long and exclusively employed, in which the soda is generally in excess, in attenuating the blood, in preventing its coagulation when removed from the vessels, and in relaxing the soft solids; and the effect of acids in removing these morbid states; are well illustrated by the nature, progress, treatment, and prophylaxis of scurvy.

113. That the nature of the food materially affects the state of the blood is further shown by the general character of the diseases most prevalent in various communities, living chiefly on certain kinds of aliment. The inhabitants of several places in the north of Europe, who live principally on *fish*, a large proportion of which is usually kept until it has become remarkably stale, or even ammoniacal, from incipient decomposition, who seldom partake of flesh meat unless in a similar state of change, and who dry or smoke both these kinds of food, instead of salting them, are generally subject to diseases which arise from, or are connected with, an impure state, or weak cohesion, of the circulating fluid. It should not, however, be overlooked, that the more complete changes which respiration effects on the blood in cold climates, and the active exercise of the functions of depuration, under the influence of the vital energies, serve to counteract the morbid alterations which this cause would induce. Yet still the prevalence of disorder in these eliminating organs, particularly the mucous and cutaneous surfaces, which preserve the purity of the blood; and the marked disposition, which all febrile diseases evince, in persons thus circumstanced, towards vitiation of the circulating fluid; and the consequently low or adynamic symptoms which characterise their progress and termination; are sufficient indications of a change in the constitution of this fluid. It is worthy of notice, that communities which live in the manner now alluded to, generally employ remarkably acid beverages, usually consisting of the fermented whey of butter-milk, and a fermented farinaceous infusion. I believe that nothing could be used as common drink better calculated than these to counteract the ill effects of their diet on the blood. Besides the acid existing in these beverages, they also contain much carbonic acid gas, which likewise contributes to their wholesome influence on the blood.

114. The effects of living upon much fresh animal food, in increasing the quantity of fibrine, in rendering the blood rich and abundant, and in disposing to inflammatory diseases, are too well known in all their relations to require illustration. But when we consider the influence of various kinds of aliments in modifying the state of the blood, we ought never to overlook that, as its organisation and vital manifestations commence with the chyle, and depend upon the vital condition of the vessels and tissues, and upon the perfect discharge of all the functions which contribute to its formation and purification, the extent of mischief produced by unwholesome food will be commensurate with the deficiency of vital energy, and the imperfection of the various organic functions. A person of a robust constitution, breathing a pure air, and assisting the eliminating functions by regular exercise, will suffer much less, than the debilitated, the indolent, and those placed in unhealthy localities, from either unwholesome food, or from the accidental ingestion of injurious substances. A person thus circumstanced will also suffer less from the habitual

indulgence in too much animal food; but more commonly such indulgence will give rise to a superabundant secretion of uric acid, and favour gravel. In such persons, also, there is reason to suppose that urea, or uric acid, may exist in the blood, and be deposited from it in various parts of the body, particularly the small joints. The uric acid, which becomes thus abundant, is a highly azotised animal principle, obviously formed from the excessive use of food which abounds in azote; and when its appropriate emunctory, the kidneys, fail of carrying it out of the blood, it is secreted in other parts.

115. *B. Imperfect performance of the functions of depuration, a chief cause of morbid states of the blood.*—The evident influence of this class of causes renders it a matter of surprise that it has been so long overlooked in our estimation of the causation of disease. When the facts which have been brought to light by the successful investigation of the animal functions are duly weighed, and estimated in connection with the sources of impurity to which the circulating fluid is exposed, the importance of assigning a due rank to this kind of morbid agency will become manifest. When we consider the important changes that take place in the lungs—the quantity of carbonaceous fluids constantly discharged through this organ, and of watery vapour loaded with various impurities continually exhaled from its surface, and passing out with the expired air; or the abundant perspiration, sensible as well as insensible, constantly issuing from the cutaneous surface, and holding dissolved in it substances which require to be eliminated from the circulation, owing either to their excess or their foreign and hurtful nature; or the varying state of the urinary secretion, the quantity eliminated, and the changes it manifests from variations of temperature, atmospheric moisture, and especially from the abundance and nature of the ingesta; or the discharges which the female experiences during the greater part of her average duration of life; or the secretions formed by the liver, the internal surface of the bowels, the pancreas, &c. out of elements which, if not combined into these new forms, and destined to ulterior purposes, would become poisonous to the frame, by vitiating the blood; it must be evident that an interruption to any one of these several functions, if not compensated for by the vicarious increase or modification of some others, must be followed by alterations of the quantity, of the quality, of the relative proportion of the constituents, and even of the vitality of this fluid.

116. *a.* Under the due dominance of the vital energy of the system—and particularly of that influence exerted by the organic nerves on the great secreting viscera, and on the whole vascular system—no sooner does any substance, which may have been carried into the circulation, or accumulated in it, become injurious, than it is eliminated by the appropriate action of some organ, which often evinces a kind or degree of disorder, either in its actions, or in the state of its secretions, according to the nature of the substance which affects it. Thus, we perceive various substances and kinds of food, even in health, affect the actions and secretions of the kidneys, of the skin, and of the bowels; certain of their constituents becoming sensible in the halitus of the expired air, in the perspiration, or in the urine, where they could be transported through the channel of the circulation only. The fœtor, &c. of the breath, and of the perspiration, &c. consequent upon interruptions of the abdominal secretions, also indicates that impurities have accumulated in the circulation, and that they are being eliminated by means of the lungs and skin. So long as the vital energy is sufficient for the due performance and harmony of the functions, injurious matters are seldom allowed to accumulate in the blood to the extent of vitiating its constitution, without being discharged from it by means of one or more organs; but as soon as this energy languishes, or is depressed by external agents and influences, and the blood is thereby either imperfectly formed, or insufficiently animalised and depurated, some one of its ultimate elements or proximate constituents becomes excessive, and the chief cause of disorder, which terminates either in the removal of the morbid accumulation, or in a train of morbid actions and organic lesions. These very important pathological facts are so fully proved by the history of the most prevalent and serious diseases, and by their terminations and results, and are so perfectly unopposed by accidental or occasional exceptions, that proofs or illustrations of their value and uniformity are superfluous.

117. Thus it will appear that, although changes in the secretions and in the blood itself are most influential in the production, perpetuation, and aggravation of disease; yet such changes are prevented, controlled, and even in some cases promoted, by the state of the nervous energy and vital actions of the frame; to which influence they are always more or less subject, unless when the causes of the disorder are so intense, in relation to its state, as entirely to annihilate it, as is occasionally remarked in respect of the most pestilential diseases, and of the operation of some virulent poisons. Thus, also, will it appear, not only that hurtful matters carried into the circulation, and ultimate elements or proximate constituents allowed to accumulate in it, owing to the imperfect performance of some eliminating function, will be removed from it, when the vital influence is sufficient for the task; but that both kinds of injurious agents will, according to their natures, become productive of a vitiated state of the blood, of the secretions formed from it, and even of the various tissues themselves, when the state of vital manifestation, particularly as displayed in the organic nerves, is insufficient to remove them from the frame, or to control their combinations, or to direct them to salutary changes.

118. Before leaving this important subject—important in as far as it involves the fundamental doctrines of disease, and points to rational indications of cure—I may briefly illustrate it by a reference to two or three facts, which are of every day occurrence. It has been long known that affections impeding the functions of the lungs are frequently attended with an increased secretion of bile. This I have shown to depend upon the liver being excited to increased action by the carbonaceous and other elements accumulated in the blood, owing to their elimination by the lungs being interrupted; and thus we readily recognise the cause of the frequent complication of biliary disorder with pulmonary disease, particularly in

some hot countries. In cases, also, where, owing to asphyxia, or to disease, as pestilential cholera, &c., the requisite changes by respiration are not effected in the blood, if recovery take place, the diseased states of the secretions of the liver and bowels indicate that the favourable result has been chiefly owing to the increased performance, under the influence of life, of the functions of these organs. When death occurs from asphyxia, and particularly if it be occasioned by the vapour of charcoal, the black, fluid, or dissolved state of the blood, the presence of yellowish globules like oil, sometimes observed on its surface, and noticed by M. Rayer, sufficiently indicate the changes produced in this fluid, and the influence these changes exert on the chief functions; and if recovery is effected, the evacuations evince that the principal secreting organs have been the means of removing the morbid matters from the blood. A strict enquiry, also, into the changes which precede a favourable termination of the latter stages of malignant diseases, manifestly detects the influence of the secreting and eliminating organs in bringing about this result, and chiefly by their operation, under the influence of life, upon the blood.

119. *b.* That high ranges of *temperature* occasion very important changes in the state of the blood, had been remarked by several of the ancients, and by some of the best writers of the eighteenth century; but the chief mode of its operation was first pointed out in a thesis written by me in 1815. I there showed that increased atmospheric warmth, particularly when accompanied with moisture and miasmal exhalations, greatly diminish the changes effected during respiration on the blood in the lungs; and that the carbonaceous, and other elements and impurities, are imperfectly discharged from the blood through this channel. I further showed, both in that production, and in my physiological notes, that these materials are partly combined to form bile, thus occasioning an increased as well as vitiated secretion of this fluid, and partly excreted by the mucous surface of the intestinal canal, and by the skin; and that, if the functions of these organs, —the liver, skin, and intestinal mucous surface, —which thus compensate the diminished actions in the lungs, be at all impeded under such circumstances, the elements, which they should have eliminated from the blood, necessarily accumulate in it, and influence the functions of the nerves, ramified on the blood-vessels, and of the principal secreting organs and surfaces, ultimately vitiating the blood and all the soft solids of the body, when the vital energies become depressed or exhausted, and the train of morbid phenomena experiences no change tending to health.

120. Thus, we perceive that, during high ranges of temperature, particularly when the air is loaded with miasmata, and the liver is inactive, the elements of the bile will accumulate in the blood, sometimes even to the extent of giving the countenance a darker or more dusky tint than natural, and the blood will be changed, 1st, by the superabundance of the materials whence bile is secreted; and, 2d, by the passage of this fluid, or of certain of its constituents, into the blood, after its secretion has taken place. In the foregoing manner (§ 119.), I explained the prevalence of biliary disorders, particularly bilious cholera, diarrhœa, dysentery, increased secretions of bile; and, in warm climates and seasons, and when vegetable and animal miasms are superadded to this influence, the occurrence of fevers of various kinds —remittent or continued, simple or complicated, biliary or malignant, inflammatory or dysenteric, endemic or epidemic, sporadic or pestilential — according to the circumstances of individuals, the kind of locality, the nature, combination, and source of the miasm, and the state of the atmosphere. This doctrine, now many years since contended for, later experience, and the concurrent opinions of more recent observers, have fully confirmed. (See Fever.)

121. *c.* Several states of disease, which occur in the puerperal state, may be referred to the arrest of the secretions or discharges incidental to it. The secretions from the internal surface of the uterus, and which partly consists of the bloody serum poured into the uterine cavity from the open mouths of the vessels which communicated with the placenta, are not infrequently arrested or impeded. In such cases, the blood does not undergo that salutary depuration which this evacuation occasions; and, consequently, either experiences further disorder, or it creates a disposition in the system to the invasion of other causes of disease. Besides, the fibrinous and albuminous parts of the blood, which are generally in excess during pregnancy, not having been discharged by this route, determine the occurrence of inflammation of the uterus, peritoneum, &c. upon the co-operation of exciting causes. Or, if such causes have produced these diseases, the obstruction or interruption of the secretions and discharges, which is generally thereby occasioned, aggravates the mischief, and the *post mortem* appearances often furnish more or less evidence of the suppression having been concerned in modifying the results; the matters poured out from the diseased parts frequently resembling, or containing constituents of, the secretion which was suppressed. How are we to account for this? We find it demonstrated, that the materials of both bile and urine, owing to obstruction of these secretions, may be mixed with the blood, and give rise to certain well known symptoms. We may, therefore, extend the same principle to suppression of the puerperal secretions; and infer, that the matters which constitute them, having accumulated in, or not been eliminated from, the blood, are discharged along with those effusions of albuminous serum which frequently follow the diseases of this state, even although they may not actually be the causes of these diseases.

122. Graeffe of Berlin (*Rév. Méd.* Jan. 1827.) states, that a female, in a favourable state, and suckling her child, experienced a fright on the eighth day after delivery, which occasioned a complete suppression of her milk. Febrile excitement followed, and effusion took place in the peritoneal cavity and cellular tissue. Upon tapping a few weeks afterwards, a bucket of fluid, resembling whey, and exhaling an acidulous odour, was drawn off. Upon being boiled with dilute sulphuric acid, it furnished a substance resembling caseum. When tapped six weeks afterwards, the fluid was of a greenish yellow, and without the least trace of caseum.

123. That changes in the composition or state of the blood are also followed by alterations of

the natural secretions, is fully shown by both physiological and pathological facts. It is not, therefore, unreasonable to suppose, that modifications or changes of morbid secretions will be occasioned by a similar cause. Indeed, alterations of the latter are quite as likely to be the consequence of pathological conditions of the blood, as changes of the former.

124. *d.* In cases, where the functions of the skin, or of the kidneys, are interrupted, not only are the watery parts of the blood frequently increased, but also various irritating matters accumulate in it, unless eliminated by other organs. These excite more or less disturbance of the whole vascular system; and if the cause continues, or is assisted by concurrent causes, the blood itself becomes very evidently changed, in respect both of the state of its cruor and of its serum. The effects of obstruction of the bile on the blood, and mediately on the tissues, are sufficiently apparent to the sight; and the actual presence of this fluid in the circulation, or, at least, the peculiar matters which characterise it, has been shown by several modern chemists, and completely demonstrated by the recent researches of MM. PROUST, ORFILA, GMELIN, and LE CANU. But it is unnecessary to prosecute the subject further, as I consider that the grand pathological inference, *that the interruption or obstruction of any important secreting or eliminating function, if not compensated by the increased or modified action of some other organs, vitiates the blood more or less; and, if such vitiation be not soon removed, by the restoration of the function primarily affected, or by the increased exercise of an analogous function, more important changes are produced in the blood, if the energies of life are insufficient to expel the cause of disturbance, to oppose the progress of change, and to excite actions of a salutary tendency.*

125. *e.* ILLUSTRATIONS.—The importance of this conclusion will become still more manifest, if we illustrate it by reference to the pathology of fever, and observe the train of morbid phenomena produced by its causes. These, although modified even still more infinitely than the combination of causes in which they originate, present the following almost unvarying characters and mode of procession:—A person exposed to the miasmata generated from vegetable or animal matter in a state of decay, or from persons affected with fever, inhales such miasmata into the lungs, where they produce a morbid impression on the nerves of organic life, followed by depression of the vital influence: the functions of digestion and secretion languish, and, owing to the imperfect performance of secretion and assimilation, the necessary changes are not fully effected in the blood; and thus irritating or otherwise injurious matters accumulate in it. These phenomena generally proceed gradually, until, owing to the continued and augmented depression of the vital powers throughout the frame, and the increasing change in the state of the blood, marked disorder is occasioned. The vascular system becomes excited by the quantity and the quality of its contents; and, when the vital energies are not too far depressed for its production, the excitement becomes general. The accelerated circulation tends still more to disorder the state of the blood; but it also has the effect, in the majority of cases, of exciting the organic functions, of restoring the secretions which were impeded or interrupted, and thereby of removing the morbid state of the circulating fluid; after which the return to health is rapid. When, however, salutary reaction of the vascular system is not brought about, owing to the morbid depression of the vital energy, and to changes which had taken place in the blood; or, if reaction occur, but, owing to the state of this fluid, and of the nervous influence to which it is subject, it is irregular, imperfect, or excessive; the vitiation of the blood proceeds; the secretions are also vitiated; the solids affected; one or more vital organs suffer in an especial manner; the energies of life are exhausted; and various organic lesions are induced, having reference to the previous state of the system, the kind of change produced in the blood, and the agencies in operation during the progress of disease.

126. Such is the general procession and character of the morbid phenomena; and we observe in them certain prominent features, by means of which the various species of fever are recognised. They may be briefly stated to be,—1st, The impression of the causes on the nerves of organic life, the depression of their energies, and imperfect performance of all the functions which they influence: 2d, More or less vascular excitement or change in the state of vascular action, and of the circulating fluid: 3d, Frequently predominance of disorder of some one general system, or vital organ: 4th, Consequent exhaustion, with either a gradual restoration of the functions, followed by a return to health; or more marked vitiation of the blood, of the secretions formed from it, and of the solids of the body, often terminating in organic changes, or death.

127. Here we observe *three* different states of vital action, in each of which the blood generally presents very different appearances. 1st, The *state of depression and invasion* of fever, in which the blood taken from a vein is of a very deep or dark colour; flows with difficulty; frequently occasioning syncope, or great depression upon the loss of a few ounces; and generally coagulates rapidly, and separates into a very dark, large, and soft coagulum, which falls low in the serum—the quantity of which is extremely small in proportion to the clot. Not infrequently the separation is very imperfect, and the coagulum extremely large and soft. 2d, The *state of reaction, or febrile excitement*, in which the blood flows more freely from the vein, and of a brighter colour, occasioning little immediate depression until a more considerable quantity is abstracted; is apparently thinner than natural; coagulates much more slowly, and separates into a somewhat more firm coagulum, than in the former state of disease; and occasionally exhibits a thin fibrinous layer on its surface: in several malignant cases, however, even in this stage, either the separation of serum is very imperfect, consisting chiefly of a deep gelatinous layer, beneath which the colouring matter is deposited in an extremely loose state, and dark colour; or the blood remains imperfectly coagulated, and of a gelatinous consistence. 3d, The *state of exhaustion*, in which the blood generally flows readily; but is uncommonly thin, dissolved or attenuated, and dark coloured; occasions great increase of exhaustion; and either scarcely coagulates, or separates into a remark-

ably loose coagulum, which lies at the bottom of the vessel; the serum varying much as to quantity and colour; being often turbid, clouded, watery, or slightly viscous, and less saline in its taste. Sometimes the coagulum which falls to the bottom of the vessel is so loose, that it appears as a precipitation of the colouring matter, of a very dark colour, and is readily stirred up into the supernatant serum (§ 94. 108.). In nearly all the cases where I have seen blood taken, either in the state of depression or in that of exhaustion, but particularly in the latter, either little or no fibrine could be collected from the coagulum; or what was obtained was scanty, remarkably loose, and even flocculent, and nearly albuminous. Throughout the progress of typhus, the venous blood is generally watery, and without consistence,— a fact to which my attention was called many years ago by the late Professor **Hildenbrand**, at Vienna. In the latter stages of typhoid or malignant fevers, it seems nearly altogether deprived of fibrine. In two or three cases, the blood was abstracted in these states chiefly with the view of examining its appearance. But several instances have occurred to me, in which I have found that blood had been drawn, although the nature of the symptoms, and the state of this fluid, equally contra-indicated the propriety of the practice.

128. With respect to the *post mortem* appearances of the blood in the vessels, I stated, many years ago, when describing the symptoms and morbid appearances of yellow fever, several cases of which I had an opportunity of examining within five hours after death, in the years 1816 and 1817, that it is generally half dissolved, or fluid and grumous, dark coloured, and speedily undergoes complete decomposition. (*Quarterly Journ. of Foreign Med.* vol. ii. 1820, p. 446.) A similar state of the blood has been noticed by **Arejula**, **Bally**, **Palloni**, and others, in the epidemic yellow fever of Spain; and more recently by Dr. **Stevens**, who has described the appearances of the blood in tropical fevers with greater minuteness than his predecessors, has referred to most important changes of the saline constituents of this fluid, and has fully confirmed some very detailed observations adduced by myself several years previously (*Appendix to* M. **Richerand's** *Physiology*, p. 640, *et seq.*), comprising the general results obtained from noting the appearance of the blood in a number of febrile and malignant diseases. Dr. **Stevens** states (*Paper read to the College of Physicians in May* 1830.), that the blood, in these fevers, loses its property of coagulating, becomes more fluid, and thin or watery, of a much darker colour, and has its fibrine and saline ingredients exhausted,— changes which I have ascertained to obtain in a greater or less degree in the fevers of this country, particularly in their latter stages, and have described in my lectures since 1825. (See **Fever**.)

129. Besides other proofs of the diseased state of the blood in fevers, I may adduce the following:— In those who were victims to malignant fevers, **Chirac** found the blood in the ventricles of the heart, and the vena cava, more or less clotted; and all the ramifications of the vena porta were filled with grumous blood. In those who died of typhus, at Brest, in 1757, the blood was found grumous, unnatural, black, and decomposed, particularly in the liver. **Soulier** observed blackish blood coagulated in the vessels; and extremely fœtid black blood in the stomach, of those who fell victims to the plague at Marseilles. **Larrey** found the blood black and liquid in those who died of the plague in Egypt. After intense fevers, **Andral** has found the blood contained in the heart, and in the larger arterial and venous vessels, remarkable for its great liquidity, and its black and deep colour: in some subjects it presented a clear rosy tint, and was like water coloured red; some small fibrous grains were then dispersed over the internal surface of the vessels. In one individual, the liquid contained in the larger vessels was no longer really blood, but a matter the colour of wine lees, sanious in some parts, nearly resembling the ill-elaborated fluid contained in unhealthy abscesses.

130. M. **Bouillaud** found, in two or three cases, the blood clear and rosy, after putrid fevers; but it nearly always appeared blacker and more liquid than in its normal state: this alteration varied, from the degree in which the clot was simply flabby, to that in which the blood formed only a blackened and liquid mass, without any trace of clot. This blood, being put into a basin, was brilliant, shining, and full of micacious specks; in some cases it has been found mixed with purulent matter, or pure pus; at other times it was so altered and disorganised that it resembled a putrid mass. **Bouillaud** justly adds, that in such instances it is not rare to meet with a quantity of gas, more or less considerable, in the circulating canal; and also that, although it be difficult to describe these changes, they should nevertheless be taken into consideration, if we wish to explain satisfactorily the phenomena attendant on putrid fever.

131. The malignant febrile diseases which very frequently attack horses and cattle are always attended with a remarkable alteration of the blood, even early in their progress. These diseases are less frequently met with in this country, than in marshy and warm climates. In some of the most pestilential of those, horses cannot be reared; and when brought into those places, they generally experience a febrile attack, with adynamic or malignant symptoms, and speedily die. This is constantly the case in some parts of Africa, where the vegeto-animal miasms from the soil are abundant and concentrated. I had an opportunity of observing the examination of a horse brought from the interior to an unhealthy situation on the coast, where it died, as all others had done, a few weeks afterwards. It was not much emaciated; but the blood was black, decomposed, fluid, and sanious; and the liver, spleen, lungs, heart, and, indeed, all the internal viscera, softened, ecchymosed, and lacerable with the utmost ease.

132. C. *Contamination of the blood by putrid or septic matters applied to the tissues.*—These substances were not inappropriately said, by the older writers, to occasion a putrid ferment in the part to which they were applied. The ferment may be disputed, but that they produce change of the blood is undeniable. If we examine the subject closely, we can arrive at this conclusion only,—that the substance applied changes the part to a state somewhat similar, as respects sensible properties, to itself; and that this contamination soon extends, either by its immediate effects upon

the organic nerves supplying the vessels, and consecutively on the blood, or by the direct introduction of the contaminating matter into the divided vessels, or by its imbibition or absorption, or by one or more of these channels, to the whole body, affecting, more or less, the blood, the secretions, and the solids. That these changes take place is undeniable, although the precise channel of primary infection cannot be easily demonstrated; and is sufficiently proved by the facts already adduced (§ 92.), and by those which follow (§ 133.). The instances of gangrenous or diffusive inflammation of the cellular tissue, arising from contact or inoculation of putrid animal matter, as recorded by numerous writers, and recently by Drs. **Butter** and **Duncan**; the not infrequent instances of it from injury in the dissecting-room (see **Cellular Tissue**, *Diffusive Inflammation of*); and the occurrence of putrid fever, with gangrenous pustules and carbuncles, particularly amongst farriers, flayers, and knackers; furnish proofs and illustrations of the blood being one of the chief, although, perhaps, not the primary or only, channel through which the whole frame becomes more or less infected in a large and important class of diseases. A most remarkable instance of this, and at the same time showing to how great an extent the fluids and solids of the body may be contaminated, and yet the patient recover, is recorded by M. **Gendrin**.

133. A flayer was affected with putrid fever, and gangrenous pustules and carbuncles. His breath, evacuations, and whole body, were horribly fœtid; and blood taken from a vein was, three hours and a half after its emission, unusually dissolved and black; and gave out an odour resembling that of putrid flesh. A spontaneous discharge of a black, dissolved, sanious blood, also occurred from his mouth and nostrils. M. **Gendrin** introduced some of the blood taken from the arm of this person into the cellular tissue of a cat, and into the femoral vein of a dog. Both animals evinced symptoms of putrid fever, and died in a few hours. The blood throughout their bodies was dark and fluid; the heart soft and flaccid; the viscera congested, and ecchymosed with dark spots, and speedily began to exhale a fœtid odour. M. **Gendrin** also details some experiments, in which he injected into the veins of different animals, the blood of persons affected with confluent small pox. Very violent effects, rapidly terminating in death, followed; and, upon inspecting the bodies, several viscera were found highly inflamed and congested.

134. *D. Contamination of the blood from causes influencing the state of the vascular system, either directly, or mediately through the nerves which supply it.* — Under this head may be comprised a very numerous class of causes: and, indeed, many of those which were alluded to in preceding sections may also act in this way. *a.* Infectious and contagious miasms and secretions may change the state of the blood in a more or less direct manner, as well as by first affecting the organic nervous system generally, and thereby impeding or changing the action of vital and secreting organs. Inordinate acceleration of the circulation appears to be frequently followed by serious alterations of the blood. The experiments of M. **Dupuy** on several animals show that the fibrine is either very much diminished, or otherwise changed, by their being coursed or hunted; as the blood remains fluid, or becomes dark coloured and grumous subsequently: M. **Chaussier** found that a portion of blood altered by this cause produced gangrenous pustules and malignant fever, when inserted into the cellular tissue of sound animals; and the striking instance recorded by **Duhamel**, and already alluded to, further proves that a morbid state of the blood is occasioned by overdriving animals. **Haller** and **Buchner** remark, that vehement exertion renders the urine fœtid, acrid, and scalding; the perspiration fœtid and disagreeable; the blood very fluid, acrid, and vitiated; and, if long continued, occasions most ardent fever, terminating rapidly in death, and dissolution of the fluids and solids. **Haller** refers to two cases where he observed these effects produced by intense acceleration of the circulation by running; and adds, that the blood of hunted animals is often not only fluid, but fœtid; the flesh becoming quickly putrid. The attenuation and subsequent alteration of the blood observed in ardent or other fevers, attended with inordinate vascular action in their early stages, and the ecchymosis, petechiæ, softening of the mucous tissues, &c. may doubtless be attributed, in part, to the rapidity of the circulation, or increased motion to which it is subjected. If we continue to agitate healthy blood as it flows from a vein, it becomes thinner than natural, a small portion of fibrine collects around the stick with which it is stirred, and the blood remains fluid, as must be familiar to every one, and long since demonstrated by **Schwencke**.

135. *b.* If any of the neutral alkaline salts, particularly those with excess of base, be added to blood as it is discharged, the coagulation will either be entirely prevented, or imperfectly produced; little or no fibrine will be formed, and its colour will become more florid. These facts have long since been noticed by **Verheyn**, **Eller**, **Rutty**, **Haller**, &c. The injection of acids, or the metallic salts, particularly those with any excess of acid, render the blood dark coloured, and changes it into a grumous fluid, from partially coagulating its albumen and fibrine. The experiments of **Eller**, **Gianella**, **Duhamel**, **Friend**, **Courten**, **Rutty**, **De Heyde**, **Sproegel**, **Aalsem**, **Borrich**, **Petit**, and various others, prove this effect; and further show, that when these substances are added to blood taken from a vein they either accelerate its coagulation, rendering the coagulum firm; or, if strong solutions are employed, the coagulation is irregular, the separation of the watery portion is more perfect, and the coagula are of a dirty black or dark brown colour. The attenuating effects of the fixed and volatile alkalies, and of their subcarbonates, both upon the blood and the secretions formed from it, particularly when long employed, will be considered as proved by any one who will peruse the experiments of **Schwencke**, **Friend**, **Eller**, **Rutty**, **Courten**, **Pitcairne**, **Thackrah**, and **Scudamore**, without the bias of system; and they are confirmed in my mind by some observations I have made of the results when these substances are mixed with blood immediately after venæsection, or when exhibited internally in large doses for some time previous to abstraction of the blood; whilst directly opposite effects are observed to follow the internal use of acids. In the

latter case, the coagulum is firm, the blood of a deep or dark colour, and the fibrine abundant: in the former, the blood is thin, of a brighter colour, the coagulum much less firm, and the quantity as well as the cohesion of the fibrine diminished.

136. The effect of the fluid extract or tincture of opium, alcohol, tonic or astringent tinctures, and of spirits of turpentine upon the blood, is to increase its coagulability; and, when injected into the veins in sufficient quantity, to produce death, as in similar experiments with acids and the metallic salts, chiefly from this mode of operation. The experiments of Courten, Friend, Younge, Schwencke, De Heyde, Sproegel, Silberling, and Fontana, fully prove these facts. The accuracy of the results as to one of these substances has been confirmed by the experiments of the writer. That both alkalies, acids, and salts, act upon the system chiefly from their being absorbed and carried into the blood, has been satisfactorily demonstrated by Magendie, Tiedemann and Gmelin, Mayer, Westrumb, and various others, and will not be now doubted, although the active exercise of the eliminating functions, which their very presence in the blood generally promotes, prevents their accumulation there to any considerable or deleterious extent, unless they have been taken in poisonous doses. They have, nevertheless, been absorbed in such quantity as to be detected both in the blood and in the various secretions by means of chemical agents, as demonstrated by MM. Groonier, Chaussier, Orfila, and by Buchner, Krimer, Bennerscheidt, Schubarth, and Dr. O'Shaughnessy.

137. *c.* The interesting researches of MM. Gaspard and Magendie, in order to ascertain the effects of *putrid vegetable* and *animal matter* when introduced into the cellular tissue or injected into the blood, further illustrate the importance that is to be attached to morbid states of this fluid, as well as the origin and nature of various diseases. These physicians have fully proved that such substances, when thus employed, produce symptoms very similar to those of yellow fever, and typhus; and that, after death, this fluid is found remarkably altered, being nearly altogether fluid, of a very dark colour, and partially exuded from the capillaries, both into the parenchyma of the viscera, and from the mucous surfaces. That the blood is really altered in its nature by this inoculation, is proved not only by those changes, but also by the circumstance of its having lost the power of coagulating upon removal from a vein soon after it has been thus infected, and by its speedy putrefaction. The more recent experiments of MM. Leuret and Hamont furnish the like results; whilst those performed by M. Magendie show that dogs confined over, and breathing the effluvium proceeding from, animal and vegetable matters undergoing decay, experience similar symptoms to those now referred to, and the same alterations of the blood, of the secretions, of the excretions, and of the viscera, as observed in yellow fever: and, in all these cases, the morbid changes also extend more or less to the soft solids, and particularly to the mucous surfaces, the lungs, the liver, the heart, &c.

138. A most interesting fact has been stated by M. Leuret, and one which fully illustrates the views I have entertained respecting the nature of certain forms of *puerperal fever*. This physician injected some blood from an artery of a living horse affected with gangrenous boils (pustule maligne) directly into the veins of a mare five months with foal. She died five days afterwards. The heart, lungs, and intestinal canal were studded with dark ecchymoses, the uterus was gangrenous, and the blood dissolved and dark coloured. But, in all the cases where poisoning has resulted from the injection of septic or putrid matters into the circulation, or from virulent and rapidly fatal poisons, it must not be overlooked that, although the more manifest lesions are often observed in the blood, the injurious agent affects also the organic nerves terminating in the vessels, and consequently the vitality of the vessels themselves, altering the blood they contain, and thereby ultimately contaminating all the secretions and solids of the body; and that the mode of operation of the greater number of these septic agents, whether applied in an aggregate or palpable form, or from being dissolved in the moisture of the air, is very different from that of the saline and mineral substances considered above, which affect the blood more especially. (See Infection.)

139. *d.* The direct influence of the nervous system upon the blood was long since contended for by Barthez, and admitted by several physiologists. The chief error, or rather mischievous fallacy in their theory, however, being, that this influence was imputed to the cerebro-spinal nerves, and not to the ganglial nerves, to which it almost entirely belongs. This great mistake also vitiates the opinions promulgated on the subject by Mr. Brodie and Dr. W. Philip. The opinions, which I have entertained, and frequently expressed, that the power exerted by the nervous system on the blood is limited to the organic or ganglial class of nerves, and that their functions are very distinct from those performed by the cerebro-spinal class of nerves, the influence of the former having been too generally and erroneously imputed to the latter, have been already alluded to. Since their promulgation many years ago, numerous proofs of the accuracy of these views have been furnished in different countries. That the effects produced by the organic nerves take place chiefly in the minute vessels may be safely assumed; and that a reciprocative influence is exerted by the blood upon these nerves will not be denied: but it may also be inferred that the effects produced by the organic nerves are not limited to the small vessels. Professor Mayer's experiments support this opinion. He found that, when both pneumogastric nerves were tied, the blood coagulated in all the pulmonary vessels, the colouring matter having separated from the fibrine; and that this change was not the consequence of death, but its antecedent, since it was uniformly found upon opening the bodies the moment they expired. M. Dupuytren had previously ascertained, that a simple division of the pneumogastric nerve prevented the venous from being converted into arterial blood in the lungs.

140. M. Dupuy found that, when the pneumogastric nerves were divided in the cervical region, in horses, the quantity of fibrine in the blood became progressively diminished to a very

remarkable extent; and that a similar result followed laborious breathing in disease. He further states, that the blood throughout the animal was entirely dissolved after the pneumogastric nerves had been divided; and he adds that, when a portion of this blood is injected into the jugular vein of another horse, a gangrenous affection is produced (§ 92.). But these effects are comparatively slow; for in order that they may take place, the division of these nerves must previously affect the ganglia and plexi supplying the lungs and heart, and with which they are in intimate connection. When, however, these ganglia are immediately impressed, the effect is much more rapid. Such impression cannot, however, be readily made upon the ganglia themselves, owing to the protection their situation affords them from experiments of a conclusive kind. But as we find that agents, which do not affect the system when applied to the voluntary nerves, or the brain itself, will act rapidly when brought in contact with parts which are especially provided with the other class of nerves, and manifest the effects of this mode of operation upon the parts more immediately influenced from this source, we must necessarily conclude that the morbid impression of poisonous substances is primarily exerted upon the latter, and not upon the former; and hence the rapidity of their effects upon the blood, — effects which are productive, no doubt, of most important consequences throughout the economy, which I am endeavouring to estimate fully and fairly, but which should not altogether obscure our perception of earlier changes, which alone can account for all the phenomena. A severe blow over the cœliac ganglion will produce instant death, and the blood will remain dissolved, and exhibit the same appearances as after death by lightning and the most virulent poisons. Here we can attribute these remarkable changes only to the sudden concussion, and annihilation of the influence exerted by this important part of the organic or ganglial class of nerves — by this central source of vital power, upon the vascular system, and to the effect thereby produced upon the blood.

141. Seeing, therefore, that the organic or ganglial nerves are chiefly distributed to the very internal membrane of the blood-vessels for the purpose of transmitting their vital influence to the blood itself, it must be inferred that, although various substances or poisons may seem to act more particularly and immediately upon the blood, and others more directly on this class of nerves, according as they are applied within or without the vessels, the action cannot be restricted to either; for whatever changes the state of the one, must affect the other. That poisons, when introduced into the blood, will have an almost instantaneous effect, but not in the manner usually explained, may be readily granted and accounted for. The views upon the subject frequently stated by the Author in the Medical Repository, and in his Physiological Notes, seem more in accordance with the resulting phenomena; and are moreover confirmed by experiments and observations recently made by others; for when the poison has been applied to the cerebro-spinal nerves, it has been found by Orfila, Fontana, and others, to have no further operation, or even less, than when applied to other tissues, because it is not directed to that particular organisation, upon which the functions of life more immediately depend. But when injected into the blood, it is applied to the terminations of the organic nerves in the blood-vessels — to that particular quarter where the life of the tissues and of the blood is either generated or supplied, — to the seat where the influence of these nerves affects, even if it does not vitalise, the circulating fluid, and the operation is instant and most manifest. The reader, who, possessing an intimate acquaintance with the healthy relations of the organic nerves to the blood-vessels on the one hand, and to the cerebro-spinal system on the other, examines the numerous experiments which have been performed, — by one class of experimenters to show the action of poisons upon the nerves, confounding, as all have done, the ganglial with the cerebro-spinal nerves, — and by another class to demonstrate the operation of these substances on the blood solely, both sides leaving reciprocity of action, or rather the rapid change occasioned by one system on the other, too much out of the question; and is able to detect the fallacies with which they nearly all more or less abound, chiefly from confounding distinct functions, and even different systems, with one another; will entertain but few doubts that the influence of various poisons, although more manifestly indicated in the blood, is chiefly exerted upon the nerves which terminate in the blood-vessels; and that the alterations in the contents of the vessels arise principally from previous changes produced upon these nerves, however rapid the succession of the phenomena may be.

142. The celebrated and accurate experiments made by Fontana on the venom of the viper and the ticunas can be justly estimated only in accordance with this view; for when these substances were applied to the cerebro-spinal nerves no more rapid effect was produced by them than upon any other tissue: but, when injected into the veins, a fatal result was almost instantaneous; the blood, in the words of this able experimenter, being suddenly changed to a livid black, and soon afterwards coagulated in the lungs, heart, auricles, and liver, as well as in the large veins, with violent disease of the structure of the lungs. Now, as these substances, when added to blood as it is drawn from a vein, preserve its fluidity, they must produce, on the organic nerves ramified to the blood-vessels, a most intense effect; the alteration in the blood resulting evidently from antecedent change in the vital influence of these nerves, since no such alteration is occasioned by them when added, even much more abundantly, to blood as it flows from a vein. And there can be no doubt that virulent poisons introduced into, or having access to, blood contained in the vessels of a living animal, however the vessel may be insulated from surrounding nerves, must come in contact with its interior, and thus have an occasion given them to act upon the independent class of nerves which is especially devoted to the blood-vessels. That the very instant and intense effects which I have, in three instances, seen produced upon the blood of the human subject from the bites of serpents, and which have been minutely described by Orfila, Fontana, and many others, cannot arise from the diffusion of the poison in the blood, must be evident from the rapidity with which they occur, but

rom the morbid impression made by them upon the vital or ganglial nerves, and instantly propagated throughout the frame; the effects of this impression first appearing as a manifest lesion in the part where the injury was inflicted, and in the blood, which, as a part of the vascular system, is co-ordinately affected with the class of nerves supplying both it, and the vessels which contain it, with vital influence. From the mode of operation, therefore, of all the most virulent poisons, as prussic acid, the venom of the viper, ticunas, &c., I infer, that, as the organic system of nerves may be intensely affected, without altering the state of the brain more than that of any other important organ, and then secondarily merely, so may those poisons destroy life by their effects upon this system of nerves primarily and chiefly, other lesions being consecutive, amongst which the alteration of the blood is the next most immediate, and the next most important in its relations and consequences. (See Poisons.)

143. *E. The passage into the blood of morbid matters formed in the same body that is the seat of disease*, has been particularly noticed in the articles on *Absorption* and *Inflammation of Veins*. I have shown, when treating of these subjects, as well as of certain organic and malignant diseases, that vitiation of the blood, and ultimately of the soft solids more or less, is a very frequent occurrence; that it is hastened or promoted by depression of the vital energies; and that this fact, as well as the vitiation of the blood, should be taken into account in treating these maladies, particularly in their more advanced stages. It is probable that morbid matters may sometimes exist in the blood without very materially affecting its condition; but they much more frequently occasion very important changes in its constitution, as must appear from what has been stated, particularly when the powers of life begin to languish. *Pus* has been often detected in the veins which convey blood from parts undergoing the suppurative process, both by the older physicians and by recent writers, particularly Bichat, Fizeau, Velpeau, Rochoux, Gendrin, Andral, Dance, Breschet, and Ribes; and it seems very probable that, when thus absorbed, and not mixed with, or eliminated from, the circulation, it gives rise to various changes of the blood in the vessels, not only from attracting the fibrinous corpuscles in the manner already noticed (§ 85.), but also from combining with albuminous or other constituents of this fluid. I further believe, that the sanies which flows from chronic ulcers, or from the inside of veins when affected with spreading inflammation of their internal surface (see Veins.), and from the internal surface of the uterus in certain states of puerperal disease; and that the tubercular and encephaloid matter which often forms in internal viscera; may all be carried into, and most sensibly affect, the circulating fluid, and, through it, all the functions and structures of the body.

144. M. Andral states, that he has often found in the blood-vessels, instead of blood, a curdy friable matter, of a dirty grey colour, and resembling either the semi-concrete pus of chronic abscesses, or the sanies of malignant ulcers, or encephaloid matter broken down and mixed with blood; and similar instances are recorded by Bichat, Béclard, and Velpeau. In all these cases, abscesses, tubercles, or other morbid formations, also existed in some part of the body. (See arts. Absorption, Abscess, &c.) In many of such cases, it is difficult to determine what may have been the state of the general mass of blood in the latter stages of the disease, owing to the period which had elapsed from the dissolution of the patient to the examination; but it is very probable that the morbid matter found in the vessels had materially affected, either directly, or mediately through the organic nerves, the constitution of the whole fluids and soft solids of the body.

145. iv. Phenomena materially depending upon a vitiated state of the Blood, and serving to indicate its existence.—I have contended that the functions of depuration are very frequently concerned in occasioning, as well as in removing, a morbid condition of the circulating fluid. These functions will, therefore, evidently present some modification, when performing this latter purpose, inasmuch as the state of the blood, and of the impurities requiring change and elimination, will excite in them, as well as throughout the soft solids, more or less disturbance. In the slighter cases, the disorder of function will be less apparent; but even in these, and still more remarkably in the more severe cases, the particular function most disturbed will generally evince some relation to the kind of change existing in the blood. This relation of the change or impurity of the blood to the functions of viscera is very similar to the mode of operation and effects of very many medicinal substances, which, having been carried into the circulation by the function of absorption, act upon particular organs according to the circumstance of their exciting or otherwise changing the vital condition of these organs, while they are being circulated through or eliminated by them.

146. As respects, however, this relation of the pathological states of the blood, much requires to be ascertained, or rather but little is yet known beyond a few facts evincing that such relation sometimes actually exists. Thus we observe that excess of carbonaceous elements in the blood is removed chiefly by means of the liver, occasioning an abundant and vitiated secretion of bile. We may frequently remark, that an imperfectly elaborated chyle, or the partial absorption of sordes from the intestinal canal, renders the breath fœtid, and the urine loaded, or otherwise changed; that accumulation of the materials usually eliminated by the kidneys produces copious urinous perspirations, and the exhalation of a copious fœtid halitus from the lungs; and that putrid vegetable and animal matters, or morbid secretions carried into the circulation, derange the digestive mucous surface, and secreting organs, in a somewhat greater degree than other parts.

147. *A.* It obviously becomes most important to enquire if the phenomena resulting from change in the blood slowly brought about, or proceeding from pre-existing disease of important functions are different from, or are nearly the same as, those which arise from the introduction of putrid or morbid matters directly into the circulation. We observe in the last stages of malignant diseases, when the blood undoubtedly becomes changed, that all the secretions are remarkably offensive, acrid, and even excoriating. The breath, per-

spiration, urine, and stools, are fœtid; and the surfaces and parts with which the secretions and excretions come in contact, experience more or less change in their vital actions, and are disposed to undergo rapid disorganisation. All the circulating and secreted fluids have acquired septic and irritating properties; and discharges of sanguineous, or black, grumous, fluid matters sometimes take place from the digestive canal. The whole soft solids also lose their vital cohesion and tonic contractility, and are rapidly destroyed upon accidental injury and pressure. Hence the frequency and severity of the excoriations, ulcers, and sphacelating sores, which affect the prominent parts, sustaining the weight of the body in bed; and to this cause, in some measure, are to be imputed the ill effects sometimes following the use of blisters in the last stages of adynamic diseases. The whole surface of the body and countenance also present more or less of the characters which distinguish change of the other structures from this all-pervading cause: they lose their vital and animated hue, and become lurid, murky, or of a dirty pale tint; in some cases of a dirty or muddied pale yellow; in others slightly livid, or even altogether purplish; and in many instances, besides assuming a lurid and unhealthy colour, they are dotted with petechiæ, ecchymoses, and blotches of various shades, from a reddish tint to a reddish brown and deep purple. In numerous cases, particularly in the last stages of yellow fever, the skin is of different shades of yellow, frequently disposed in large patches, some of which are deeper than others, but the whole surface being more or less changed from its healthy tint. All these appearances arise from the state of the colourless parts of the blood, transmitted by the minute vessels of the integuments; and the admission, where ecchymosis, &c. occur, of colouring matter into vessels which did not circulate red blood in health, and the extravasation or escape of minute portions of a reddish serum, or attenuated or semi-dissolved blood, from the pores or extremities of the capillaries of the *rete mucosum*, — a change, however, which is not limited to the teguments, but which often exists still more remarkably in the mucous and submucous surfaces, and parenchymatous organs. (§ 149.)

148. *B.* The rapid or direct introduction of vegetable or animal putrid matter, purulent sanies, or animal poisons, into the circulation, generally occasions, not only changes in the blood, destroying its property of coagulating, and imparting to it a tendency to quick decomposition, but also most intense disease of the principal organs: — *a.* The nervous centres are remarkably impressed, giving rise to great prostration of strength, delirium, convulsions, or death, according to the intensity of the cause: — *b.* The digestive organs are affected by vomiting of morbid, brown, grumous, or other fluids; with purging of sanguineous, dark, putrid, or black matters; or distended with fœtid gaseous secretions: — *c.* The respiratory and circulating functions are remarkably deranged — the respiration is quick, difficult, or panting; the action of the heart quick, weak, or fluttering, and the impulse deficient; and the pulse, at first full, open, broad, and unusually soft and compressible, soon becomes uncommonly quick, weak, and ultimately small, thready, or fluttering: — *d.* General disease of all the functions and soft solids, accompanied with speedy death when the cause is intense; but, with the symptoms of adynamic, typhoid, or putrid fever, when acting more slowly, or to a less extent, and occasioning sphacelation or gangrene of various parts, gaseous exhalations or secretions, and various serous, sanguineous, or sanious exhalations and infiltrations.

149. *C.* The effects upon the fluids and soft solids have been already mentioned incidentally, and may, indeed, be inferred from what has been stated. These chiefly consist, *a.* Of a fœtid, decomposed, remarkably morbid, acrid, and dark or unnatural colour of all the secreted fluids: *b.* Of diminished cohesion of the tissues generally, but most remarkably of the mucous, cellular, muscular, and glandular parts, — the heart is soft and flaccid, the blood dissolved, and the internal surface of the heart and blood-vessels tinged of a more or less deep red colour, owing, as M. Trousseaux has fully proved, to the altered state of the blood; the muscles are easily torn, the mucous and cellular tissues are soft and pulpy; all the structures have lost their vital and physical elasticity, and they all undergo decomposition more rapidly than usual: *c.* Congestions, infiltrations, extravasation, &c. of fluid dark blood into the parenchyma of the lungs, liver, kidneys, and into the cellular, mucous, muscular, and other parts, with gangrenous spots, and a fœtid odour.

150. Such are the consequences of putrid or morbid matters conveyed into the circulation, and the results, in respect both of the phenomena, and of the remote organic lesions, of changes produced by these matters in the constitution of the whole fluids and structures of the body. When these matters are in a less concentrated state, or enter the circulation in a more gradual manner, they will then act in a relatively slower and less intense form, and their effects will more nearly approach those described as consequent upon a diseased state of the blood in malignant fevers (§ 125—130.). Yet their operation will still retain nearly the same distinctive characters, the symptoms varying chiefly in degree, but not materially in kind, unless the nature of the cause has also varied. Whether we contemplate, therefore, the character and progress of the phenomena following infection of the blood from these various sources, or the nature of the lesions which ultimately result, we shall be equally struck by the marked similarity existing between them.

151. That the blood is changed in various other maladies, although to a much less extent, may be inferred from the phenomena which are observed either essentially or contingently in their course. The secondary fever in small pox is apparently connected with the partial absorption or the more fluid parts of the matter contained in the pustules, and the change thereby produced on the blood, and through it upon the economy. Instances have come before me, where, upon the rapid disappearance of the small pox eruption, purulent matter was secreted suddenly and in large quantity in the capsules of the joints, and without any previous or coexistent inflammation of these parts. In such cases the purulent matter had evidently passed through the current of the circulation. (See Abscess — *Consecutive*, and Absorption.) Similar occurrences are not un-

frequent in cases of inflammation of veins, and in puerperal metritis. (See VEINS, &c.)

152. v. THERAPEUTICAL INDICATIONS AND MEASURES IN DISEASED STATES OF THE BLOOD. — The facts and observations now adduced in illustration of the *pathology of the blood* must appear sufficient to attract greater attention to the state of this fluid in the treatment of diseases, than has been directed to it in modern times. However scanty well ascertained facts connected with this subject may seem, they are at least sufficient to justify us in directing our means of cure to the removal of those changes which may be presumed to exist in this fluid. This indication is the more safely entertained, as those means are often at the same time the most efficacious in removing pre-existing or concomitant disorder of the nervous or other systems of the frame. And it should not be overlooked, in our anticipations of the benefit resulting from curative indications founded on these views, that the most certainly beneficial means of prevention and cure of a most dangerous disease admitted to depend chiefly on the blood, viz. scurvy, is a remedy which acts principally on this fluid, — the citric acid.

153. There are certain facts, which a review of the foregoing observations will lead us to entertain as useful data for our guide, both in the recognition of changes in the blood, and in devising means for their treatment. It will be apparent from what has been adduced, that remarkable diminution or exhaustion of the vital manifestations of the organic nerves, or of the vital energy generally, renders the blood dark coloured, prevents its fibrinous particles from adhering into a coagulum when removed from the vessels, disposes the colouring matter to separate from their central corpuscles, and occasions a diminution of its saline ingredients. The effects of various matters, vegetable, animal, and mineral, when gradually and circuitously conveyed, or directly introduced, into the blood, have been particularly described, not merely as evidence of the very important changes produced by them on this fluid, but also as furnishing indications for the removal of similar alterations, when they are the results, immediate or remote, of diseased actions.

154. *A. Treatment of blood abounding with fibrinous and albuminous constituents — of buffy blood, &c.* — In various diseases, particularly those which are inflammatory, in the early stages of the exanthemata, especially in certain epidemic occurrences of these maladies, the blood abounds in these constituents; and hence partly the copious albuminous and fibro-albuminous exudations which are thrown out by the blood-vessels in their progress. The knowledge, which we have already obtained as to the effects of certain substances on the blood, indicates the propriety of having recourse to such as possess the property of diluting and attenuating these constituents, at the same time that they diminish the vascular action which is instrumental in secreting them; and experience fully proves, by its success, the propriety of the treatment. Blood-letting, and afterwards the free use of diluents holding in solution the alkaline carbonates and salts, more particularly cream of tartar and borax, or the tartarized antimony; and digitalis, large doses of calomel, or other substances which have been shown to produce an attenuating effect upon the blood, are especially indicated. Blood-letting in those cases is of the utmost service, as it diminishes general action, and removes a portion of the fibrine and albumen which are replaced by the thinner fluids absorbed from the prima via and tissues.

155. *B. Treatment of blood with a loose coagulum, &c.* — Rapid coagulation and deficient adhesion of the clot have been shown to arise from weak nervous influence and vascular action; and indicate the propriety of having recourse to stimulating tonics, particularly when the smallness of the coagulum, and whey-like, milky, or turbid state of the serum, evince a poor and imperfectly elaborated blood. In this case, chalybeates, the sulphate of quinine, and the more permanent tonics, with the mineral acids, and the metallic salts, are especially required. When, in addition to this state, the blood is of a very dark colour, the combination of stimulants with tonics and the alkaline salts, especially the chlorides of potash or soda, will be found most advantageous. In cases of this description, however, the preparations of ammonia, excepting the muriate and acetate of ammonia, although stimulating, will not be found so serviceable as other saline preparations. When, however, the muriate and acetate of ammonia are combined with excess of acid, the use of them will be advantageous. Camphor, serpentary, and arnica, the essential oils, the turpentines and balsams, are all beneficial in this state of the circulating fluid.

156. *C. The treatment in other morbid states of the blood* will necessarily vary according to the particular appearances it may present.—*a.* When the blood coagulates imperfectly, is dark coloured, is readily decomposed, or is thin and dissolved as in scurvy, and various malignant and adynamic diseases, especially when the vital cohesion of the tissues is also impaired, the use of most of the remedies recommended above (§ 155.), particularly the chlorides, the preparations of bark, antiseptic wines, the oil of turpentine, camphor, the chloric and muriatic acids, with vegetable tonics, the nitro-muriatic acid, vinegar, citric acid, &c. The influence of *acids* in restoring the state of the blood, particularly when morbidly attenuated, and deficient in fibrine, appears to have been well known to the ancients, and the indications thereby offered put in practice. Vinegar was adopted by the Carthaginians and Romans in all their campaigns as the chief beverage, as may be gathered from VIRGIL, MARTIAL, PLINY, GALEN, &c.; and its advantages have been adverted to in modern times by LINNÆUS. There cannot be a doubt that both it and citric acid are particularly serviceable in preventing the attenuation, and tendency to dissolution, of the blood generated, as has been shown, by excessive fatigue and exertion, — causes which have often been proved (§ 134.) powerfully to concur with unwholesome food, and vegeto-animal miasms, in the production of scurvy, dysentery, and typhoid fevers. It appears that the scurvy, which was found so destructive in Admiral Anson's fleet, was in no small degree promoted by the excessive labour of the men at the pumps, — a species of exertion which tends more than any other to accelerate the circulation, and exhaust nervous power, and consequently to produce a dissolved and incoagulable state of the blood, and to dimi-

nish its fibrine. When, however, the blood is morbidly thick and carbonaceous, when the respiratory functions are imperfectly performed, and when there appears to be a deficiency of saline constituents in the blood, as in the advanced stages of fevers, the fixed alkaline salts, and chlorides, are much to be preferred to acids.

157. *b.* Since the general neglect into which the humoral pathology has fallen, *antiseptics* have almost been discarded from practice; at least, medicines have seldom or ever been given with an intention of preventing a tendency in the fluids and solids to dissolution. It must have been long known to every person who considered attentively the operation of remedies on the frame, that many of them, either directly or indirectly, produce this effect, in conjunction with other operations; and that they act in this manner, 1st, by exciting the organic nerves, and increasing the vital cohesion of the tissues, to which they are immediately applied; and, 2dly, by their passage, to a greater or less extent, into the circulation, and operation on the blood itself, and, through its medium, on the nerves supplying the vascular system, and on the structures generally, — the antiseptic effect being the sum of those actions. Amongst the various antiseptic remedies with which we are acquainted, there is none more energetic than the chlorides or chlorurets, the spirits of turpentine, camphor, the barks, mineral and vegetable acids, the spices and aromatics, metallic, earthy, and alkaline salts, spirits, and balsams; and observation has proved to us, that these are actually the means which, when appropriately employed, are most successful in removing morbid states of the blood, secretions, and solids. Needham and Paulet found salt most successful in combating an epizooty characterised by a morbid state of the blood; and I had an opportunity of ascertaining that, without a necessary supply of this substance, the natives of the more insalubrious districts in intertropical Africa are carried off in great numbers by a putrid and liquescent dysentery, for which salt, lime-juice, and cayenne pepper are their principal means of cure. It should, however, be remembered, that all stimulants are not also antiseptic in their operation on the blood. The preparations of ammonia have even an opposite effect, unless the muriate combined with an excess of acid.

158. *c.* During the treatment of all diseases in which the blood becomes more or less changed, it will be requisite to have strict reference to the causes from which the change has arisen. Unwholesome food, vegeto-animal miasms, imperfect secretion and depuration, and deficient nervous and vital power, have been shown to be the chief of these. That the first and second of these should be avoided, need not be stated; and that the secreting and eliminating functions ought to be promoted, in order to purify the blood, is equally manifest. The nervous and vital energies must be not only supported, but also promoted and excited, in order that the power of secretion may be afforded to the torpid and weakened viscera; and that the crasis and vital condition of the blood may be thereby restored, and the tonicity of the capillaries, and of the tissues generally, be increased. In addition to these, also, morbid secretions should be frequently evacuated, in order hat vital power may not be further reduced by their morbid impression on the nerves and mucous digestive surface, and that the possibility of the absorption of any part of them into the circulation may be thereby avoided. But, in carrying this indication into execution, care ought to be had as to the measures which we employ. Gentle means are generally requisite, as rhubarb, &c. But those substances, which, with an aperient operation, possess also a stimulating and antiseptic operation, as the oil of turpentine, should be selected; or, if other substances be preferred, they should be combined with tonics, antiseptics, and stimulants. Formulæ 266. 437. 572. in the *Appendix*, are good examples of this combination.

159. *d.* In all the alterations of the blood resulting from the introduction or absorption of morbid matters from parts previously diseased, whatever tends to lower nervous and vital power, or to promote absorption—more particularly blood-letting, which operates in both these ways — ought to be guarded against, and a diametrically opposite plan of cure adopted; not neglecting at the same time the promotion of the depurative and excreting functions.

160. *e.* In diseases where it seems evident that the watery and saline parts of the blood are drained off, by the continued exudations from the mucous surfaces, as in cholera, particularly epidemic cholera, diarrhœa and dysentery attended by dangerous symptoms, much advantage might accrue from the injection of warm water into the veins, holding a very small proportion of saline matter, particularly the muriate and sub-carbonate of soda, with a minute quantity of some mild stimulant and astringent, in solution; care being taken that the latter ingredient be not in nearly such quantity as to affect the albumen of the blood. Spirit of wine, ammonia, sulphate of quinine, &c. may be thus employed. (See Poisons, for *treatment of Poisoning of the Blood.*)

161. *D. Prophylaxis, or the prevention of morbid states of the blood.* — The extended enquiry which has been entered into respecting the causes of the alterations which take place in the blood, furnish the chief indications for preventing their occurrence. The primary influence of the organic nerves upon the blood, and the effect rapidly produced upon this fluid by a diminution or vitiation of this influence, having been conclusively shown in respect of changes directly produced by this class of nerves, both on the blood circulating in the vessels, and on the functions of secretion and depuration, it becomes a matter of the first moment to preserve the vital manifestations of this important part of the nervous system from experiencing depression or exhaustion; especially where causes having this effect are in operation, and where there is any risk of those morbid matters, which have been shown in this article to be the chief sources of vitiation, being carried into the blood; particularly those vegeto-animal, or animal effluvia, which, floating in a moist atmosphere, act both by depressing these vital manifestations, and by infecting the blood itself. Persons exposed to those sources of disease should live on a due proportion of farinaceous and other vegetable substances, with a moderate proportion of fresh animal food, and preserve the energies of the digestive and assimilating organs; always attentively promoting the functions of secretion, depuration, and excre-

tion. At the same time many of the substances mentioned above may be employed as beverages, condiments, or preventives; more particularly the medicines formerly denominated antiscorbutics, the citric acid, lemons, lemon-juice with sugar; vinegar in which the warm spices, as capsicums, have been infused; the chlorides, camphor, quinine, &c. As it has been satisfactorily shown that great excitement and acceleration of the circulation, besides exhausting nervous and vital power, have also the effect of changing, and even of corrupting, the state of the blood, such excitement should be prevented, and allayed when present, by appropriate evacuations, and by refrigerant saline medicines and beverages.

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BLUE DISEASE. SYN. *Cyanosis*, (*κύανος*, blue, and *νόσος*, disease,) Beaumes. *Morbus Cæruleus*, *Cyanopathia*, Marc. *Exangia Cyania*, Good. *Cyanose*, Fr. *Die Blausucht*, Ger. *Blue Skin*, *Blue Jaundice*.

CLASSIF. 3. *Class*, Sanguineous Function; 4. *Order*, Cachexies (*Good*). IV. CLASS, II. ORDER (*Author*, see *Preface*).

1. DEFIN. *A blue, violet, or purple colour of the integuments, particularly of parts usually presenting a rose or flesh tint, as the cheeks, lips, mucous surfaces, &c.*

2. A blue or purple colour of the integuments of parts, or nearly the whole of the body, may occur as a symptom in the last stage of various acute diseases. But it is present from the beginning of this affection, is frequently connected with comparatively little disturbance until some sudden change takes place, and generally results from chronic organic lesion. In other maladies this colour is an accidental, occasional, and not the most important symptom; in this affection it appears as the only, or the most remarkable, change observed during life.

3. ITS PATHOLOGY. — According to M. GINTRAC, who has directed much attention to this affection, it always proceeds from organic change of the heart or large vessels; the admixture of venous with arterial blood, and the distribution of it to the surfaces of the body, being the immediate or essential cause of the alteration of colour. This pathology agrees with the opinion of SENAC and MORGAGNI: it has, however, been disputed. M. CORVISART first threw out doubts of the constant origin of *cyanosis* in this source; and more recently MM. FERRUS, BRESCHET, MARC, LOUIS, FOUQUIER, and CRAMPTON, have adduced facts which seem to militate against it, while it has received the able support of M. BOUILLAUD.

4. M. FERRUS contends, 1st, That cyanosis sometimes has existed to an intense degree, and yet upon *post mortem* examination no lesion could be detected admitting of the admixture of venous blood; nor any organic change of the heart or respiratory organs: 2d, That the opening of Botal may continue unclosed for many years without blueness of the surface being occasioned: and, 3d, That the admixture and circulation of venous with arterial blood have been demonstrated to occur in some cases, without giving rise to this peculiar appearance. That the second and third objections are well founded seems almost incontrovertible. Numerous instances have been recorded by LOUIS, and others, which fully prove these facts. I have met with cases in children, where the communication between both sides of the heart seemed very free, and yet no alteration of the natural colour existed; and others, in which the change was evident during the paroxysms of suffocation only. But I must agree with CORVISART, RICHERAND, CLOQUET, GINTRAC, and BOUILLAUD, that the existence of this opening is no certain proof of admixture of the venous and arterial blood; for if the contractile powers of both ventricles are nearly equal, in relation to the resistance to be overcome, and if the natural openings of the cavities be not obstructed, no admixture of the blood in both sides of the heart could take place.

5. The principal force of the objections, therefore, urged by M. FERRUS, evidently rests upon the fact of the non-existence of organic disease of the heart, large vessels, or lungs, in some cases of the disease, — a fact which is still not satisfactorily established. I believe that it may be safely concluded, that the blue disease of infants

and children is very generally dependent upon a communication between the opposite sides of the heart, or some malformation of the heart or large arteries, particularly contraction of the origin of the pulmonary artery, or some other change affecting the circulation through the right cavities of the organ; whilst in older and aged persons, a similar colour of the surface may proceed from whatever obstructs the circulation through the large veins, lungs, or heart, and even from simple congestion of the venous capillaries from loss of vital power; and in these latter cases, the affection more nearly approaches the blueness observed to occur as a dangerous symptom of various acute diseases of the lungs and heart, as of asphyxy, and of pestilential cholera.

6. *Symptoms, progress, and terminations of blue disease.* — The bluish tint of the external surfaces, whence this malady derives its name, is not equally deep in every part. It is usually deepest over the whole of the face, and the lips in particular, on the hands, feet, and genitals. During any effort, or when crying, this symptom is much more marked than during repose: at the same time the parts presenting a bluish colour, or a violet of the darkest shade, are more or less puffed. The circulating and respiratory functions are rarely without derangement. The disordered circulation is characterised by palpitations more or less violent; sometimes accompanied by a very distinct bellows sound, and by a purring tremor, tendency to faintings, and serous effusions. The breathing is laboured and panting after the slightest effort. The warmth of the body is considerably diminished and patients are very sensible of cold. The functions in general, and principally those of locomotion, are more or less languid, and, as it were, benumbed.

7. The symptoms just described do not always exist in the same degree, during the continuation of the malady. It may even be said that the disorder is made up of a succession of paroxysms and remissions. In the paroxysms alone we observe those frequent faintings, that tumultuous palpitation of the heart, and suffocations, which endanger the life of the patient. No rule can be relied on as to the recurrence of these paroxysms; in fact, if it be certain that they are often brought on by over-exertion, fatigue, and violent mental agitation, it is equally certain that they occur without any assignable cause, and are more frequent in winter than in summer. The length of the paroxysm varies: it sometimes lasts several hours, and generally abates gradually. The *termination* of cyanosis is fatal to most patients; but some appear to recover entirely; others live for many years. Cases of this kind have been recorded by Morgagni, Sandifort, and Richerand. The death caused by this disorder is sometimes very sudden; but in the majority of cases it is preceded by an intense suffering, characterised by the most acute anguish, difficulty of breathing, fainting fits, and cold sweats. In a case of remarkable blueness from birth, in a girl, who was for some time under my care, the colour changed, in the course of two or three years, to dirty yellowish, chlorotic tint, which is still retained up to the thirteenth year. The disorder of the heart's action and respiration, in this case, although more or less considerable, was never very severe; but the child was always remarkably delicate, and incapable of any bodily or mental exercise.

8. *Lesions observed after death: and their connection with the symptoms.* — 1st, The most common lesion is the persistence or the re-establishment of the opening of Botal. This communication of the two auricles is generally accompanied by an obstacle to the passage of the blood from the right auricle into the corresponding ventricle, or from the latter into the pulmonary artery. Twenty-seven cases out of fifty three reported by M. Gintrac, presented such an obstacle. In twenty-six of these cases the circulation on the right side of the heart was impeded either by a contraction or by a total obliteration of the orifice of the pulmonary artery, and in only one case by the contraction of the right auriculo-ventricular orifice. Co-existent with these lesions is usually a hypertrophy of the right ventricle and auricle, or of one only of these cavities, with or without dilatation. Sometimes the ventricular cavity is itself contracted. 2dly, The ventricular partition has often presented a solution of continuity of more or less extent. 3dly, The arterial canal remained open in some subjects. 4thly, In one of the cases reported by M. Gintrac the two auricles (imperfectly divided) opened into the right ventricle: the latter being very large, communicated freely with the left, which (narrow and without auricular orifice) gave origin to the aorta. 5thly, In another case, the aorta and pulmonary artery sprung from the left ventricle, the right being almost obliterated, and the inter-auricular partition perforated. 6thly, In another instance, the opening of Botal was preserved; the aorta disappeared after having supplied the cephalic and brachial trunks; the pulmonary artery, receiving the blood from both ventricles, formed the descending aorta. 7thly, Such a transposition of the larger arterial trunks has been witnessed, as the aorta springing from the right ventricle, and the pulmonary artery from the left; the opening of Botal and the arterial canal still remaining, or only the latter. 8thly, In some cases the heart consisted only of one auricle and one ventricle. 9thly, Two superior venæ cavæ were seen, the one opening into the left auricle. It is unnecessary here to enlarge upon the other lesions noticed in persons afflicted with this complaint, because they do not necessarily belong to the subject.

9. As respects the *relation between the symptoms and lesions,* M. Bouillaud remarks, that the alterations pointed out in the central organs of circulation have usually the effect of permitting the black blood to mingle with the red; but some of these lesions, as previously observed, such as the opening of Botal does not necessarily entail this admixture; for which reason it is not invariably accompanied by blueness of the teguments; either the black blood not having mingled with the red, or the mixture being insufficient to produce the bluish colour. But when the arterial canal remains open; when the aorta springs from both ventricles jointly; or when, to the communication between the right and left cavities, is superadded an obstacle to the free current of blood in the former; a considerable quantity of black blood must necessarily mix with the red. Whenever an anormal communication between the cavities of the right and left divisions of the

heart co-exists with an obstacle to the circulation of the blood in the right ventricle or in the pulmonary artery, the mixture of the blood is not the sole cause of the discoloration of the skin, the puffing of certain parts, of various serous congestions, &c. In fact, it is evident, that the impeded circulation contributes mainly to the production of these phenomena. Should we not also attribute to the contraction of the auriculo-ventricular, or ventriculo-pulmonary orifices, the bellows sound and the purring tremor remarked in some patients? However this may be, some of the lesions coincident with blueness of the teguments are invariably congenital; while others (such as the communication between the right and left regions of the heart) may be either congenital or accidental.

10. The *causes* which develope most of the congenital lesions, from which blueness may ensue, are not easily determined on. But a communication between the right and left cavities of the heart may be occasioned by ulceration of the auricular and ventricular partitions, or by the rupture of these partitions, especially of the auricular, in violent and lengthened efforts. An obstacle to the course of the blood through the right auriculo-ventricular, or the ventriculo-pulmonary orifice, may also, particularly in the early stages of life, induce an anormal communication between the two auricles, by ungluing, as it were, the valvular laminæ, which, by their agglutination, have obliterated the opening of Botal. The existence of a similar obstacle at an intra-uterine period of life, when the opening still remains, may be also deemed a sufficing cause for its ultimate non-obliteration. (*Dict. de Méd. et Chirurg. Prat.* t. vi. p. 7.)

11. I am of opinion, not only that such obstacles have very generally existed during intra-uterine life, and been the cause of the blueness observed afterwards, but that they have also occasioned, during fœtal existence, a permanent state of distension; and thence, in some respects, malformation of the capillary system, particularly in the cutaneous and mucous surfaces, favouring congestion, and languid circulation through them after birth, and the consequent blueness, and the puffiness that generally attends it. I may add, as a matter of diagnosis, that very intense and general blueness is not uncommonly produced by the incautious internal use of the nitrate of silver. I have observed two or three such cases, and others are recorded by Albers, Roget, &c. (*Med. Chir. Trans.* vol. vii. p. 284.)

12. Treatment. — Art is of little avail in this malady. We must chiefly depend upon the efforts of nature in bringing gradually about a change in the lesions on which it depends; and attempt to assist her efforts, by directing bodily and mental repose, and a pure, mild, dry, equable and somewhat warm air; by attending strictly to the state of the biliary and other secretions, and the digestive functions; and by recommending gently tonic medicines, with an easily digested and nutritious diet. During the paroxysms, M. Bouillaud recommends blood-letting, — a practice which is by no means warranted by my experience. Depletions, and all other lowering means, aggravate the symptoms, and seldom or ever succeed in removing the severity of the paroxysms, for which he advises them. I have derived more advantage from stimulating pediluvia, frictions of the surface of the body and lower extremities, and the administration of gentle antispasmodics and stimulants. (See F. 348. 424. 663.) In one or two instances, I conceived that some advantage was derived from the preparations of iron combined with the fixed alkaline carbonates. (See also F. 94. 662. 718. 920.)

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BRAIN — its Morbid Structures.

Syn. Ἐγκέφαλος, Gr. *Cerebrum*, *Encephalon*, Lat. *Cerveau*, *Encéphale*, Fr. *Das Hirn*, *Gehirn*, Ger. *Cerebro*, Ital.

Classif. Special Pathology and Morbid Structures. IV. Class, III. Order (*Author*, see *Preface*).

1. With the view of avoiding unnecessary repetition, and of furnishing a complete account of the changes and morbid phenomena connected with the parts contained within the cranium, alterations of structure will be considered in the first place, and in systematic connection; and, afterwards, inflammations affecting either the brain or its membranes, will receive attention. As similar lesions develope themselves in the brain, or its membranes, in the course of a variety of diseases; and as many of those which are most commonly found upon dissection give rise to very different phenomena during life; their arrangement in a separate form will facilitate reference to them, when those specific states of disease, which they either originate in, or occasion, are being discussed. Thus tumours formed in the brain, or purulent matter secreted there, or induration or softening of the cerebral substance, &c. are not infrequently found in cases of either palsy, epilepsy, insanity, or encephalitis, without limitation to any one of them. Instead, however, of describing these and various other lesions, when considering each of these diseases, I shall here give a minute description of the morbid structures observed in the brain and its membranes, and refer merely, when discussing these and other diseases implicating the cerebral functions, to those changes most commonly found on dissection of fatal cases, as they are described in this article.

2. Of all the organs of the body, the brain is the most exquisitely and incomprehensively formed, and presents the least intimacy of connection between the results of dissection and the phenomena of disease. The most violent symptoms referrible to this organ often exist during life; and yet, on the most careful examination, after death, either no appreciable lesion, or none sufficient to account for the phenomena, can be detected. Whilst, on the other hand, many, and most important changes are frequently discovered in both the brain and its membranes, in cases which betrayed either no cerebral disorder, or none calculated to excite suspicion during life of any organic change. It is extremely important to be aware, not only of this fact, but of the circumstance just alluded to, that the same morbid appearances, or, at least, states so nearly alike

that they cannot be distinguished, will frequently be found after maladies very dissimilar as regards their cause, nature, and consequences. Thus, irritation of the brain occurring in the progress of fevers, and the exanthemata; convulsions, insanity, drunkenness, puerperal derangements, metastasis of gout, and various other diseases, will be attended with congestions, injection of the blood-vessels, secretions of lymph, or serum, or of air between the membranes, &c. — states in every respect similar to those proceeding from idiopathic inflammation. Nor should it be forgotten, that the kind of death, the particular circumstances attending it, and the position and changes to which the body is subjected immediately afterwards, tend very materially to influence the appearance and states of the parts within the cranium. In the view which I am about to take of the principal lesions of structure affecting the encephalon, I shall *first* notice the morbid states of its membranes; *next*, the lesions presented by its sinuses and other blood-vessels; and, *lastly*, the diseased appearances of the different parts of the encephalon itself.

3. I. Morbid States of the Membranes of the Brain.—The intimate connection which the membranes of the brain have with the cranial bones on the one side, and the brain itself on the other, and their expansion between both, render them extremely liable to participate in all the malformations, diseases, and external injuries of those parts. Whilst they most commonly, with the limpid fluid exuded between them, separate those parts, and facilitate the motions of the latter, they also often prevent the extension of morbid action from the one to the other. But they do not always succeed in thus limiting disease; for they frequently become secondarily affected during maladies commencing either in the skull or the brain; and, when thus involved, they, in some measure, become the medium of mutual infection. But the membranes are not only thus secondarily affected; they are also not infrequently themselves the primary seat of disease; and when such is the case, the parts on each side of them, particularly the brain, seldom fail of participating more or less in the disturbance. Thus we often find them the primary seat of congestion, inflammation, with its consequences, as effusion between them of various kinds of fluids; and the source whence disease has extended to the brain itself. Those changes are presented to our view, not only in the primary inflammations of the membranes, but also in several forms of fever; in morbid affections of the mind, tetanus, delirium tremens, convulsions, epilepsy, apoplexy, palsy, and other diseases, wherein we have reason to suppose that the brain itself is either primarily and principally affected, or participates largely in the morbid states of its envelopes.

4. i. The Dura Mater is often found *unusually adherent* to the cranium, even when the brain and its membranes have been quite free from change, but more commonly when chronic disease has existed in either the one or the other. It is also sometimes *slightly adherent* to the skull, and occasionally this want of adhesion is very remarkable. In some instances, the dura mater is *separated entirely* from a portion of the cranial bones. In some rare instances, the space is filled with a *watery fluid;* but this has only been met with in hydropic children. The separation is generally the result of external injuries; and either *blood or pus*, or even both, is usually found in the space between the bone and the membrane. In some cases, these effused fluids, particularly blood, either fluid or in coagula, are in considerable quantity, occasioning the usual symptoms depending upon pressure. *Lymph*, in various degrees of firmness, is also found between a part of the dura mater and the skull; and this, as well as *pus*, with which the lymph may be partially mixed, are generally the result of inflammations consequent upon external injuries. These appearances have been sometimes observed in fatal cases of epilepsy, but only when the patient has received some injury during the paroxysm. They are often connected with a puffy swelling of a corresponding portion of the scalp.

5. The *dura mater* itself may be here viewed as two membranes, closely united throughout by means of fine, close, cellular tissue: the exterior, or that applied to the cranial bones, resembling in structure, and performing the office of, periosteum; the interior, or unattached, being a reflection of the arachnoid, and having, as respects its functions, a more intimate relation to the included organs: the former being a fibrous; the latter, a serous membrane.

6. *A*. The *fibrous structure of the dura mater* is frequently more than usually *vascular*, particularly in fatal cases of apoplexy, paralysis, fever with cerebral symptoms, epilepsy, and in the congestions which occur in the last stages of whooping-cough, pulmonary diseases, asphyxia, and poisoning by narcotics. This state is, however, very different from inflammation, as the minute capillaries do not present the same degree of redness, particularly in the unattached or arachnoid surface. This structure is sometimes *tinged* with bile, and of a deep yellow colour through its whole extent, as in cases of acute jaundice, which are attended with comatose symptoms. After contusions, or when suppurations exist beneath or exterior to it, it is either yellow, dusky, bluish, brownish, or even blackish. It is also occasionally spotted with black, in some cases of melanosis. In some instances, this membrane seems *distended* from fluids effused in the cavities of the brain, or between the membranes: in others it is apparently *corrugated* or *collapsed*. This latter state generally proceeds from it having been punctured during the separation of the calvarium, the fluid which it had contained having thereby escaped. But it is sometimes noticed where no such accident occurs, particularly in extremely emaciated bodies, or in the very aged, when little or no water is collected beneath it. A more than *usual dryness* and *transparency* is occasionally observed in this as well as in similar structures. Unusual dryness is also sometimes conjoined with a *shrivelled* state, and *deficient transparency*. Otto thinks that this is one of the remote effects of inflammation.

7. It is but rarely *inflamed*, excepting from external injuries, and then generally in circumscribed patches of greater or less size. In these cases, the *injection* and *redness* are very remarkable, particularly in the vicinity of purulent formations and injuries of the bones, or where ulceration, discoloration, fractures, abscesses, &c. exist in its vicinity. *Suppurations*, in which the pus is

found between its layers, or on its outer surface, are very rare. Cases, however, are referred to by OTTO of this occurrence. When suppuration does occur, it is generally seated in its inner surface. In some of these cases, the purulent matter has eroded, and perforated the skull and layers of the dura mater exterior to it. *Thickening* of the dura mater is not an unusual result of chronic states of inflammation. It varies extremely in degree, and it is sometimes so great as to occasion symptoms of pressure and irritation. It is sometimes found in fatal cases of epilepsy and paralysis; and is occasionally conjoined to *induration* of the thickened part. *Ossification* of the fibrous structure of the dura mater is a comparatively rare occurrence, whilst ossific deposits in its free or arachnoid surface are very common. In the former case, the bony matter follows the fibrous arrangement of the membrane, and involves its substance. Two interesting specimens of this change are referred to by Dr. BRIGHT (*Reports of Medical Cases, &c.* vol. ii. p. 663.). Ossific deposits may likewise be ascribed to slight, or chronic states of inflammatory action.

8. *Tumours* also form in the dura mater. Those which are most intimately connected with it have a *fibrous* structure; whilst the *fungoid* tumours sometimes observed seem to be common to both this membrane and the arachnoid lining it. Nor are they limited to the dura mater, as supposed by LOUIS and the WENZELS; but they may arise also in the bones of the skull, as shown by WALTHER, GRAAFF, and SIEBOLD; and even in the pericranium, as contended for by OTTO, EBERMAIER, and CRUVEILHIER. *Osteosarcoma,* or *fungus cranii,* therefore, as stated by VON WALTHER, and *fungus duræ matris,* are merely different, although often simultaneously occurring forms of the same disease. (See § 17.) When fungous tumours originate in the dura mater, they not infrequently perforate the skull, by occasioning absorption of the superincumbent portion of bone: but they also often involve the bone in a similar change, giving rise to fungus cranii as now stated. They occur in every part of the dura mater, commencing more frequently in its inner coat, and are found oftener in this situation, than in the bone itself, or the pericranium. (See CRANIUM.)

9. *Other kinds* of tumour are occasionally found in the dura mater. But those of a constitutional origin usually commence either in the arachnoid covering the dura mater, or in the fine connecting cellular tissue. They, however, generally soon involve, not only this latter membrane, but also occasionally the cranial bones. Of these tumours, comprising the *scrofulous, scirrhous, carcinomatous,* and the *hæmatoid,* I shall make more particular mention in the sequel. Although sometimes found in the inner surface of the dura mater, they are met with only consecutively upon their original manifestation in some other part of the body. More rare than any of the foregoing, is the occurrence of *fatty* and *encysted tumours* on the exterior surface, or between the layers of the dura mater. They have been found in this situation by MORGAGNI, FRICKE, and OTTO; and, in very rare instances, have been observed to contain hair. *Scrofulous* tumours are less frequently found exteriorly to, and between the layers of, the dura mater, than in its internal surface.

10. *Unusual thinness* has been observed in some parts of this membrane; and some of its processes have been wanting, owing to their *absorption;* in some cases, without any obvious cause, but more frequently from the pressure of a tumour of the brain, or some other morbid enlargement. "The falciform process, and a part of the sensorium, have been wholly removed, and large portions of the dura mater and its processes have been found as thin as silver paper." (HOOPER, *Morbid Anatomy of the Brain, &c.* p. 29.) When portions of the *dura mater* are destroyed by any internal cause, or even by external injury affecting the bone, they are rarely or never *reproduced,* and never otherwise than by a thick or *dense cellular tissue* closely connected with the newly formed bone; or, if the bone be not produced, after having been destroyed, it assumes a fibro-cartilaginous state, and becomes consolidated into a common cicatrix with the integuments. *Rupture,* or *laceration* of the dura mater is generally the consequence of fractures of the cranium and concussion. It has, however, proceeded from violent coughing, after the superincumbent bone has been removed by fracture, or by trepanning, &c.

11. *B. Morbid states of the arachnoid covering the dura mater.* — The internal surface of the dura mater is lined by a reflected portion of the arachnoid membrane, the unattached surface of the dura mater thus consisting of a true serous membrane, intimately attached to, although different in its nature from, the fibrous structure which it covers. *Inflammation,* whether originating in the dura mater itself, or in this surface, chiefly manifests its distinctive characters and effects on this lining: and generally presents, especially in the early stages of the acute disease, a minutely injected state of the capillaries, with a bright red tinge of the whole surface. This appearance has been beautifully illustrated in the first of Dr. HOOPER's plates of lesions of the brain. When acute inflammation attacks this part, it is generally confined to one side, the longitudinal sinus or the falx furnishing the boundary of the disease. In very acute attacks, and in the advanced stages of inflammation of the dura mater, the internal surface becomes covered by a layer of *fibrinous lymph,* into which, as I have shown in respect of serous membranes generally, minute vessels may be traced, when the exudation of this substance has been proceeding for some days. It is usually diaphanous, very delicate, and forming a complete adventitious membrane. In other cases, a much thicker, opaque, and albuminous-like membrane, of much firmness, less vascular and less intimately adherent to the dura mater, is formed. Although the fibrine and albuminous matter exuded may be both abundant, and thus provided with vessels, it is seldom the medium of adhesion; or, indeed, at all adherent, to the arachnoid covering the convolutions: and if adhesions have formed, they are very slight in respect of this latter duplicature of the arachnoid, unless very acute inflammation also exists in the pia mater, directly opposite to the inflamed surface of the dura mater.

12. In more chronic forms of inflammation, this surface not infrequently assumes a *spongy appearance,* with more or less redness and marked injection of the vessels. In some cases it has a *villous aspect,* from a slight exudation of albuminous matter, and interstitial effusion of serum

in the texture of the arachnoid lining. *Purulent matter* is seldom formed to any considerable extent; but, when it is secreted, it usually spreads thinly over the membrane. It seems generally to proceed from the inflamed surface, without any distinct appearance of ulceration. In some cases, however, owing to adhesions of the membranes around it, circumscribed accumulations of pus are met with; and these may cause the erosion of the dura mater and bones exterior to them. Although the productions now noticed sometimes are observed to follow idiopathic inflammations of this part, they are more frequently the results of external injuries; and are more commonly met with in the parts which cover the hemispheres, than in the basis of the skull, unless there be a very general state of inflammation of the parts within the cranium.

13. *Adhesions* of the lining membrane of the dura mater to the arachnoid and pia mater are chiefly observed when both reflections of the arachnoid are inflamed, particularly in chronic affections of the cranial contents. The medium of adhesion varies considerably. It is frequently found to consist of a firm but thin exudation of fibrinous lymph or of albuminous matter: in some cases, delicate, diaphanous, and vascular; in others, thick, opaque, and less intimately adherent to the internal surface of the dura mater than the preceding. In a few instances, it is formed of fine filamentous bands passing through a more than usually copious effusion of serum; and occasionally the membranes are intimately and firmly joined, even without any very apparent medium of union, particularly at the centre of the part adherent. This is chiefly seen immediately over or near the situation of severe organic disease of the brain itself, as abscess, tumours, superficial ulcerations, &c. In some cases, the adhesions are so firm that, in attempting the raise the dura mater, the subjacent membranes, with a portion of the brain, are removed along with it.

14. *Ecchymosis* and *purple spots* arising from the effusion of blood, in minute patches, beneath its arachnoid lining, are sometimes observed in the unattached surface of the dura mater, and partake of the character of purpura. They are most commonly found in cases of cerebral disease, which has been complicated with chronic change of the biliary organs and deficient energies of life, — or with general cachexia. *Carbonaceous deposits*, or *melanosis*, have also been sometimes observed in the situation. Dr. BRIGHT believes them to be the result of extravasated blood. (See the art. MELANOSIS.) *Ossific deposits*, generally disposed in plates, or much thicker in the centre than the circumference, and varying much in number and situation, are also frequently found towards the surface of the dura mater. They seem covered by the arachnoid, are closely adherent to the dura mater, and formed between them. They occasionally present an irregular surface, or assume a nearly conical form, and are often connected with nervous diseases, particularly epilepsy. They are most frequently met with upon the falx, and near the part where the dura mater separates to form the longitudinal sinus.

15. *Tumours* not infrequently proceed from the internal surface of the dura mater. Many of those productions are actually formed in the arachnoid lining this surface; being only adherent, and often very slightly, to the proper structure of the dura mater, and in no way changing its characters. As these tumours increase in bulk, they gradually produce debility of both mind and body, particularly the former. Much of the severity and rapidity of these effects will, however, depend upon the rapidity of their formation. When small, and sources rather of irritation than compression, convulsive affections are oftener occasioned by them than paralysis: when large, they more frequently give rise to paralysis than convulsions: but either of them may be followed by any of those affections; mental weakness being the more constant, and often the most remarkable effect. Many, also, of the tumours developed in the dura mater can scarcely be said to originate either in its fibrous membrane, or in its serous or arachnoidal lining: but should rather be referred, at their commencement, to the cellular tissue uniting those layers. Amongst those which seem more frequently at least to originate in this latter situation, — although often involving, and in a very short time, all the layers of the dura mater, and even the parts adjoining, — the scrofulous, the cartilaginous, the hæmatomatoid, and the encephaloid or fungous tumours, require the most particular notice. The *scrofulous tumour* is found on the internal surface of the dura mater, having an organised, fleshy, solid, and humid appearance; and is but rarely met with, and only in connection with scrofulous disease in some other part of the body.

16. The *cartilaginous tumour* is generally seated in close connection with the dura mater, and under its arachnoid lining. It varies as much in the perfection of the cartilaginous state, as in its size. It is sometimes perfectly cartilaginous; at other times merely gristly. It is oftenest met with in the falciform process and tensorium; and is occasionally attended with ossific deposits in the same situations. Indeed, as remarked by Dr. HOOPER and Dr. MONRO, some of those tumours are partly ossified, so that the cartilaginous state seems to be often an intermediate stage between that of gristly firmness and complete ossification. A case is described, by Mr. WATSON, in Dr. MONRO's work, of a cartilaginous tumour, the size of a walnut, containing bony matter towards its centre, growing from the dura mater. The *sub-cartilaginous tumours* are often tuberculous, of a dirty white colour, always distinct, but often numerous, and varying from the size of a pea to that of a hazel-nut. They generally are found between the dura mater and its arachnoid lining, have a broad base, present a clean smooth surface when divided, are firm, and devoid of vascularity. They seldom affect much the superincumbent dura mater and bone, but deeply indent the substance of the brain.

17. The *malignant tumours*, which are occasionally met with in the dura mater, assume the *sarcomatous*, the *carcinomatous*, and the *fungoid* characters. The fungoid disease may be either *encephaloid*, or *hæmatoid*. The *encephaloid tumour* is not common. Its divided surface is cellular and spongy, and gives out a pap-like matter when pressed. Its structure is more generally approaching to the fungoid, than to the tuberculous. It seems to be entirely produced from the lining membrane of the dura mater, and is almost always connected with scirrhous or malignant

diseases originating in some other part of the body. The *hæmatoid tumour* is of the colour of venous blood, has a broad base, and a fungous, sometimes a tuberculous, structure. It is soft to the touch, is covered by a delicately lamellated tissue, thinner than silver paper. When divided, it appears spongy, and extremely vascular. It is very rare, and is always connected with the primary occurrence of the disease in some other part of the body. The *simple cyst*, or *watery tumour*, the *hygroma* of Dr. HOOPER, is seldom or ever observed in this situation, although frequently in other parts of the encephalon. A case of it, however, occurred to Dr. DUNCAN. The *acephalocyst*, or headless hydatid, has been found connected with the arachnoid of the dura mater, in a very few cases.

18. The CAUSES of malignant, or constitutional tumours in the dura mater, are generally external wounds or contusions, concussions, the scrofulous or syphilitic taint, and most commonly previously existing disease of a similar nature in other parts of the body.

19. The SYMPTOMS by which their existence may be inferred are extremely equivocal. At the early periods of their growth, they frequently give rise to little or no disturbance. Much, however, will depend upon the rapidity with which they are formed, and their situation. When they grow slowly, the portion of brain becomes gradually accustomed to, and, as it were, insensible of, the pressure; it seems to waste; and, if this compressed and atrophied part be not indispensable to the free exercise of the sensorial, intellectual, and locomotive functions, the disease produces no evident or sensible indication of its existence. But sooner or later the compression produced by them on the brain, or the irritation occasioned in the membrane, gives rise to symptoms of the most serious nature; frequently in a very sudden manner, sometimes more gradually. These chiefly consist of paralysis, epileptic convulsions, and apoplexy, occasionally occurring as suddenly as in the sanguineous forms of these diseases. Most commonly, however, and especially when the tumour is situated in or near the base of the brain, the symptoms, whether those of compression or of mental disorder, supervene more rapidly: sensation and volition gradually disappear from the limbs which correspond with the compressed portions of brain; the intellectual powers are obscured, and the patient soon becomes hemiplegic and idiotic. The gradual accession of hemiplegia, and of the other symptoms of compression, generally indicate that the paralysis arises from the developement of a tumour, rather than from the formation of an apoplectic effusion of blood. The frequent occurrence, also, of acute pain in the paralysed limbs, of epileptic movements, antecedent cephalalgia of a violent character, with obscuration of the intellectual powers, somnolency, a cachectic habit of body, or the occurrence of disease in other parts of the body calculated to taint the system, as the scrofulous, syphilitic, carcinomatous, or fungoid diseases, are also circumstances indicating the formation of tumours in the membranes of the brain.

20. These tumours usually give rise to further disease of the brain, or its membranes, before terminating life; such as inflammation of the parts adjoining, effusions of fluid beneath or between the membranes, adhesions of their opposite surfaces, destruction of the bones, softening and pulpy destruction, &c. of the cerebral substance; sanguineous effusion in this situation: and these increase the severity of the symptoms, and hasten the fatal termination. It should, however, be kept in recollection, that the effects produced by these tumours have in general no relation to their bulk. One of the circumference of one or two inches will often occasion (the situation and nature of the tumour being the same) as violent effects as another of four or five inches. It is, moreover, not to the tumour itself that the symptoms are to be imputed, but to the effects it produces on the brain and membranes.

21. ii. MORBID CHANGES OF THE ARACHNOID AND PIA MATER. — *A.* The ARACHNOID is so delicate, perfectly transparent, and so intimately adherent to the pia mater, except at the base of the brain, as to admit with difficulty of separation from it. That lesions, therefore, of the latter membrane should affect also the former, cannot be a matter of surprise. Indeed, the greater number of changes which I shall to have to notice in this section generally invade both these membranes simultaneously, although either of them may be affected in a more or less marked degree.

22. *Inflammatory action* gives rise, though very rarely, about the optic nerves and between the lobes of the cerebellum, to small patches of beautiful *vascularity* in the *arachnoid;* the surrounding portions of this membrane being opaque, and adhering to *inflamed* parts of the pia mater. It is, however, very uncommon to find, even in the most intense inflammation of these membranes, red vessels in the arachnoid. The most frequent results of inflammation in this situation are, *thickening*, and the effusion of a watery or *serous fluid* under it, raising and separating it, in places, from the pia mater, particularly in the intergyral spaces. The *fluid* secreted in this situation is generally transparent, but it is sometimes turbid and albuminous, occasionally opaque, and tinged with bile in jaundice. In rarer cases it is tinged with blood. *Thickening* and *opacity* of the arachnoid vary much in degree. They are occasionally so great as to obscure the vessels and membrane underneath it. Less frequent than the foregoing is the secretion of a *puriform matter*, under the opaque and thickened membrane, giving the appearance of a diffused suppuration; and still more rare is the deposit of *fibrinous lymph*, unless in a state nearly approaching to an albuminous substance, or a puriform fluid.

23. The effusion of a *serous fluid*, in excessive quantity, exterior to the arachnoid of the pia mater, and in the bag of the arachnoid coat, around the encephalon, forming *dropsy of the cerebral membranes*, is sometimes observed. It has been fully demonstrated by M. MAJENDIE, and confirmed by other enquirers, that this membrane secretes a fluid, in health, varying somewhat in quantity with the state of the brain, and of its circulation; that this fluid cannot be materially diminished, or entirely deficient, without morbid phenomena being produced; and that it may, in disease, not only be secreted in too large quantity, but also in modified quality. In some cases of chronic and congenital hydrocephalus,

particularly when accompanied with *spina bifida*, the effusion is chiefly in this situation. In those, it is usually pellucid, and the arachnoid is not materially changed in its appearance. In more rare cases, however, this fluid has been observed somewhat turbid, as well as excessive in quantity; and the arachnoid opaque and thickened. In these, it would seem to have proceeded from increased vascular action affecting this membrane and the pia mater. Effusion of a watery fluid, however, in this situation, is much less frequent than in the ventricles. It is commonly congenital and chronic in these latter cases; and it sometimes protrudes the membranes, in large watery tumours, through apertures in, or between, the bones of the head. Several cases of this kind have occurred to me in the Infirmary for Children. In dropsy of the ventricles, which is most common, producing almost all the large watery heads, the fluid is collected in the bags of the arachnoid and vascular membranes lining the cavities of the brain, so that it is contained, either in all, or the greater number of them, at the same time, which is most frequently the case; or in one of them only. Serum effused from the arachnoid and vascular membrane (pia mater) may thus be situated:—1st, In the sub-arachnoid cellular tissue; that is, between the arachnoid of the pia mater and this vascular membrane: 2d, In the great cavity of the arachnoid around the encephalon: 3d, In the different ventricles, and even in the cavity between the two folds of the septum lucidum (BRESCHET). The quantity of serum effused in these situations varies remarkably. In *congenital and chronic cases*, it is sometimes uncommonly great, filling up and distending enormously the cranial cavity; impeding or arresting the developement, altering the form, and even injuring or destroying the texture, of the cerebral substance, which is expanded in the form of a sac; that part of it above the ventricles sometimes consisting of the meninges merely. In *acute hydrocephalus*, the effusion takes place in a few days, and to a much less extent; and in *serous apoplexy* it may occur in a few hours. In these latter diseases, however, it is often a matter of dispute, whether the symptoms are more the result of the effusion, or of diminished vital endowment, and the state of circulation of the brain. (See DROPSY *of the Encephalon*.)

24. *Dryness of the arachnoid* is occasionally found after cases of excessive cerebral irritation, and where inflammatory action has been suspected. There can be no reason wherefore deficient secretion should not sometimes occur here, as well as in other serous membranes, as a result of inflammation. An *unctuous* state of the arachnoid is sometimes observed, particularly after erysipelas, abscess of the brain, discharges from the ear, paralysis, &c., and other states of disease, in which there was reason to infer the existence of inflammatory irritation of the membranes of the brain. *Adhesions* of the arachnoid to the opposite surface of the dura mater, by means of a cellular or firm albuminous false membrane, &c. have been already described (§ 13.). *Dark carbonaceous* deposits, similar to those noticed (§ 14.) in the internal lining of the dura mater, are also rarely observed in the arachnoid and pia mater. *Osseous deposits* also occur in the arachnoid, and are likewise rare.

25. *B.* The PIA MATER partakes in all the inflammatory states, and their consequences now described in respect of the arachnoid. The *vascularity* of this membrane varies greatly. Sometimes it consists chiefly of engorgement of its veins, imparting to it a dusky or purplish hue, without any sign of inflammatory or other change. Occasionally this congestion is attended with injection of the arteries, and increased redness only, or with these in conjunction with one or more of the lesions now referred more immediately to the arachnoid.

26. Slight *effusions of blood*, and patches of *ecchymoses*, varying from the size of a split pea to that of a half-crown, are occasionally found lying upon the surface of the convolutions, and retained between the meshes of the pia mater. This state arises from concussions of the brain, and congestions consequent upon suffocation, poisoning by narcotics, and the advanced stages of disease; also from obstructions in the vessels returning the blood from the brain. A layer of *fibrine* is sometimes, but rarely, observed as a consequence of effusions of blood between the pia mater and brain; the serum and red particles of the effused blood having been absorbed, and its fibrine remaining.

27. The *pia mater* and *arachnoid* are occasionally separated from the convolutions in consequence of concussion; and in some cases, particularly after acute or recent inflammations, they may be removed from the cerebral substance with scarcely any force, or with much less than in health, the vessels being loaded with blood. OTTO thinks that the *easy separation* of the vascular membrane from the brain originates in the effusion of lymph beneath the membrane, loosening its connection to the cortical substance. On the other hand, after chronic inflammation, occurring without effusion under the membranes, but with a considerable effusion into the ventricles, they are often found so *closely adherent* to the convolutions, that they cannot be separated, but in very small fragments, and then not without bringing away with them portions of the cineritious substance of the brain.

28. Patches of *yellow, albuminous, or albumino-puriform* matter, are sometimes found on the upper surface of the pia mater, between it and the tunica arachnoidea. These patches are usually small; but they are occasionally very large, and diffused over nearly the whole of one hemisphere. Dr. HOOPER has observed them covering nearly the whole of the base of the brain, so as to envelope most of the nerves. This appearance seems to result from a more than usually intense state of inflammation, as all the membranes are found inflamed, and the blood-vessels loaded with dark blood, and to differ but slightly from the effusion of *pus* and lymph already described in connection with changes of the arachnoid. *Ulceration* and *mortification* are very rare consequences of inflammation of the pia mater. They may, indeed, be rather considered as superficial ulceration and gangrene of the brain. Cases, however, have been met with, sometimes connected with superficial suppuration, affecting chiefly this membrane. (BUZZI, MORGAGNI, DUBREVIL, OTTO.)

29. *Tumours* often grow from the *pia mater*. The *scrofulous kind of tumour* or *tubercles* are not very rare in this situation. When they occur,

they sometimes reach a large size, and break down into a puriform fluid, forming circumscribed or encysted abscesses on the surface of the brain. Leiveillé found them as large as an egg, in an idiot. Cases are also described by Earle, Abercrombie, Otto, and others. Tumours *of a sub-cartilaginous structure* are very rarely met with in the pia mater, although occasionally in the *choroid plexus*. They are usually of the size of a pea, round or oval, laminated, cartilaginous in the centre, exteriorly tuberculous, and covered with a delicate vascular membrane.

30. True *encysted tumours* are also sometimes met with in the pia mater. Otto describes one of immense size, — six inches long by three broad, — found on the right hemisphere of the brain of the Duke of Saxe-Gotha. Esquirol met with a tumour of this kind containing fat; and similar instances have been recorded. *Ossific deposits* and *earthy concretions* have been rarely observed on the internal surface of the pia mater, dipping down into the structure of the brain.

31. *Serous cysts*, the hygroma of Dr. Hooper, consist of a delicate and transparent membrane, filled with a clear, limpid serum. There is in some cases only one, in others two, three, four, or even more. When solitary, they vary from the size of an orange-pip to that of a walnut; but they are seldom much above the bulk of a large pea. When numerous, they are usually much smaller. They are very rare in the membranes of the exterior surfaces of the brain; but they are very common in the *choroid plexus*, where they are frequently in clusters. They have been mistaken for hydatids, but are merely simple cysts, containing a serous fluid. They have likewise been found in the adventitious membranes formed on the surface of the brain. They generally furnish no symptom by which their existence can even be suspected during life. The *acephalocyst*, or headless hydatid, is seldom or never found in the pia mater. Five species of the *Cysticercus*, or the bladder-tailed worm, namely, the *C. tenuicollis*, the *C. Fischerianus*, the *C. dicystus*, *C. punctatus*, and the *C. Finna*, have been discovered respectively by Brera, Fischer, Laennec, Treutler, and Werner, either in the pia mater or *choroid plexus*. (*Art.* Cysticercus, *Dict. de Méd.*)

32. *Fungoid*, *hæmatoid*, and other malignant *tumours*, are sometimes found in the pia mater and arachnoid; but I believe they are seldom or never met with as a primary disease, but associated, as a consecutive change, with fungoid or malignant disease in some other part of the body. When they grow to any considerable size, they become deeply indented into the convolutions; producing at first irritation, and afterwards, as they increase, symptoms of pressure. When, therefore, such phenomena present themselves in persons with fungoid disease, we may suspect its developement also in the brain.

33. *C.* The Choroid Plexus, and the *vascular plexus* of the fourth ventricle, which are all productions of the pia mater, are often found remarkably *distended with blood*, and their *vessels varicose*, particularly when the pia mater has its vessels overcharged. The choroid plexus is also sometimes uncommonly *pale and exsanguine*. This generally occurs when considerable effusion of serum has taken place in the ventricles, especially when the effusion is connected with debility. Sometimes the plexus contains a number of *transparent vesicles* (see § 30.), and it occasionally presents a *granulated* or *fleshy* appearance. This has been ascribed to a morbidly enlarged state of the glandular apparatus, with which, in the opinion of some anatomists, this structure is naturally provided. *Gelatinous tumours* about the size of a bean, and surrounded by a cyst, have also, though rarely, been observed in this situation. Tumours of a *cheesy* or *sub-cartilaginous* consistence, the size of a pea, are likewise found, in some rare cases; and occasionally these tumours contain *ossific deposits* in their centres. *Bony* and *earthy concretions* are still more rarely met with in the choroid plexus than in the membranes. All these morbid changes have been most frequently observed in apoplectic, epileptic, and paralytic cases; but they have also been frequently detected where no particular symptom referrible to the nervous system had manifested itself during life.

34. The *membrane which lines the ventricles* is naturally extremely thin and transparent. No blood-vessels, excepting those which ramify over the corpora striata and thalami from their trunks, which pass by the side of the tænia semicircularis, are usually observed in it. The vessels, however, of this membrane are sometimes found much enlarged, and gorged with blood, particularly when a fluid is collected in the ventricles, so as to distend them beyond their natural capacity. In this state the membrane is not only more vascular, but also much firmer and thicker than natural. The septum lucidum is sometimes as thick as the dura mater, and very firm; but more commonly, those parts of the membrane which are thickened and rendered opaque, are also soft and pulpy.

35. *Coagulated albumen* is occasionally found on the surface of the ventricles. It is sometimes met with in layers on the corpus striatum and the thalamus. I have found it of great thickness; and in one case, which recently occurred to me at the Children's Infirmary, it nearly filled both ventricles. *Ulceration* proceeding from inflammation is occasionally met with in this surface, particularly in the corpus striatum. It seems generally to arise from the formation of a small abscess or purulent collection under the membrane, which it ruptures, the fluid thus escaping into the ventricle.

36. *D.* Inflamed states of the *pia mater*, with ulceration, puriform secretion, are, as well as other lesions of this description in other parts of the brain, most frequently occasioned by external injuries. Inflammatory irritation, affecting the arachnoid and vascular membrane either of the periphery of the brain or of the cavities, is not an unusual consequence of injuries of a serious character sustained in other parts of the body, as after compound fractures and contusions of the limbs and joints, severe burns, &c. In these cases, a similar state of the membranes, as well as a nearly similar kind of delirium to that which has been called delirium tremens, sometimes occur. Inflammatory states, either with dryness of the membranes, but more frequently with effusions of various kinds, often take place in the progress of acute diseases, particularly fevers, and the exanthemata; from drunkenness, accidents, concussions, or mental excitement; whilst congestions, effusions,

and infiltrations of blood, proceed generally from interrupted circulation through the heart and lungs, narcotic poisons, asphyxia, &c., and frequently are attended with convulsions, stupor, coma, paralysis, &c. The adventitious formations are usually the result of a cachectic habit of body, as scrofula, deficient vital power, and the vitiation of the system by syphilis, and the cancerous or carcinomatous taint.

37. iii. Diseased States of the Sinuses of the Dura Mater. — *Inflammation* of the sinuses is sometimes observed, in its advanced stages and consequences, and but rarely at the early periods. In this latter case, they manifest chiefly increased vascularity, and redness of their internal lining, with slight thickening and friability, sometimes with softening, and occasionally with abrasion, and give rise to the following changes, seated immediately within the part of the vessel which is inflamed: — 1st, To the coagulation of the blood in contact with, and its adhesion to, the inflamed surface of the vessel: 2d, Subsequent discolouration of the coagulum, and its conversion into a state nearly resembling that of coagulated lymph: and, 3d, The presence of pus, which is usually found in the middle of this coagulum, though not always. *Thickening* of the membranes forming the parietes of the sinuses is occasionally remarked, and is evidently a result of a slow state of inflammatory action, affecting chiefly the fine cellular tissue connecting the serous lining to the fibrous membrane. Sometimes their parietes are remarkably thick and dense, almost approaching to cartilage, this morbid change being chiefly seated in their connecting cellular substance. Firm *fibrinous formations*, or *coagulated lymph*, are also occasionally formed in these vessels; in some cases, conjointly with marks of inflammation in them; the internal tissues of the vessels being red, injected, congested, and of a dark colour; and in others without any very marked appearance of such disease, but with evident thickening of their parietes. In several instances I have observed these formations disposed in the form of false membranes within the sinuses, and adherent to their serous lining. While the more exterior surface of these false membranes, or that next the vessel, is generally firm, the interior of the canal which it forms is soft, and contains a purulent like matter mixed with a concrete albuminous substance.

38. In other instances, no fibrous concretions are formed, nor is the vessel perceptibly inflamed, and yet *pus* is found in parts of the sinuses, either distinct and in considerable quantity, or mixed with firm coagula, or with clots of blood, and in small quantity. In these cases there is reason to suppose that pus has been carried by the veins into this situation from an adjoining part. In some cases it occurs accompanied with an albuminous-like effusion, more or less concrete, or with firm fibrinous coagula, and an inflamed state of the internal membrane of the vessel. In many, the presence of pus is connected with an apparent abrasion, and even ulceration of the internal surface of the sinus; but in others, increased vascularity, with patches of deep redness, or of congestion, with a deep lividity, and, occasionally, slight thickening with diminished cohesion of the parietes of the vessel, are most remarkable. In all these, there can be no doubt that the puriform fluid is deposited in this situation from the surrounding inflamed parietes of the vessel.

39. The lesions now described are most frequently connected, in adults, with chronic disease of the bones of the cranium; and, in rarer instances, with disorganisation of the brain itself and of its membranes. They are most frequent after fractures of the skull, and external injuries: and I believe that they are occasional consequences of the worst forms of erysipelas of the head; a case of this description having occurred to me, in which inflammation of the sinuses of the dura mater was found upon dissection. They are more common in children, according to my experience, than in any other class of patients; particularly from the age of one and a half or two years to ten or twelve. I have observed the appearances now described in several cases of cerebral disease; or, at least, of cases terminating with the usual symptoms of pressure on the brain, following severe states of porrigo, ulcers of the scalp, and chronic diseases of this structure, particularly in scrofulous, weak, and ill-fed children. The observations of M. Tonnellé and of M. Ribes fully agree with my experience as to the pathological relations of these lesions of the sinuses.

40. The sinuses also present a *vermilion colour* of their internal membrane, like that which is sometimes found in the arterial system. This appearance is most probably caused by a morbid state of the blood; and it may be, on some occasions, a *post mortem* change, arising from the staining of the internal surface of the vessels by the colouring part of their contents. In respect of the *state of the blood* itself in the sinuses, much diversity exists: the quantity contained by them also varies greatly. More frequently they are empty, or nearly so. When they contain blood, it is in some cases dark, semifluid, or thick; in others, less dark, and more fluid; in the greater number, either altogether or partly coagulated. In a few, it is separated into a serous or serosanguineous fluid, and a fibrinous coagulum having no connection with the parietes of the vessel, the coagulum consisting entirely of the fibrine of the coagulated blood, and not of the albuminous fibrin, or coagulated lymph, already described (§ 36.). In some cases, one or more of the sinuses is filled with a dense, firm, and brown *coagulum*, perfectly continuous throughout; branching even into the veins which open into the sinuses; and not interrupted, soft, and forming variously sized clots, such as are often found after death. This state of the contents of the sinuses is seldom or never connected with inflammation of its parietes, unless the inflammation has occasioned, by means of the albuminous matter effused, a complete obstruction of the vessel, and, consequently, the accumulation and gradual coagulation of the blood beyond it; being a change in these fluids independent of organic lesions of the parietes of the sinus, unless such lesion occasion obstructed circulation through it.

41. The firm, dense, and continuous coagulum now described is evidently the result of a slow coagulation proceeding in the sinuses previous to death; and, in every instance in which I have observed it, has arisen from obstruction in the return of blood from the sinuses, owing to compression of the jugular veins, by tubercles, scrofulous tumours, or other organic changes obliter-

ating the canals of these vessels, or of the sinuses themselves; or from a stasis of the blood, followed by coagulation in these vessels, arising in consequence of great cerebral conjestion, joined with the utmost general adynamia. There is no doubt that the effusion of lymph, in any of its states, or even of purulent matter, will, while in connection with the internal surface of an inflamed vessel, or mixing with the blood in it, dispose this fluid to coagulation; forming a nucleus around which coagulation will proceed, or a point from which it may depart. And such seems to be the source of the more or less extensive and continuous coagula, which we frequently find in connection with inflammatory lesions and formations in the sinuses. But such is not the case here. In the course of an extended experience at the Infirmary for Children, I have observed, in several cases, that this state of dense coagulation of the blood in the sinuses manifestly supervenes before death, owing to the general and local conditions now stated, and gives rise to all the symptoms of more or less complete and sudden compression of the brain, owing to the consequences I am now to notice as arising from it, in common with other causes of obstruction in the sinuses. In cases of this description, if no effusion of blood have occurred, the veins are found generally engorged with dark blood. In some cases, the distension of the veins had given rise to an exudation of blood, or rupture of several of their minute distributions, with copious extravasation of this fluid; and in many, the distension of the veins was accompanied with copious effusions of serum in the ventricles, between the membranes, or in both situations.

42. The *glandulæ Pacchioni* are sometimes so much increased in number and size as to obstruct the passage of blood through the sinuses; give rise to the appearances now described; and thus, as the other changes in the sinuses, terminate in some one or other of the apoplectic states. Mr. EARLE (*Medico-Chirurg. Trans.* vol. iii. p. 66.) has observed these glands changed to the appearance of grumous blood, in connection with fungoid disease in the brain. They are more frequently enlarged and hardened; and, occasionally, they cause an absorption of the dura mater, with corresponding depressions in the superincumbent bone.

43. The *bands* which cross the longitudinal sinus are occasionally more numerous than natural; and they are sometimes thickened, particularly in connection with a similar change of the parietes of the sinus.

44. The *veins on the surface of the brain* sometimes contain a few bubbles of air; but it is doubtful whether this is a morbid state or a *post mortem* change. They are occasionally filled with *fibrine*, particularly in those cases which presented a corresponding state of the sinuses. *Pus* has also been observed in them, especially in cases of inflammation, with secretion of pus under the arachnoid.

45. *Ossification* is detected only in the *arteries;* but it occurs in them very frequently, and to a very great extent, particularly in advanced life. The early stages of this change have also been discovered in youth, although rarely. The arteries most commonly found ossified are the internal carotids and the basilar; but the circle of Willis, and the vessels departing from it, as well as the arterial ramifications which appear between the convolutions, and come out upon the surface, often participate more or less in this morbid state. *Cartilaginous* degeneration is still more extensive, and seems to precede the ossific deposits. Cartilaginous and ossific formations in the coats of the arteries of the brain occasion irregular distributions of blood, and interrupted or imperfect supplies of this fluid to some parts of the organ; disposing to aneurismal dilatations, to rupture, and, consequently, to the production of apoplexy and paralysis. In most instances of extravasation of blood in the substance of the brain, this condition of the arteries exists; and is, most probably, the cause of the extravasation, by disposing it to congestion, and rupture from increased action of the heart.

46. *Aneurismal dilatations* of the arteries of the encephalon are by no means very uncommon: they are most frequently met with in the carotids after they have entered the cranium, in the large branches, and in the basilar artery. They may derange the circulation of the brain, or may occasion effusions of either blood or serum, without themselves having been ruptured; but they more frequently break, occasioning apoplexy. The arteries, particularly those about the base of the brain, and some part of the branches forming the circle of Willis, are also occasionally *obliterated* and reduced to a thin chord.

47. II. LESIONS OF THE SUBSTANCE OF THE BRAIN. — The morbid states of the brain have been investigated in modern times with the greatest success and advantage to practical medicine. The labours of REIL, SERRES, LALLEMAND, WENZEL, GALL, ROSTAN, ABERCROMBIE, HOOPER, CRAIGIE, and DUNCAN, have chiefly tended to this advancement; whilst a number of other enquirers have added much of importance, as well as confirmed the observations of more original enquirers.

48. i. INFLAMMATION OF THE SUBSTANCE OF THE BRAIN, — *Encephalitis,* — *Cerebritis.* — *A. Acute inflammation* of the brain does not frequently occur as an idiopathic or primary and uncomplicated malady. It is in consequence of previous disease, as fevers, the exanthemata, inflammations of the ears, extravasated blood, tumours and tubercles of the brain, of poisons, and external injury, that it comes most frequently before the pathologist. Resulting from injury, it is generally limited in extent, although intense in degree. The whole brain is rarely or never affected at the same time, but only a part of it; and the disease is seated either in the vascular membrane, or in the cortical substance, or in the medullary matter of the interior parts, of the brain, or in them all simultaneously. The part affected first becomes vascular, and the injection of the vessels proceeds till the cerebral substance displays a red tint, deepening, as the disease advances, until it assumes a reddish brown, and, occasionally, even a brownish or green shade. With this increased intensity of disease, the part becomes softer than natural. The formation of matter, however, is not so frequent a consequence of this form of inflammation as of that of a sub-acute or chronic kind, occurring in persons of a scrofulous diathesis, and unhealthy habit of body, unless when a foreign substance, or piece of bone, has been driven into the brain. Somewhat similar to inflammation,

although decidedly different from it, is that state of *morbid irritation* frequently met with in fevers, especially typhus, eruptive diseases, epilepsy, delirium tremens, tetanus, convulsions, hydrophobia, nostalgia. In these diseases, vascular turgescence and red injection of the brain, are usually seen; but not the general red colouring, the spot-like effusion of blood, and the change of consistence, which characterise acute inflammation of this structure.

49. Acute cerebritis occasions violent headach, intolerance of light, acuteness of all the senses, delirium rapidly succeeded by convulsions, coma, and death. When it arises from morbid poisons affecting the system, as in gaol and camp fevers, purulent formations are more frequently met with, as stated by Pringle and others. In these cases the symptoms are somewhat varied; the prostration of the powers of life being much greater, and the delirium of a much lower grade. In those diseases, the *post mortem* inspections, when numerous, will furnish examples of the various stages of lesion, from the first appearances of injection of the vessels to the formation of matter, or complete destruction of the part chiefly affected.

50. *B. Suppuration of the brain,* — *Abscess of the brain,* — *Apostema cerebri.* — Collections of purulent matter have been often found in the brain, generally as a consequence of inflammation of a sub-acute or chronic kind. Of this the writings of Bonet, Morgagni, Lieutaud, Baader, Stoll (*Rat. Med.* i. p. 285.), Frank (*Acta Inst. Clin. Viln.* Ann. 1. p. 75.), Prochaska (*Anat. Acad. Fasc.* part ii. sect. ii. cap. 2.), Schaeffer (*Hufeland und Himly, Journ. der Pr. Heilk.* 1809.), Portal (*Mémoires de l'Acad. des Sciences*, 1780, p. 315.), Lallemand, Baillie, Brodie, Powell, Hooper, and Abercrombie, furnish numerous examples. The situations of these abscesses vary considerably, as well as the kinds of abscess formed. *a.* Sometimes the purulent collection is lodged in an irregular cavity, and appears unsurrounded by any distinct cyst. These take place to a greater or less extent, and consist most commonly of purulent matter mixed with flakes of lymph, giving it a slight curdly appearance. They are most commonly found in the anterior lobe of the cerebrum, or in the centre of the hemisphere. Some of the abscesses of this kind seem to consist of several small cavities communicating with each other: these are usually found also in the anterior lobes, the centres of the hemispheres, or near the striated nucleus of Reil. *b.* The next species of abscess consists of a distinct, firm cyst, or even cysts, as observed by Lallemand, and seems to have been the result of a slower process of formation, and of a less acute form of inflammation: it contains purulent matter, and is most frequently found in the centre of the hemispheres, particularly just above the central oval of Vieussens, or at its margin. Abscess of the brain has also been met with immediately below the *cornu ammonis;* likewise near the parietes of the small posterior cornu of one of the lateral ventricles, and just below the unciform eminence which rises into the interior of this cavity. In one instance only (*North Amer. Med. and Surg. Journ.* 1818.), have the *tubercula quadrigemina,* and pineal gland, been the seat of abscess.

51. *c.* Purulent matter is also found in some part of the brain, infiltrated, as it were, into the cerebral substance in the form of a number of minute drops, and occupying a considerable extent, but not lodged in any single distinct cavity: the parts surrounding the purulent infiltration presenting scarcely any other appearance of change, excepting more or less softening, which is always present, and seldom any sign of augmented vascular action. This morbid state is frequently observed as the consequence of the transit of purulent matter into the circulation, which, in some cases, is secreted from the vessels in the substance of the brain, giving rise to the infiltration. This phenomenon takes place much more frequently in the parenchyma of other organs, as of the liver, lungs, and spleen, than in the brain. The infiltration, whether proceeding from this source or not, often passes into the condition of distinct collections, varying in number and size; and sometimes they nearly or altogether communicate. In such cases, the cerebral substance separating these collections seems as if it were softened, or broken down into the purulent matter, and often processes of the cerebral structure, still adhering to the surfaces surrounding these collections, are floating in them, appearing as the debris of a portion of the disorganised brain. In these cases an approach is made to the formation of a regular cavity. In other instances, if the disease is less rapid, or does not destroy life before further local changes take place, a distinct cavity is effected, which, at first, consists of the cerebral substance merely, softened, discoloured, and vascular. M. Andral thinks that the following characters presented by the cavities containing purulent matter are the result of subsequent changes which the surfaces of these cavities undergo, and not the result of an original dissimilarity of structure. As to this point, I think his reasoning inconclusive, and his proofs insufficiently strong. It, however, should be admitted, that the purulent infiltrations, and collections in either of the forms now noticed, are those which take place most rapidly, and which are generally observed in *post mortem* researches, in cases of death taking place soon after the symptoms of cerebral disease had supervened; whilst the encysted form, as I have already stated, are those which manifestly form most slowly.

52. *d.* The different kinds of parietes surrounding the collections of matter in the brain, according to this able pathologist, are, — 1st, The cerebral structure itself, which, in recent and acute cases, forms the only envelope of the purulent collection; but which may assume the following appearances successively, according to the duration of the disease. 2d, A cellulo-vascular substance, extending over the whole of the internal surface of the cavity, or merely in parts. 3d, A true membrane, which is as yet soft, and flocculent, but yet admitting of separation from the adjoining nervous substance. 4th, A fine membrane, presenting a distinct organisation, and capable of being detached either in pieces or entire. Once arrived at this stage, their internal surface often has the appearance of villosities, whilst sometimes the cyst is composed of two or more distinct layers, which may be detached from each other. In these cases, the cysts are thick, as remarked by Professor Lallemand; the internal layer, or cyst, being of a reddish white, and presenting the appearance of a mucous sur-

face slightly inflamed. In a case noticed by this author, in which three distinct layers, or cysts, were observed, the exterior was cellular, adhering to the cerebral substance; the middle one thick and firm; the interior layer closely resembled a mucous surface. MECKEL, however, espouses a different opinion from ANDRAL, as to the formation of abscesses contained in distinct cysts. These are not, according to him, owing to advanced changes in the organisation of the walls of the purulent collection; nor are they to be ascribed to suppuration of the cerebral texture itself; but to inflammation and suppuration of an adventitious structure, developed in the cerebral substance. His reasons for this opinion, are,—1st, That those cysts adhere but very loosely to the surrounding cerebral texture: 2dly, That this texture is not hardened, but, on the contrary, softened, immediately around them.

53. The cerebral substance in which the purulent infiltrations and collections of the first grade are found, is generally softened, and, excepting when they arise from the absorption of purulent matter into the circulation, more or less injected. In cases of purulent collections contained in more or less distinct cysts, or membranes, the surrounding structures are often but slightly altered, and occasionally not even perceptibly so. But when the collection has much increased, or continued long, the nervous substance surrounding the cyst becomes irritated, inflamed, discoloured, and softened; and then only supervene those symptoms which evince, unequivocally, the existence of abscess or serious organic lesion: for, up to this period, the abscess may have been proceeding, but so slowly as not to disturb the functions of the organ, until, owing to some determining cause, in conjunction with the changes taken place in the cyst, its contents, or with its size, the substance of the brain surrounding it becomes diseased.

54. Abscesses, whether immediately surrounded by the cerebral structure, or contained in more or less distinct cysts, may vary in number from one to six or seven, each distinct from the other, and seated in various parts of the brain. They may present appearances of ulceration in their parietes; and they may be accompanied by a variety of other lesions of the brain and its membranes, generally in different subjects, but occasionally even in the same case. Inflammatory appearances of the membranes; effusions, serous or albuminous, in either the external or internal surfaces of the organ; softening of the structure, tumours, occasionally hardening, &c.; are their usual attendants.

55. *e.* In respect of appearance, the pus found in the brain differs in no way from that formed in other textures of the body. M. LALLEMAND (*Récherches Anatomico-Patholog. sur l'Enceph.* &c. let. iii. p. 361., let. iv. p. 41.), whose numerous observations of purulent collections in the brain have enabled him to give much interesting information on this topic, states, that he has observed it of a yellowish green tint, yellowish, yellowish white, greenish, greyish, yellowish grey, whitish grey, dirty white, and altogether white. He, as well as ABERCROMBIE, has frequently found it extremely fœtid. This fœtor of the pus I have observed in several cases of abscess occurring in young subjects, from the extension of inflammation of the ear to the brain. In a case of this description, reported in the *Medico-Chirurgical Review* for Dec. 1830, the fœtor of the purulent collection was extreme; and the cerebral substance surrounding it greenish, disorganised, and broken down into the contained matter. Abscesses formed within the substance of the brain occasionally make their way to some part either of the external or of the internal surface of the organ: thus they sometimes break into the ventricles, as in the case just now alluded to: when they open upon the periphery of the cerebrum, they occasionally destroy the bone and intervening membranes in its immediate vicinity, before death is occasioned. M. ANDRAL says, that he has observed an abscess of the brain destroy the cribriform plate of the ethmoid bone, and escape externally through the nasal fossæ: and MM. ITARD, LALLEMAND, and others have shown, that abscess of the brain, from an extension of inflammation from the ear, may destroy the petrous portion of the temporal bone, so far as to admit of the evacuation of the abscess by the ear. In cases originating from this source the matter is frequently contained in no distinct cyst, the cerebral structure surrounding it being generally discoloured, softened, and often appearing as broken down into it. Sometimes the meatus externus and internus are shut up by means of fungous granulations preventing the external exit of the purulent secretion, and hence probably, in some cases, diverting it internally. In some cases more than one abscess, in some instances four or five, seated in distinct parts of the brain, have been observed.

56. *f.* Collections of purulent matter have likewise been found by BIANCHI, STOLL, WEICKARD, J. PLANCUS, FRANK (*De Curand. Homin. Morb.* lib. ii. p. 49.), NANNONI, PERRAULT (*Journ. de Méd.* t. vi. p. 389.), and ABERCROMBIE, in the *cerebellum*, generally contained in more or less distinct cysts, "the walls of which were membranous and vascular." Matter, indistinctly defined, has been found also in the *medulla oblongata*, generally in small irregular cavities, "especially in that part of the olivary body which contains the corpus dentatum." (CRAIGIE, *in opus. cit.* p. 386.) Dr. ABERCROMBIE mentions a case where it was met with at the junction of the protuberance.

57. *g.* These collections are evidently the result of inflammation, but of a peculiar and slow character, probably owing to the constitution of those in whom they are most frequently found, and who are generally of the strumous diathesis. The encysted abscess seems to take place very slowly, and to be analogous to what has been commonly called *chronic* or *cold abscess.* The purulent infiltrations occasionally met with in the large nervous masses, as well as in other viscera, from the absorption of purulent matter into the circulation, evidently take place with great rapidity, and are a result rather of morbid secretion, than of inflammation.

58. *h.* Abscess of the brain is very frequently met with as a consequence of purulent *discharge from the ear.* This affection of the ear, when it has not apparently proceeded from inflammatory sore throat, and the extension of the inflammation along the Eustachian tube, is very generally connected with a sub-acute or chronic inflammation of the dura or pia mater of the brain; and is thus frequently extended to the substance of the brain

itself, terminating at last in abscess in this situation. This has been satisfactorily shown by Morgagni, Itard, Powell, Lallemand, Duncan, Abercrombie, Craigie, and others. Bonet, and, more recently, Mr. Brodie, supposed that the affection of the ear was consequent upon that of the brain, or at least coeval with it; and hence they ascribe the discharge from the ear to the inflammation of the membranes having extended itself from the dura mater of the temporal bone to the tympanal cavities. When abscess of the brain takes place owing to the affection of the ear, they consider it an extension of the inflammation from the membranes internally to the substance of the brain, in consequence either of the unhealthy habit of the patient, or of improper treatment, by suddenly suppressing the discharge, "and converting a chronic external inflammation into an acute internal disease;" the external discharge having been, as it were, arrested and turned in upon the cerebral substance. The only question here is in respect of the particular parts in which the inflammation originates; as to the consecutive phenomena, there seems to be no difference of opinion: and this point can be decided by the symptoms only, and the order in which they occur. If the purulent discharge take place without any previous internal and deep-seated pain, and the dangerous symptoms follow upon the suppression of the discharge, we may infer that the disease has commenced in the ear, and extended itself to the membranes and brain itself. This is, perhaps, the most frequent procession of the morbid phenomena. But, occasionally, a different course is manifest, especially in delicate children, and patients of a strumous diathesis. In these, symptoms of disease of the brain or its membranes are very manifest before the discharge takes place; and when it does take place, either the patient recovers under judicious management, or, upon the disappearance or suppression of the discharge, a sudden exacerbation of the symptoms are observed, with delirium, coma, convulsions, &c. followed by death. Such is the result of my experience in a very great number of cases which have come before me; so that I am led to conclude that, whilst the opinion adopted by Morgagni and his followers, on this question, is often correct, that espoused by Bonet and Brodie is not wholly without foundation.

59. But it is not infrequently observed, (and I have met with several instances in grown up persons,) that patients have been occasionally liable, for years, to a puriform discharge from the ear, — occasionally from childhood, with little remission, and with little or no further ailment. This sometimes gradually diminishes, or suddenly disappears; when either soon afterwards, or not until several months subsequently, or even after a year or two, dangerous symptoms of diseased brain supervene, and rapidly advance to a fatal termination; and upon dissection, inflammation of the membranes of the brain of the same side of the body with the affected ear is observed, and in the substance of the hemisphere is found a large purulent collection with inflammation and softening of the cerebral matter surrounding it, the cavity presenting an irregular soft surface.

60. The following *cases* strongly illustrate this: — 1st, A young gentleman had, from childhood, a slight purulent discharge from the right ear, until nearly the period of puberty; about which time it gradually disappeared. He had nearly lost the sense of hearing on that side. He went into the public service, in which he continued for several years, until, about the age of thirty, he was suddenly seized with intense pain of the head, fever, followed by paralysis of the whole left side of the body, insensibility, involuntary motions, coma, shortly terminating in death. On examination, thickening of the membranes of the right side of the brain, with adhesions, softening of the cerebral structure, and a purulent collection nearly in the centre of the middle lobe of the hemisphere, were found. I very recently witnessed a nearly similar case, to which I was called by a neighbouring practitioner; and a third case, in which I had ventured to predict similar lesions in a person advanced in life, but which we were not permitted to verify by a *post mortem* inspection.

61. Abscess of the brain consecutively on purulent discharge from the ear, is most frequently observed in young subjects, particularly in those of a strumous diathesis. From what I have said, it must not be inferred that abscess of the brain is the only unfavourable consequence, or even the most frequent one, owing to an extension of the inflammatory action from the ear or cerebral membranes; for other lesions accompany it. But, whether the abscess proceed from a gradual extension of disease, as now stated, or be a vicarious result of the suppression of the external discharge, — in which light it may sometimes be justly viewed, — there are generally found, upon examination of the surrounding parts, increased vascularity, softening of the cerebral substance, and an irregular, soft, and vascular cavity, containing the purulent matter. Added to this, there are also inflammation, thickening, and suppuration of the membranes; the pia mater being injected, and covered with lymph; the dura mater thick, opaque, dark coloured, more readily torn, and detached from the bone underneath it, which is also discoloured, and sometimes carious.

62. Abscess of the brain is very often a consequence of external violence; but it is one which takes place at extremely indefinite periods from the receipt of injury, and which often has little or no relation to the extent of the external mischief. The period which elapses from the external violence to that full developement of the abscess which is incompatible with the duration of life, according to the observations of Pigray, Morand, Prochaska, Thilenius, Home, Denmark, and others, varies from two or three months to as many years. A case which I had an opportunity of observing in a public institution, and in which the operation of trephining had been performed, presented a large abscess in the hemisphere, underneath the seat of injury, between three and four years from the time at which it had been sustained. The perforation made by the trephine was completely filled with ossific matter, which extended in a radiated manner from the edges of the perforation towards its centre.

63. Dr. Baillie says, that when suppuration of the brain takes place from internal causes, it is generally in the substance of the organ; but when it arises from external violence, it affects only the surface. But as Dr. Craigie has very

justly remarked, this distinction does not always hold good, and requires modification.—"1st, Where a long interval elapses after the infliction of the injury, the collection of purulent matter is almost invariably deep-seated. 2d, In like manner, when the injury operates in the manner of counterstroke, the collection is also often within the substance of the organ." 3d, In some instances of suppuration after injury, the collection does not take place at the part where the blow struck the skull, but either in the line of the force passing through the brain, or in some of the lines into which this force may be resolved. 4th, It is chiefly when this force has been directly expended on the part, *i. e.* when the bone has been immediately broken, and its membranes injured, that suppuration takes place on the surface of the brain: it is then the result rather of the injury of the membranes, especially of the pia mater, than of the cerebral substance itself.

64. Suppuration may occur in any part of the brain; but it is most frequently met with in the hemispheres, as shown above (§ 50.). Its effects vary exceedingly, according to the situation and extent of the purulent collection; but are not essentially different from those which follow upon the slow effusion of blood, the presence of tumours, or other morbid formations. I have already hinted at the occurrence of suppuration in parts of the brain in the course of fevers, especially those which are of a malignant character, or which are complicated with inflammatory action of the brain. Such occurrences have been observed by PRINGLE, BORSIERI, EISFIELD, PLOUCQUET, CLUTTERBUCK, MARCUS, JACKSON, and MILLS, and many others. But this falls under the pathology of, and morbid appearances in fevers, where the subject has received due attention.

65. *C. Ulceration.*—To ulceration of the brain authors have attached no precise idea, they differing widely as to what should constitute ulceration of the cerebral texture. According to the opinions of some, those solutions of continuity, sometimes observed in the most advanced degrees of pulpy destruction of the brain, about to be described (§ 72.), are nothing else than ulceration; and certainly, if there were appearance of any considerable loss of substance by absorption, the lesion would be legitimately ulceration. The case recorded by MORGAGNI (*De Sed. et Caus. Morb.* ep. xi. pars ii.), in which he described the *corpus striatum ab reliquo cerebro omnino separatum inventum est*, which is so singular, may be referred to ulceration. By ulceration of the brain, Dr. CRAIGIE understands destruction of part of either of its surfaces, "so as to present a hollow or depressed surface, rough, irregular, and covered partially either with bloody or albuminous exudation." This seems sufficiently precise; and excludes those doubtful cases of ulceration sometimes consequent upon effusions of blood, the advanced stages of softening of the organ, and the formations of abscesses existing in the substance of the brain, where, although a breach of continuity of structure is produced, yet the removal of it by absorption cannot be demonstrated. Cases of this description are more legitimately examples of pulpy destruction, or suppurative disorganisation, than of ulceration. With this limitation of ulceration and erosion to the various internal and external surfaces of the brain, M. ANDRAL agrees with Dr. CRAIGIE. This species of lesion, although not of frequent occurrence, is yet occasionally met with. Besides the case given by MORGAGNI, and already referred to, another is mentioned by him in the same epistle. Instances of this disease have also been recorded by BONET (*Hist. Anat. Med.* part iii. Ob. 108. 138.), WEPFER (p. 212.), MORGAGNI (*Epist. Anat. Med.* iv.), LIEUTAUD, (*Hist. Anat. Med.* let. iii.), SENAC, VALSALVA, PORTAL (*Anat. Méd.* t. iv. p. 98.), HOWSHIP (*Med. and Phys. Journ.* March, 1810.), ANDERSON (*Transact. of Royal Soc. of Edinburgh*, vol. ii.), RIDLEY, HALLER, STOLL (*Ratio Med.* pars iii. p. 122.), POWELL (*Case* 6. *Transact. of College of Physicians*, vol. v. p. 96.), and SCOUTETTEN (*Archives Gén.* t. vii. p. 31.), who have met with it on the convoluted surface of the brain, on the foliated surface of the cerebellum, and in the surface of the ventricles,—parts in which this morbid change is chiefly found. As shown by HALLER (t. iv. p. 351.), STOLL, and SCOUTETTEN, ulceration of any part of the brain's surfaces is always attended with an inflamed, or otherwise unsound state of the pia mater, and occasionally with softening of the parts underneath, sometimes limited to the grey substance, but at others proceeding further. In the two cases recorded by M. SCOUTETTEN, the adjacent brain was somewhat softened, and in one of them, of a wine lees colour. The ulceration in the first case existed on the inferior surface of the right anterior lobe, and presented a hard, dry, irregular, yellowish surface, thirteen lines long and eleven broad, with singularly indented edges. This patient died with symptoms of irritation of the digestive canal, and of the brain. He experienced a constant acute pain at the bottom of the orbits. In the second case, the extremity of the posterior lobe presented two small ulcerated patches, one much larger than the other, and of an oval form. They penetrated no deeper than the cortical substance. This patient had been seized with gastro-intestinal irritation, and complained of no pain in the head. During the latter stage of his disease, he became delirious. In both these cases the surrounding pia mater was injected, and somewhat eroded; so that we may infer from these, and other cases upon record, that ulceration of the brain is a consequence of circumscribed inflammation of the pia mater.

66. The *existence* of ulceration of the brain is indicated by headach, partial convulsions, sometimes epilepsy, palsy, loss of memory, hebetude, coma, and exhaustion. In some cases the headach is intermittent, and the palsy is generally on the side opposite to that in which the lesion is found. In the case recorded by Dr. T. ANDERSON, and in which most of the symptoms now noticed were present, there was a superficial loss of substance from ulceration, two and a half inches long, one and a half broad, and nearly an inch in depth, situated on the upper part of the right hemisphere of the brain. In the bottom of this cavity were found some thin laminæ of a brownish matter, with stony concretions, some of which broke into sand upon the slightest touch.

67. *D. Sphacelation* or *mortification* of the cerebral substance is rarely met with, and chiefly as a result of external injury, when it has been

bruised and acutely inflamed. In this state of disorganisation, the cerebral substance is dissolved, of an orange brown colour, or of a greyish black, and fœtid. This alteration seems to be rarely produced by internal causes, and is to be distinguished from the pulpy softening of the organ. Dr. ABERCROMBIE, however, considers this latter change to be identical with gangrene.

68. ii. SOFTENING OF THE BRAIN.—*A. From serous infiltration,—Œdema of the brain.* Infiltration of the substance of the brain with a watery fluid has been noticed by GUERSENT and ANDRAL,—by the former in children, by the latter also in adults. In these cases the serum may be diffused in the nervous substance, or contained in more or less distinct cavities. This change is most frequently observed in the white central parts of the organ. It has not generally been remarked in connection with any particular symptom; but it has, in a few instances, co-existed with dropsy of the ventricles; and, in adult subjects, with general leucophlegmatia and cachexia.

69. *B. Simple diminished consistence of the brain, without change of structure,— Malakencephalon* (CRAIGIE),— seems to be a different state of the organ from that which constitutes the *ramollissement*—softening, or pulpy destruction of the brain. In this latter more or less disorganisation is manifest, and generally some change in its colour; but the former is merely diminished consistence, greater flaccidity, and decrease of its natural firmness, toughness or tenacity, and of that clamminess or viscid feeling which it usually communicates to the touch. This state is commonly attendant on low or malignant fever, and on chronic diseases, particularly pulmonary affections, marasmus, diabetes, dropsies, mesenteric and visceral affections. It generally affects the whole organ, and, indeed, the whole cerebro-spinal axis; whereas the pulpy destruction of the brain is more or less limited in extent, affecting parts of the organ in a particular manner.

70. In *dropsies*, the brain is often flaccid, more easily lacerated, and of diminished consistence throughout. This state proceeds either from diminished nutrition of the organ, or from an interstitial deposit of serous fluid with its minute atoms, and defective vital cohesion of its substance. The proper texture of the part is not otherwise changed. *Diabetes* sometimes occasions a similar state, and most probably from diminished nutrition added to a deficient vital cohesion of the structure. In *pulmonary consumption*, and in chronic bronchitis, the brain is very commonly found softer than natural throughout; and this softness is the more marked, the more chronic the pulmonary affection has been, and the more complete the emaciation. May not this state be considered as analogous to emaciation of other parts? the molecules of matter removed by interstitial absorption of the texture of this organ being replaced by a serous effusion, owing to the cranium being a shut cavity, which must necessarily, during the life of the subject, always be in a state of repletion. In such a case, the density of the brain is actually diminished. MECKEL states, that he found a cube of six lines, taken from the brain of a man dead of phthisis, 1¼ grain lighter than the same bulk of a sound brain. Dr. MONRO has found the brains of condemned felons extremely soft, particularly internally, (*The Morbid Anatomy of the Brain*, vol. i. p. 35. and 100.). LITTRE, however, states, that the brain of a felon, who committed suicide, was extremely dense and firm, (*Histoire de l'Académie Royale des Sciences*, Ann. 1705.) TULPIUS, KERKRINGIUS, KING, SCHEIDE, MORGAGNI, GREDING, &c. have found the brain frequently soft and flaccid in fatuous persons, as well as in epileptics, and epileptic maniacs. GREDING (*On Ludwig's Adversaria*, t. ii. part iii. p. 533.) found in about one half of the last named class of subjects, the brain very soft throughout, particularly in its central parts; and Dr. HASLAM's observations (*Observations on Madness and Melancholy*, 2d edit. Cases, 4. 10. 18. 25. 28. 30. 37.) in some degree confirm these statements. But it should not not be overlooked, that the brain of epileptics and maniacs is found also more than usually firm. The diminished consistence of the brain of condemned felons has been attributed to confinement, inactivity, and low diet. Whether these may have a greater influence in causing it than the mental distress to which these persons are reduced, it may be difficult to determine; but if the former be the cause of this state of the organ in felons, it may be equally so in maniacs, who are generally also subjected to confinement and low diet. The diminished consistence now described, is more or less universal, although more remarkable in particular parts, and it generally affects the whole cerebro-spinal axis. Whereas the morbid softening, or pulpy destruction, about to be described, is generally limited in extent. The former also seldom presents any very sensible change from the natural colour of the part; whereas with pulpy destruction there is a more or less evident discoloration.

71. *C. Pulpy destruction,—Softening,—Ramollissement, —Encephalitis sub-acutus,—Cerebritis sub-acutus et chronicus.*—Softening of the substance of the brain has generally been ascribed to a sub-acute inflammatory action, especially by MORGAGNI, ROSTAN, LALLEMAND, BOUILLAUD, PINEL, OLIVIER, and VELPEAU, to whom we are chiefly indebted for having directed attention to this particular lesion. There are others, however, as RECAMIER, who consider this change as the effect of a morbid nutrition of the part, rather than as a result of inflammatory action. By softening of the brain, must not be understood that soft state of the organ which is always present in early infancy, nor the less consistent state of the organ sometimes observed in some chronic diseases, and in certain forms of fever, and already described. It should also be recollected, that all parts of the brain possess not the same degree of firmness; for, if the mesocephalon be as soft as a lobe of the cerebellum, it is undoubtedly in a morbid state.

72. Softening of the brain presents various degrees. The least change of consistence of the part can be recognised only when it is touched. In a more advanced degree, the softening is obvious to the sight. In a still farther advanced grade, the cerebral substance is nearly liquid, and has almost entirely lost its organisation; and in its place there is a mere loose cellular substance, soft and gelatinous, appearing as the original matrix of the structure; and in the last and most advanced stage of all, there is a perfect dissolution of the part, and breach of continuity.

In the cases of this description published by MM. **Rullier** and **Velpeau**, the disorganisation was so complete, that the filaments of the delicate cellular substance, forming, as it were, the matrix of the structure, were suspended in the middle of the diffluent matter into which the cerebral substance was changed. In the case observed by M. **Velpeau**, the solution of continuity was still more complete. From the inferior margin of the mesocephalon to the base of the pyramidal bodies, a substance entirely liquid, which no longer retained the appearance of nervous substance, occupied the place of the bulb of the chord; and through the whole of this space there existed neither arachnoid nor pia mater.

73. The softened portion of brain presents various shades of colour. 1st, It may be of the natural or healthy colour of the part,—even although the softening has advanced to such a degree as to form a diffluent pulp, (**Andral**, **Lallemand**). 2d, It may be perfectly colourless; of a dull white resembling milk; and occasionally the whiteness of the part assumes a clear, or brilliant hue. 3d, The shades of colour sometimes are the following:—a rose tint, an amaranthine red, reddish brown, the colour of wine lees, violet, yellowish, greenish yellow, light grey, and dark grey. Besides the above appearances, the softened part of the brain may be,—1st, The seat of effusions of blood, which are sometimes small, relatively to the degree of softening, or to its extent; at other times very considerable compared with the softening itself: 2d, Pus may be infiltrated throughout the part which is softened; or the pus may exist in it in the form of one or more distinct collections. M. **Lallemand** considers, that in all softenings of the brain of a white colour, this appearance is owing to the infiltration of purulent matter through the softened structure. MM. **Rostan** and **Andral** espouse an opposite opinion, on the grounds that, in many softened portions of the brain of this shade, no pus could be detected. The softened part of the brain is generally inodorous; but M. **Billard** has remarked, in the case of an infant, the smell of sulphuretted hydrogen. Softening, attended with the odour observed by this author, seems to have constituted what was called by the older writers, gangrene of the brain.

74. There is no part of the brain or cerebellum in which softening has not at some time or other been detected. Generally those parts which are most obnoxious to hæmorrhage are most liable to softening, such as the optic thalami, and the corpora striata, and the parts in their vicinity. It also as frequently affects the cortical substance, as the medullary texture. In the cerebral hemispheres, the softening may be seated in the *cortical substance* of the convolutions, the white medullary structure remaining unchanged, where it may often escape detection, owing to such limitation; and it is usually an attendant upon active inflammation of the membranes of the brain. When the grey part is softened, it generally separates along with the pia mater, on attempting to raise this membrane. When softened, this portion is commonly also redder than natural; sometimes, on the contrary, it is paler than common. The *medullary structure* situated above the lateral ventricles is very often the seat of this species of lesion. This mass may be altogether softened, or in a few small points merely, each point being quite isolated from the other. The symptoms, however, resulting from this smaller extent of morbid change may be as severe as those arising from the more extensive and more intense lesion. When one of the hemispheres is softened near to its external surface, the circumvolutions are flattened, and often evince a species of fluctuation. M. **Andral** has remarked, in some cases, the existence of softening of the parietes of the ventricles, with the presence of a turbid fluid effused into them. (*Anat. Pathol.* t. ii. p. 802.)

75. The optic thalami, the striated bodies, and parts in the vicinity of these; the cornu ammonis, and the eminences in the interior of the digitated cavities of the lateral ventricles, the commissures of the hemispheres (*corpora callosum, septum lucidum, &c.*), have all been observed the frequent seats of softening; sometimes limited to one or other of them only, at other times extending to two or more, and occasionally co-existing with signs of inflammatory action, or with effusion of a serous fluid into the ventricles. Softening of the other parts of the encephalon is not so often met with, as of those now enumerated; yet has it been seen in the mesocephalon, in the various parts of the cerebellum, in the medulla oblongata, and spinal chord.

76. Softening of the brain may be limited to one part, or it may exist in several parts, even in both hemispheres, in the same case; and it may affect these different parts at the same time, or successively, either as respects the brain merely, or as regards the whole cerebro-spinal axis. Instead of being partial, which is its usual form, the softening may be so general, and to so intense a degree, that the brain is almost reduced to a pulpy matter, evincing scarcely any appearance of organisation. So general and great a change is very rarely met with in the adult; but it is occasionally observed in infants. M. **Billard** has met with ten instances of it, and I have also found it in some cases of young children: the odour of sulphuretted hydrogen, first noticed by M. **Billard**, was sensible in these; and he found it present in all his cases, which were chiefly of infants only a few days old.

77. Softening of the cerebro-spinal axis is met with in patients of all ages. According to M. **Rostan** (*Récherches sur Ramollissement du Cerveau*, 2d edit. p. 155.), whose attention has been directed, at the Salpêtrière, to this lesion in a special manner, it is very common in old subjects; even more so than sanguineous apoplexy. The researches of **Lallemand**, **Andral**, and others go to confirm this opinion, and to show that it is also common during early and middle age, although less so than in old age. And I perfectly agree with M. **Billard** in considering it common in children, especially infants. He believes, and I think with justice, that it commences in some cases even before birth.

78. There still remains an important question to be discussed, namely, what is the origin and nature of the softening which has now been described? M. **Lallemand** conceives that it is a constant and necessary result of an acute, subacute, or chronic inflammatory irritation of the part. M. **Rostan**, who has examined this subject with great care, and viewed it in various lights, as respects both the morbid appearances

and the symptoms accompanying them, concludes at last by confessing its difficulty, and considering this change as analogous to senile gangrene. Before the question can be entertained with precision, we should previously enquire with what other morbid states of the system generally, and of the brain in particular, has softening been found allied? 1st, It has been observed by Jemina, Black, myself, and others, to supervene during fevers, especially those of an epidemic and malignant character. 2d, It has been seen connected with puerperal disease of a malignant nature; and with epidemic and infectious erysipelas. 3d, It has been found in cases of scorbutus, and to occur in persons of an unhealthy and cachectic habit; also in those whose powers of life have been exhausted by bad living and excesses.

79. As to its relation to other lesions of the brain, I may state that it is often found surrounding *extravasated blood* in the brain, and intimately connected with this effusion. The softened part is then generally of the colour of wine lees, of a brownish hue, sometimes tending to green, or of a grey or ash tint. But what is the nature of this connection? M. Rostan contends, that the softening precedes and is always the cause of the effusion, owing to the destruction of the minute capillaries at the point where the softening is greatest; whilst Dr. Craigie and others consider the softening surrounding the effused blood as the consequences of such effusion; and chiefly because, "in cases in which death takes place early, the pulpy disorganisation is less complete than those in which it takes place at a later period. In short, the extent of the disorganisation is proportionate to the interval which elapses between the effusion of the blood and the period of death." But is this the fact? It certainly is not in accordance with my experience, for I have observed no such relation; but have found recent effusions surrounded by as great, and even a greater, extent of softening as effusions of an older date.

80. Pulpy softening may be the attendant upon a *coup de sang*, or sudden congestion of the venous capillaries of some part of the brain. This is considered to be the case in softenings with the reddish, amaranthine, crimson, or reddish brown shades of colour. But is the softening a consequence, or a cause of the injection? May it not be a state of the vessels preceding that of effusion? These are questions which large experience and deep thought will not readily decide. Dr. Craigie thinks that the softening is a consequence of the blood-stroke; but I cannot agree with with him, merely because the reasons for a contrary opinion are quite as strong as those which may be urged in its favour. It has been often found accompanying hydrocephalic effusions, by Rostan, Lallemand, Billard, Otto, Andral, and by the author. It is then generally of the lighter shades of colour, and not great in degree. Is it here a consequence or a cause of the serous effusion? It may be either. I am more inclined to consider both lesions as being often coeval, and, whether consecutive or not, depending upon a similar state of the vessels and vital manifestations of the organ and system generally.

81. Softening, or pulpy destruction of a portion of the brain, has likewise been found surrounding tumours and abscesses, by Morgagni, Sandifort, Meckel, Lallemand, Blane, Yellowley, Powell, &c., and presenting almost every variety and depth of shade already noticed. In these cases, especially in those where purulent matter is lodged in the substance of the brain, without any intervening cyst or membrane, the softening often amounts to disorganisation, and is more clearly attributable to inflammatory irritation. When it is found subsequently to injury of the brain, external violence, and inflammation of the brain and its membranes, its nature and origin are most manifest. That it does supervene in this way, is shown by Fantoni, Morgagni, Le Dran, Schmucker, O'Halloran, Dease, Abernethy, Thomson, Hennen, Abercrombie, and others. The apparently unequivocal origin of this lesion in inflammation, under these latter circumstances, induced Morgagni, Lieutaud, Jemina, and more recently Baillie and Abercrombie, to consider it as analogous to gangrene in other structures.

82. But it should be kept in recollection that this state of the cerebral structure, although often preceded by signs of inflammation, and exhibiting in the parts surrounding it inflammatory appearances, is often neither preceded by the one, nor accompanied by the other, but, on the contrary, with a directly opposite train of phenomena and state of parts. In these opposing cases, what is the origin of the disease? Are we to infer, with Recamier, an entirely opposite origin to that of inflammatory action, and that, as the softenings observed in the brain betray a variety of characters, therefore they ought not strictly to be referred to a single unvarying source?

83. From what I have seen of, or read concerning, this lesion, I should infer, in respect of either of its most manifest conditions, that it is an effect of different states of morbid action, but most frequently of a form of sub-acute inflammation, characterised by deficient power and loss of the vital tone and cohesion of both the vessels and the substance of the brain, — that it is the result of deficient vitality of the extreme capillaries and cerebral structure, occurring either primarily, or in consequence of previously excited action. The circumstances in which it is observed; its occurrence after injuries and bruises, from the pressure of tumours, &c., and during the progress of malignant diseases, show that it is not produced by a sthenic or healthy form of inflammatory action; but by that unhealthy, disorganising and diffusive kind observed in cachectic habits, or in persons whose vital powers are much reduced. At the same time, I think it cannot be denied, that it sometimes originates in a different way, being preceded by no signs of inflammatory irritation, nor attended with inflammatory appearances, and is a simple consequence of diminished, or altogether lost, vital power and cohesion of the part affected.

84. iii. Hæmorrhage.—*Sanguineous effusion* may occur in a primary form, but more commonly from some morbid state of the vessels, or of the substance of the brain itself. It may take place in any part of the organ, but much more frequently in some situations than in others. *a.* Blood is effused on the external surface of the brain, either in small quantities, beneath the pia mater, in one or two anfractuosities; or in an

uniform layer, even extending over the whole of an hemisphere in rare cases. *b.* It is sometimes found in large quantities in the ventricles; but it generally has escaped into them, owing to laceration of the cerebral substance in which the extravasation takes place. *c.* The hæmorrhage most frequently is in this substance.' M. ANDRAL states, that in 392 cases of hæmorrhage in the brain, its actual seat was in some part of the cerebral substance in as many as 386. Of these, 202 occurred in the *corpora striata*, and *thalami optici*, and parts in the hemispheres, on a level with these places. The cavities formed by the extravasated blood vary in size, from that of a small pea, to the greater part of the extent of a whole hemisphere. When the effusion is very large, it generally ruptures the parietes of the lateral ventricles, sometimes tearing the septum lucidum, and destroying the fornix. In other cases it may make its way to the exterior of the brain, and spread itself over the cavity of the arachnoid.

85. The number of hæmorrhagic cavities found in the brain vary from one to many. When several are found in the same brain, they generally present different appearances, owing to their having been formed at different periods. This is generally the case when the patient has experienced several attacks of apoplexy or palsy. M. ANDRAL remarks that effusion of blood seldom occurs in the cerebellum without appearing also in the cerebrum, whereas it may take place in any part of the cerebral hemispheres without occurring elsewhere. I have stated in the article on APOPLEXY, the periods of life at which hæmorrhage in the brain is most frequently met with. Instances have occurred to MM. ROCHOUX, BILLARD, SERRES, GUERSENT, and myself, in which it has taken place at the unusual periods of infancy and childhood. The changes that take place in the effused blood, in the cavity containing it, and in the substance of the brain after hæmorrhage, comprising the reparative processes consequent upon it, are fully described in the article APOPLEXY (§ 35—39.). I have there shown that the cysts remaining after the coagula have been absorbed, sometimes disappear altogether by adhesion of their parietes. Some pathologists suppose that the cerebral fibres in those cases are directly united, and refer to the experiments of FONTANA, HAIGHTON, MICHAELIS, and MAYER, who had shown, in opposition to ARNEMANN, that the filaments of divided nerves are, after a time, directly produced in the direction of their axis across the cicatrix. But intimate examination of the cicatrix of a lacerated portion of brain, or of a hæmorrhagic cyst, shows that this does not take place in the medullary structure of the brain. (See APOPLEXY, § 53.)

86. iv. HYPERTROPHY AND ATROPHY OF THE BRAIN. — *A.* The brain occasionally presents lesions evidently connected with a *modification of the nutritive process*. In such cases, the consistence and size, either of the whole, or of certain of its parts merely, are altered. Changes of its consistence are more frequent than of its size, and both are occasionally conjoined. It should not be overlooked, however, that the consistence and size of the organ are modified from the usual standard of middle age, at both the earliest and most advanced epochs of life; and that these modifications, as being its natural conditions at those terms, are to be distinguished from the alterations occasioned by disease. One hemisphere may also differ from the other, in respect both of its volume, and the form and size of its convolutions, owing to original conformation, without occasioning any appreciable disorder of function.

87. The brain continues to increase in size until manhood; from this period until old age its volume continues the same; but with extreme age it somewhat diminishes in bulk. This is, however, not an uniform occurrence, for disease may have cut short existence before the period had arrived at which the organ would have undergone this change. According to CAZANVIEILH, the longitudinal diameter of the brain of an old man, compared with that of one in early life, is 6 inches 1 line French measure for the former, and 6 inches 4 lines for the latter; whilst the transverse diameter is 4 inches 10 lines, and 5 inches, respectively. M. DESMOULINS (*Anat. des Syst. Nerv. &c.* t. ii. p. 620.) found, that in persons above seventy years of age, the specific gravity of the brain was from one twentieth to one fifteenth less than that of the brain of persons just arrived at manhood.

88. The *convolutions* of the brain are scarcely developed at birth, or even until the expiration of the first year. In old age they again become less distinct and prominent. In the brain of the full grown young subject, they vary in thickness from three to five lines, whilst they are usually about two or three lines in old persons. They present the greatest diversity in respect to their number and length, and the depth of their anfractuosities in the adult: in general they are the most marked and developed in the largest brains. Several physiologists in France are of opinion that the developement of the faculties of the mind has a very intimate relation with the extent and number of the convolutions of the hemispheres, and the depth of their anfractuosities.

89. But it is important for the physician to know that not only may the whole encephalon experience a diminution of its bulk and specific gravity with old age, but that this diminution may be particularly apparent in certain parts of it in preference to others; and it is presumed, that this change may sometimes commence in one portion previously to others, or may affect it alone, so as to disturb its functions without being so evident upon dissection as to attract notice. The comparative length of the following parts of the encephalon of subjects just arrived at puberty, of those in the prime of life, and of aged persons, is here given, as furnished by M. CAZANVIEILH in French measure: —

Persons at Puberty.				*In the Prime of Life.*		*In Old Age.*	
		in.	lines.	in.	lines.	in.	lines.
Thal. optici -		1	5½	1	6	1	4½
Corp. striata -		2	6	2	6	2	4½
Corp. callosum		3	4½	3	5	2	7
Mesocephalon	length	0	10	0	11	0	10½
	breadth	1	0	1	1	1	0
Cerebellum	length	2	2	2	3	2	3
	breadth	3	9	3	9	3	9

90. From these data it will appear, that the cerebellum is the only part of the encephalon which is not diminished by old age. But it may be asked, do the large nervous masses experience

any diminution of volume analogous to that which the muscular textures and other parts experience in chronic diseases? In answer to this, M. Desmoulins states that the brain, although atrophied in the manner stated above by old age, suffers no diminution of its bulk, whatever may be the degree of marasmus to which the individual may have been reduced. In all such cases he has also found the brain of the same specific gravity; and, to this predominancy of developement which the brain thus has acquired over all other organs, he is inclined partly to impute that nervous susceptibility and excitation, which are common to the last stages of those maladies. It ought, however, to be borne in recollection, that, although the nervous centres may not undergo any change in bulk or specific gravity in consequence of those diseases, they often experience a very marked diminution of their consistence, as we shall have to show in the sequel. Having been made acquainted with these modifications of the nutrition of the encephalon which it undergoes at the different epochs of life, we are the better able to recognise those which are the result of disease.

91. *B. Hypertrophy*, or *morbidly increased bulk of the brain*, is very rarely met with. This state of the organ is to be distinguished from the apparently augmented bulk, arising either from increased vascular action, or congestion of the vessels. It appears to consist of an actual increase of the molecules of matter composing the proper tissue of the organ, and not of an injection of the minute vessels distending its structure. Although this condition of the brain seems to have been known to Morgagni, it is to Laennec that we are indebted for precise information respecting it. He stated (*Journ. de Corvisart, &c.* t. ii. p. 669.), that, upon opening the heads of patients who had been thought to have died of hydrocephalus, he found no fluid effused; but the brain presented appearances of great compression, which he could attribute to no other cause, than to a too active nutrition of its structure, giving it a bulk too great for the bony case containing it. In children especially, who had died in convulsions, or who had been subject to epilepsy, this disproportion between the capacity of the cranium and the bulk of the encephalon has been witnessed by him on several occasions, the convolutions of the hemispheres being flattened, and apparently squeezed against each other. M. Dance has also described this state of the brain (*Repertoire d'Anatomie*, t. v. 1828.), and furnished some cases in which it was observed. It is chiefly met with in children or young subjects, and is, I conceive, of very rare occurrence, since, from amongst the great many thousand cases of children's diseases which have come before me, I have only remarked three cases in which it was unequivocally present. In these it presented the following characters: — The convolutions of the hemispheres were extremely flat, and closely pressed against each other, so that the separations between them were scarcely apparent. The cerebral structure was firm, and, when incised, was dry, and more than commonly destitute of blood. The ventricles seemed small, were closely pressed together, and almost dry. The bones of the cranium were either natural or thicker than usual, as if they had participated, as regarded their thickness, in the increased nutrition of their contents: the dura mater adhered closely to the cranium. A similar augmentation of the thickness of the cranial bones, but to a greater degree than I have remarked it, has been recorded by M. Scoutetten, who met with it in a girl five years of age, who died of abdominal disease, and who had never complained of any disorder of the head, or of disturbance of the mental faculties, which were those common to children at her age.

92. *Rickety hypertrophy* of the brain is more frequent. It commences soon after birth, and often attains a great extent. Otto supposes that brains which have been much expanded by dropsy in youth, become subsequently, in rare instances, cured by increased deposition of cerebral matter; and thus retain their size and weight. The distension of the cerebral substance by the accumulation of fluid in the ventricles, cannot be comprehended under hypertrophy of the organ.

93. M. Andral (*Anat. Path.* t. ii. p. 776.) says, that, although hypertrophy of the brain is *usually general*, and extends to the whole of both hemispheres, it is sometimes *also partial:* thus he has seen the *thalamus opticus* of one side of its natural dimensions, whilst that of the opposite side was one fourth larger. This extraordinary developement of the thalamus of one side was not attended with any particular symptom during the patient's life. Otto refers to a number of cases of hypertrophy confined to a single part of the *brain*, chiefly to the *thalami* and the *corpora quadrigemina*. I am not aware that any well authenticated cases of marked hypertrophy of the *cerebellum* are upon record. The *spinal chord*, however, is not infrequently subjected to this change.

94. Morbid enlargement of the *pineal gland* has been observed by Drelincourt, Morgagni, Lieutaud, Desportes, Soemmering, Angeli, Greding, Meckel, and Blane. The *pituitary gland* has also been found enlarged, inflamed, and otherwise changed, by Greding, Baillie, Chaussier, Oppert, Ward, Rullier, De Haen, Rayer, Neumann, Abercrombie, Otto, the Wenzels, and Meckel.

95. *C. Imperfect developement and atrophy of the brain,* — *Agenésie cerebrale* (Cazanvieilh), — is met with in every degree, from a slight diminution of the usual bulk of the whole organ, or of any of its parts, to their almost entire disappearance. Atrophy, although occurring in all situations of the cerebro-spinal axis, is most frequently observed in those which are the last formed: thus the spinal chord is formed before the brain, and atrophy of it is much rarer than that of the encephalon. Of the brain, the convolutions are the last developed, and they are most frequently atrophied. It should, however, be noticed, that the majority of those cases which are denominated atrophy of the brain by Andral, and other French pathologists, are, strictly speaking, imperfect or arrested developement of the organ. The hemispheres are most frequently the seat of atrophy and imperfect developement; and they may be thus affected, either partially, or altogether. Imperfect growth of particular lobes, especially the anterior, is common in idiots, and may exist even although the cranium is well formed, the void being filled up with water, the congenital effusion of which is the probable cause of the arrest of developement. When the hemispheres are par-

tially affected, the lesion is most commonly observed in the convolutions.

96. *a. Atrophy of the convolutions.* — These parts are sometimes only smaller and less numerous than usual, either in respect of one or both hemispheres, or in a portion of a hemisphere merely; and they may be altogether wanting in one, or in both. M. JADELOT lately found the hemispheres of the brain of an idiotic child, aged six years, without convolutions, and consisting of an uniform layer of medullary substance covered by a thin coat of cineritious matter.

97. *b.* Sometimes the *greater part of the hemispheres* of the brain, especially their superior portions, from the vault of the ventricles upwards, are found in a state of atrophy, or altogether wanting. Most of the cases of this description, which have been adduced by the French pathologists, as well as the case of JADELOT, are merely instances of imperfect developement of the part. Sometimes this portion of the encephalon is replaced by a sac containing a serous fluid, having no communication with the ventricles. In other cases, no such body replaces the deficient hemispheres; but the different parts of the anterior and superior aspect of the ventricles, as the thalami optici, corpora striata, &c., may be seen through the membranes, no substance intervening between them and those portions of the floors of the ventricles. These occurrences are, however, not cases of atrophy, but of arrest of the formative process as respects the hemispheres of the brain. Cases of diminished size merely, of one or both hemispheres, are more common than those now instanced; and are generally to be considered as being congenital; or, at least, the result of a diminished nutrition of the part, in the process of the growth of the organs. Instances of extreme smallness, or an entire absence of a part of the hemisphere, are most frequently met with in its posterior or anterior lobes: either of which may be altogether wanting, in one or both sides of the brain. Diminished size of the anterior or posterior lobes are a much more frequent occurrence than their entire absence.

98. *c.* The *thalami optici*, and *corpora striata*, may be also much diminished in volume, either singly or together. The diminution may proceed from a defect either of the grey matter, or of the white substance; and from this cause of diminished bulk, the accompanying symptoms will derive their chief characters. Not only may those bodies be simply diminished in volume, they may be even altogether wanting, either being replaced by a serous cyst, or having no other body as a substitute: in the former case, the hemisphere of that side may be, or not, also entirely wanting; in the latter it is always absent, and, from the cerebral peduncles, nothing more is found than a few scattered fibres, which are spread out into a membranous tissue, resembling that which, at the earliest epochs of fœtal existence, forms the rudiments of the hemispheres. It is evident, that in such cases, the white central portions of the brain being absent, and both sides of the cerebrum being thus circumstanced, there can scarcely be said to be any brain in existence. This, however, does not prevent the other parts contained within the cranium, as the mesocephalon, cerebellum, &c., from being fully formed.

99. *d.* The *central white parts* of the brain may be imperfectly developed, even when no alteration is remarked in the hemispheres. In some such cases the corpus callosum is so small as to form merely a thin membrane. REIL remarked its entire absence in a female idiot, who died at thirty: the two hemispheres communicated only through the medium of the anterior and posterior commissures. It is remarkable, that when the cerebral lobes are wanting, two small masses of nervous substance, whence the olfactory nerves arise, are sometimes found in the anterior part of the cranium; thus displaying in man, in the morbid state, the independent existence of the olfactory lobes, naturally shown in animals.

100. It will be seen from the above, that all the parts of the brain may present a state of imperfect developement to a greater or less extent; that either of them may be entirely wanting, while the others remain; and that all of them may be absent, so that there exists no brain: a circumstance not infrequently observed in fœtuses, and evidently owing to the process of developement having been suddenly arrested.

101. But not only may the brain be in part, or entirely, deficient at birth; it may be also remarkably small at advanced age, particularly in idiots. It may be generally, but more frequently only locally, diminished by external pressure, as in meningeal hydrocephalus. Although the brain, as well as the other parts of the nervous system, wastes so little in general consumption, it is, however, somewhat diminished, although rarely, in the course of certain diseases: SAVARESY states, that he has found it atrophied in yellow fever. HORN remarked a similar state in diabetes; and OTTO, after venereal excesses. Atrophy is, however, more frequently observed in particular parts of the brain. The lateral *lobes of the cerebellum* have been occasionally found atrophied. M. HUTIN observed the medullary centre of the cerebellum reduced one third of its natural size. MORGAGNI, WENZEL, and BIERMAYER have described atrophy of the *corpora striata*. The *optic beds* have been found greatly reduced in size after blindness, by SOEMMERING, MICHAELIS, RUDOLPHI, &c.; and in idiots, by OTTO, RAMSAY, and ROMBERG. The *quadrigeminal bodies, and the tubercles* of the brain, have likewise been severally found atrophied. The pressure occasioned by tumours, collections of lymph, pus, or blood, or even dropsy of the ventricles, may give rise to atrophy, interstitial absorption, or destruction of particular parts of the brain. The want of exercise of the functions of the nervous system may also occasion atrophy, by diminishing nutrition, as an unexercised muscle soon wastes. Thus, the wasting of the brain so generally observed in idiots, may be the effect and not the cause of idiotcy. The *pineal gland*, and the *pituitary gland* or appendage of the brain, have both been seen remarkably atrophied, particularly the latter. According to OTTO, this change has been most frequently remarked in idiots, and in hydrocephalic cases.

102. V. INDURATION, OR HARDENING OF THE BRAIN, — *Sclerencephalia* (CRAIGIE). — The cerebro-spinal axis sometimes presents, either throughout its extent, or in particular parts, a remarkable increase of consistence. This increase varies in *grade*. In its *first degree*, it is nearly of the consistence of a brain which has been kept some

time in dilute nitric acid. The *second degree* of increased hardness resembles the consistence of cheese. In this state, the cerebral substance, when exposed to the action of fire, instead of swelling up, without emitting any marked odour, and leaving a brownish light residue, assumes a horny hardness, emits a strong heavy smell, and leaves a compact blackish residue. Nitrous acid also imparts to it a horny hardness, — circumstances evincing a great increase of the albuminous constituent of the structure. The *third degree* of hardening equals the firmness of wax, frequently also conjoined with elasticity, so that the indurated portion resembles fibro-cartilage.

103. *a.* The *first* grade of induration may affect the whole or the greater part of the cerebro-spinal axis. The two greater degrees of this change are commonly of more or less limited extent. *General hardening* of the brain is usually attended with augmented vascularity, numerous drops of blood becoming effused when the cerebral structure is incised. This increased vascularity, although general, is not constant; for, in some few instances, little or no injection of the capillaries is observed, the brain being rather exsanguineous than vascular. Even in the general induration of the brain, the hardening is not equal throughout every part. It is least remarkable in the cortical structure and convolutions; and more manifest in the white, particularly the central medullary parts, than in the grey substance.

104. *b. Partial induration* of the brain is most frequently found in its central parts, and sometimes in the convolutions. M. ANDRAL has observed it in this latter situation, at as early an age as three years, which is extremely unusual. Sometimes the convolutions of the convexity of the hemispheres are unaltered, whilst those of the base are hardened; occasionally, in such cases, especially when the induration is considerable, the cortical can scarcely be distinguished from the medullary structure. In a case recorded by LALLEMAND, the induration was limited to a circumscribed portion of cortical substance, and, under it, the medullary texture was manifestly softened. M. PINEL found, in one of the hemispheres of a female who had died in a state of idiotcy, a portion of the medullary structure extremely hardened; and, in the same individual, there existed, in the whole posterior and inferior border of the cerebellum, an induration of a fibro-cartilaginous description. The hardened portion was yellowish, elastic, resembling a piece of whitish yellow leather. Mr. PAYEN found, in a girl six years of age, near the posterior third portion of the left hemisphere of the brain, a depression, owing to hardening of one of the convolutions, which seemed externally as if it were shrivelled. It was rose-coloured on its surface, slightly yellowish in its substance, and almost concealed from view by two convolutions, which were healthy. The membranes covering this hardened convolution were white and thickened. Hardening was here joined to diminution of volume; or, perhaps, the disease of this portion of the brain was congenital, and, whilst the growth of the rest of the organ had proceeded, the developement of this was interrupted. The intelligence of this child was well advanced; but she had, from birth, a contraction of the right wrist and foot, with slight atrophy, and incomplete hemiplegia of this side. Similar cases of hardening of portions of the lobes of the brain are described by MONRO, LALLEMAND, and HUTCHINSON. In a case recorded by JOEGER, the induration was limited to the parietes of the posterior cornua of both lateral ventricles, and amounted almost to that of cartilage. BERGMAN found both optic beds hardened in a paralytic and squinting girl: and CASTELLIER and ANDERSON observed excessive hardening of the lobes of the cerebellum. Partial induration of the nervous centres frequently co-exist with other lesions of those organs, especially around old sanguineous effusions and morbid productions formed in the cerebral substance: they are also occasionally found accompanying the usual results of chronic inflammation of the membranes; these being firmly agglutinated together, to an extent of surface more or less considerable, and closely adherent to a subjacent hardened portion of brain. (PORTAL, *Anatomie Méd.* t. iv. p. 91.)

105. *Cause of hardening of the brain.*—The *first* degree of induration has been frequently found in persons who have died of fevers, generally of an ataxic or typhoid type, and in maniacs. M. ANDRAL observed it in two patients afflicted with convulsions from working in lead. MM. GAUDET (*Récherches sur l'Endurcissement gen. de l'Encéph. comme une des Causes des Fièvres Ataxiques.* Paris, 1825.) and BOUILLAUD (*Archives Génér.* t. iii. p. 477.) consider it as the consequence of acute inflammatory action of the brain and its membranes, they having found it in persons who have died of encephalitis occurring either primarily, or as a complication in fevers; and M. ANDRAL (*Anat. Path.* t. ii. p. 810.) seems to coincide with this opinion. RUDOLPHI observed it in thirty cases of typhus: and OTTO found, during the epidemic typhus of 1809 and 1812-13, hardening of the brain frequent in those who died within the first week; and softening in many who died at a later period. But, in these cases, granting the induration to have been the consequence of the disease which destroyed life, it must have taken place in the short space of a very few days; whereas, I am much more inclined to impute it to inflammatory action of a lower grade and of a much slower progress. M. BROUSSAIS regards it as the result of meningo-encephalic inflammation, of a sub-acute or chronic nature. As being generally found in connection with increased vascularity of the substance of the organ, and with this and other signs of inflammatory action of the membranes, the relation of this change to inflammation seems established; but I am inclined to adopt the inference of Dr. CRAIGIE, in respect of the opinions of MM. GAUDET and BOUILLAUD, that, in those cases in which they observed this lesion, it had existed previous to the acute disease which occasioned death.

106. Induration of the brain has been long familiar to pathologists, in relation to mental derangement. The writings of LITTRE, GEOFFROY, BOERHAAVE, LANCISI, MORGAGNI (*Epist. Anat. Méd.* viii. 4—18.), J. F. MECKEL (*Mém. de l'Acad. Roy. de Berlin*, t. vii. p. 306.), LIEUTAUD, SANTORINI, GREDING (*Ludwig's Advers. Med.-Pract.* t. ii. pars 3. p. 533.), PORTAL, MARSHALL (*Morbid Anat. of the Brain*, &c. Lond. 1815.), HASLAM (*Observ. on Madness and Melancholy.* Lond. 1809.), SERRES (*Ann. Médico-*

Chirurg. Paris, 1819.), Lallemand (*Récherches Anat. Path.* let. ii.), Lerminier, Bouillaud (*Traité Clinique de l'Encéphalite.* Paris, 1825.), Pinel, jun. (*Rév. Méd.* t. vi.), Foville, and Pinel-Grandchamp, furnish numerous instances of it, thus related: and, from the history of the cases, as well as the generally augmented vascularity of the membranes and of the indurated brain itself, I infer that it is a consequence of chronic inflammatory action, conjoined with some change in the nutrition of the cerebral substance; and that it proceeds from a less intense and more chronic state of the vascular action than that which occasions softening, or pulpy destruction of the cerebral texture. That such is the case, is proved, not only by my own experience, but also by the observations of the authors enumerated above; for, in the majority of those cases, even when presenting the appearances and consequences of cephalo-meningeal congestion and inflammation, the symptoms of cerebral disease were of much longer duration, than those depending upon morbid softening of the organ.

107. It has already been stated, that induration of the cerebral substances, amounting to either the *second* or the *third* degree, is generally circumscribed in extent. Whatever doubts may be entertained of the *first* degree of hardening being the result of chronic rather than of acute disease, there can be no doubt of the second and third being always a chronic affection — perhaps, of a still more chronic state of capillary action than that giving rise to the first form of increased hardness; the morbid action, affecting in the former cases a portion of the brain only, may be compatible with a longer duration of life, and hence give rise to ulterior or more advanced stages of change than those presented when the whole organ is affected, and all its functions and energies thereby involved. That this change is one of the consequences of chronic irritation, or inflammatory action, may be conceded, as well as the supposition entertained by Andral and Craigie, that the morbid irritation is connected with a perversion of the nutritive action. Indeed, the numerous cases detailed by Portal, Serres, Lallemand, Bouillaud, Pinel, and others, furnish satisfactory evidence, both in the symptoms during life, and in the co-existent lesions in the membranes and other parts of the brain, of the existence of a chronic inflammatory action, or of a state of irritative erythism of its capillaries. But to say that this state is in such cases accompanied by a perversion of its nutritive actions, is ascribing to it what always is an attendant upon inflammatory action, of whatever grade, or in whatever texture it may be seated. It should, however, be mentioned, that M. Lallemand considers partial induration to occur occasionally as a favourable termination of morbid softening of the brain; but this is a mere supposition.

108. As to the *phenomena* to which induration of the brain gives rise, every practical man must feel considerable interest. The *first* and more *general induration* of the brain generally occasions loss of memory, confusion of thought, and derangement of the mental manifestations — causing insanity without lucid intervals. When the induration is advanced in degree, or considerable as to its extent, or both, and especially when its long duration has been indicated by continued mental derangement, a complete obliteration of the mental faculties, or fatuity, is frequently its attendant towards the last periods of life, and may therefore be considered as the consequence of the most advanced degrees of this lesion. The signs of *partial induration* of the brain, in any of the grades to which I have referred, will vary according to the extent and seat of the lesion. They consist chiefly of a progressive defect of memory, inattention, or an inability to pursue a long train of ideas, indifference to momentary impressions, and to present or future occurrences, difficulty of articulation, derangement of ideas, with partial or total loss of the affections, appetites, and desires; and ultimately increased loss of speech, palsy, convulsions, or want of power over the muscles, fatuity, general or partial wasting, and death.

109. Lallemand found, in a patient who had complained of fixed pain of the forehead, palsy of the face, and confusion of memory; the membranes firmly matted together, for the extent of a thirty sous piece, at the anterior extremity of the left hemisphere; the subjacent cerebral substance hardened to a scirrhous or cartilaginous firmness, and adhering closely to the membranes. Bouillaud states, that of a man, aged sixty-eight, who, after symptoms of cerebral disease, had impaired memory, headach, difficulty of expressing his ideas, followed by muscular weakness and convulsions. The cerebral substance was found injected, and induration was seen "passing from the striated body of the left hemisphere, through the nucleus, at the upper region of which it formed a cavity with hard yellow walls; a similar hardened portion also existed in the posterior lobe. According to M. Pinel, induration confined to the brain causes fatuity, with more or less of palsy; but, if it extend to the annular protuberance, the crura cerebri, the corpora olivaria, or chord itself, epilepsy, followed by palsy, and death by marasmus, are generally superadded. In these advanced degrees of hardening, which are sometimes attended with a shrunk, depressed, and condensed appearance, — a species of atrophic hardening of the part, — there are usually remarked palsy and idiotcy, which are either congenital, or occurring subsequently to birth.

110. vi. Morbid Growths. — *Tumours of the brain.* Tumours of various kinds have been found to originate in the substance of the brain; but as Dr. Craigie (*Anat.* p. 447.) has observed, they have not been distinguished with sufficient precision by authors, from those which, originating in the membranes, affect the brain only secondarily. The *first* form of tumour which he has described, and denominated "*cerebral tumour*," entirely agrees with those partial indurations already considered; differing from them in no respect, but in the extreme degree of firmness it presents, which is similar to the second and third (the latter particularly) degrees of hardening, arising in the manner I have endeavoured to explain (§ 104.), and affecting all parts of the nervous masses, — the cerebellum and medullary chord, as well as the various parts of the brain itself. (See Hardening, &c.)

111. *A. Tubercular secretion,* — *Tyroma* (Craigie). — Tubercles of the brain have been described in recent times with much accuracy by Gendrin, Léveillé, Ollivier, Abercrombie,

ANDRAL, and CRAIGIE. They are formed of a white, or pale yellow, opaque, firm, cheese-like, sometimes granular and friable substance, consisting of a large proportion of albuminous matter, and varying in size, from that of a millet seed to the bulk of a hen's egg. This substance is deposited in various forms in the brain, but usually as follows: — 1st, One, two, or more, homogeneous, distinct masses, of considerable size; 2d, Several, or many, separate, minute, spherical, or spheroidal masses. Cases of the *first* form of tubercular formations are to be found in the writings of MANGET, ROCHOUX (*Récherches sur l'Apoplexie*, p. 151.), POWELL (*Trans. of Coll. of Phys.* vol. v. p. 222.), BLANE (*Trans. of a Society, &c.* vol. ii.), BAILLIE (*Fasc. of Eng.* No. 10. plate vii.), COINDET (*Mém. sur l'Hydroceph.* p. 106.), BOUILLAUD (*Traité, &c.* p. 161.), ABERCROMBIE, (*Dis. of the Brain, &c.* p. 428.); CHAMBERS (*Med. and Phys. Journ.* vol. lv. 1826, p. 5.), PIEDAGNEL (*Journ. de Phys.* t. iii. p. 247.), BERARD (*Ibid.* t. v. p. 17.), and HOOPER (*Morbid Anat. of the Brain*, p. xi. and xii. fig. 1.). Tubercles of this class vary in number from one to five or six, and in size from that of a pea to the bulk of a hen's egg. In form they closely resemble tubercles in other parts of the body. According to LÉVEILLÉ, they are often of an unequal surface, so as to appear lobulated, particularly when they are very large. If only one or two are present, their size is generally considerable. M. ANDRAL mentions their existence in the cerebellum, of so large a volume as to destroy nearly the whole of one of its hemispheres. Even when of this bulk, they consist of the opaque, cheese-like substance already described, and are always destitute of vessels, or any trace of organic structure. They are albuminous, friable, and generally surrounded by a cyst. MM. GENDRIN and LÉVEILLÉ are of opinion that they always have cysts, but of variable thickness, which are sometimes remarkably thin, at other times, especially in old tubercles, thick and fibrous. The cyst adheres externally to the surrounding cerebral structure; and its internal surface sends off delicate filaments, which traverse the continued tubercular matter, and, in the large and old tubercles with thick cysts, seem like small fibres or partitions passing between the lobules of the contained substance, which is disposed in cellules formed by these filaments. In some large and old tubercles, the cyst is fibrous, cartilaginous, or even osseous (GENDRIN), and is sometimes partially separated from the surrounding cerebral structure by a minute quantity of serous fluid. In proportion as the tubercle softens, the cyst becomes more apparent.

112. The surrounding cerebral substance is often perfectly natural, and sometimes variously altered; — occasionally inflamed, or softened, or atrophied, or even destroyed, especially when the tubercles are very large. Upon these lesions, the symptoms during life are often chiefly dependent. Very frequently, especially in children, tubercles varying as to number and size may exist in the brain, without occasioning any symptoms sufficient to lead to the suspicion of cerebral disease: but this seems to be the case only when the nervous substance around them has been but little changed from the healthy state. When nervous symptoms have appeared without such change, they have generally assumed an intermittent character.

113. It is very probable that tubercles are formed in the brain, as elsewhere, at first in a fluid state; and that they afterwards either undergo a slow coagulation, or have their aqueous portions partly absorbed, the albuminous and other more solid constituents forming the tubercular substance. M. BOUILLAUD believes that they are the product of an inflammatory process; and the tendency of inflammation to produce an albuminous secretion certainly countenances this opinion. Whatever may be the origin, they appear to experience in the brain a similar softening to that which they undergo when formed in other organs. When this is advanced to more or less partial fluidity, tubercles may be mistaken for other formations; and when amounting to liquefaction, the tubercular production can, with difficulty, be distinguished from a small encysted abscess. (See art. TUBERCLES.)

114. The *second* form in which tubercular productions are found in the brain, is that of spheroidal bodies, disseminated through its substance. Professor REIL (*Memorab. Clinica*, t. ii. fas. iii. No. 2. p. 39.) describes them, in a case which occurred to him, to have consisted of about two hundred spheroidal bodies lodged in the grey matter of the brain and cerebellum. They were a little firmer than the brain itself, mostly of a pale yellow, some of a pale blue, of the size of a lentil or pea, and consisting of an adipose-like substance. From some, which were marked in the centre with a dark point, and seemed covered by a thin cyst, a slight incision discharged a matter like vermicelli. These bodies were confined entirely to the cortical substance of the brain, chiefly near the deep anfractuosities, and but very few were in the prominent parts of the convolutions. They were most numerous in the superior aspect of the hemispheres, less so in the cerebellum, and least numerous in the base of the cerebrum. The pia mater was remarkably injected with blood, and the ventricles contained very much fluid. This patient had never complained of pain in his head, although long afflicted with scrofulous sores, until eight days previous to death. In a case recorded by M. CHOMEL (*Nouv. Journ. de Méd.* t. i. p. 191.), similar bodies were found disseminated through the brain of a woman aged thirty, who died with symptoms of cerebral disease. Two such productions were also found in the cerebellum, and one in the spinal chord. Cases similar to the above have likewise been recorded by other writers. Tubercles, even in the form now being considered, are seldom or ever found in greater number than in the case just quoted from REIL; and, as GENDRIN has remarked, they are never found in the brain in so very great numbers as in the lungs; nor, in my opinion, do they assume, in the cerebral structure, the agglomerated form, in which they are so often met with in other viscera, and in the lungs especially.

115. Tubercles are often met with in the brains of children, and those especially of a strumous diathesis, and upwards of one or two years of age. They occur most frequently from this age to puberty; after which they are rarely met with, even in scrofulous and phthisical subjects, where tubercles exist not only in the lungs, but

also in other organs. They are most common in the hemispheres of the brain, and there occupy indifferently either the cortical or the medullary texture: sometimes they appear, as it were, placed between both. In some cases in which they have been found in the more exterior layer of the cineritious structure, they seem not to have been originally formed in it, but to have sprung from the internal surface of the pia mater, and to have pressed inwards the cerebral tissue as they increased in size, forming, as it were, a superficial cavity in it, without any intimate union with it beyond that of close contact. The parts of the brain, after the hemispheres, where tubercles are most commonly found, are, according to M. Andral, the cerebellum, the mesocephalon, the medulla oblongata, various parts of the spinal chord, the peduncles of the cerebrum and cerebellum, the thalami optici, corpora striata, the commissures of the thalami, and pituitary body. According to the order of frequency here indicated, it will be observed, that those parts of the cerebro-spinal axis which are most frequently the seats of inflammation, softening, or hæmorrhage, are not those which are oftenest the seat of tubercles.

116. *B. Adipose tumour* (Wenzel),—*Fatty productions* (Andral), — *Lardaceous degeneration* (Hebreart, *Annuaire Méd. Chirurg.* Paris, 1829. p. 579.), — *Ceroma* (Craigie). — This morbid formation has been noticed, under the above designations, by the authors whose names are respectively noticed, and also by Rudolphi, Braun, Cruveilhier, Merat, Leprestre (*Archives Génér. de Méd.* t. xviii. p. 19.), and Dalmas (*Journ. Hebdom. de Méd.* t. i. p. 332.). Borelli states that he has found, behind the upper part of the medulla oblongata, a fatty, homogeneous, reddish, or rose-coloured substance, the size of a nut, apparently traversed by reddish lines, and contained within a thin envelope. A similar tumour, though smaller, was found in the left cerebellic hemisphere. Amongst the great number of brains examined by the Wenzels, only two presented this change; which they describe as having been smooth, of a yellow colour, and consisting of a solid, adipose, ash-coloured substance; and, although found near the exterior surface of the hemisphere, penetrating deep into the substance of the organ.

117. According to M. Hebreart, this disease is not so rare as the Wenzels lead us to suppose. He had met with four cases of it; two in which the tumour was seated in the brain, and two in the cerebellum. "In the first of the former, a distinct tumour, consisting of matter of a yellow colour, and lard-like consistence, the size of a nut, in the anterior part of the anterior lobe of the right hemisphere, gave rise to idiotcy. In the second, a square inch of the posterior lobe of the left hemisphere was converted into a yellowish pulpy matter, which was separated from the contiguous sound brain by hardened cerebral substance. This, in a man aged forty, caused epileptic paroxysms, occurring once or twice a month, which at last proved fatal, by causing asphyxia. In the first of the cerebellic cases, in a young man who had been idiotic for six years, the cerebral substance, forming the walls of the fourth ventricle, had been converted into a yellowish lardaceous matter In the second, that of an incurable maniac, a space, six lines in diameter, of the lower part of the right hemisphere of the cerebellum, had become hard, yellowish, and lardaceous, both in the grey substance, and also in the white." The membranes also participated in this change. M. Hebreart considers that this lesion may occur in two forms,— 1st, As a degeneration of the cerebral structure into a matter of a yellowish colour and lardaceous consistence; and, 2d, In the shape of a distinct tumour situated in the cerebral substance.

118. Closely allied to the above, although materially different in some respects, yet still more strictly deserving the term adipose, are the tumours described by Leprestre and Dalmas. M. Leprestre found, in the left side of the mesocephalon of an adult subject, a large tumour, with a brilliant lobulated surface, consisting of concentric layers, united by means of fine cellular tissue, but without any trace of blood-vessels. It was denser in its structure than the brain, and closely resembled a mass of adipocire. This resemblance is remarkable, inasmuch as MM. Barruel and Gmelin have demonstrated, in the healthy human brain, a certain quantity of fatty matter and cholesterine. The tumour found by M. Dalmas nearly resembled the foregoing. It was situated in the base of the brain, and was as large as a hen's egg. It rose upwards into the third ventricle, separated the parts which contribute to the formation of this cavity, and disappeared in the medullary substance of the striated bodies, the thalami optici, the anterior commissure, &c. Its superior surface closely resembled spermaceti. Its inferior surface was transparent, polished, and studded with a number of pearl-like granulations, from a line to a line and a half in diameter, which were, like the whole of the mass, perfectly homogeneous, and devoid of every trace of organisation. When analysed by M. Barruel, this tumour was found to contain a very large portion of fatty matter, and a substance which seemed to be cholesterine. The description of a similar tumour is recorded in the first volume of the *Journal Clinique des Hôpitaux*. Otto also found a fatty tumour, which contained hair, protruding through an aperture in the hemisphere into the ventricle, its cyst shining like mother-of-pearl.

119. *C. Flesh-like tumour,* — *Adenoidea* (Craigie).—This production has been described by the vague names of scirrhous and scrofulous tumour; but it cannot be admitted to possess unequivocal characters of either. It is generally stated to be similar to a mass of flesh, or an enlarged absorbent gland. Its colour is light pink, or pale flesh-colour; its firmness is considerable; and, in some instances, it is compared to the kidney. Cases of this description of lesion may be found in the writings of Plater (*Obser.* l. i. p. 13.), T. Bonet (*Sepulchetum*, t. i. p. 283.), Rhodius (*Cent. Obs. I.* No. 55.), J. J. Wagner (*Miscell. Curios. Dec. II. Ann.* 10.), J. G. Zinn (*Comment. Soc. Reg. Scient. Gott.* t. ii. 1752.), J. J. Huber (*Nova Acta Physico-Medico Acad. Cæs. Leop. Cur.* t. iii. p. 533.; *et Comment. de Rebus in Scient. Nat.* t. xviii. p. 335.), Haller (*Opusc. Path.* Obs. i.), J. E. Greding (*Ludwig's Advers. Med. Prac.* t. ii. part ii. p. 492.), H. Earle (*Med. Chirurg. Trans.* vol. iii. p. 59.), Powell (*Trans. of Coll. of Phys.* vol. v. p. 241.), &c. Most

of those cases appear to have occurred in strumous habits; and, besides signs of glandular disease, many of them were affected with palsy, apoplexy, or mental derangement; and others with convulsions and epilepsy, shortly before death. M. Andral (*Anat. Patholog.* t. ii. p. 848.) mentions his having found, in the middle of one of the hemispheres of the brain of a person who had died of apoplexy, a fleshy fibrous tumour of the size of a walnut.

120. *D. Fibro-cartilaginous tumour,—Scirrhus, Chondroma* (Hooper and Craigie),—is probably, in its slighter grades of change, merely an advanced state of the third variety of partial induration of the brain (§ 103.). It is distinguished from the surrounding cerebral substance by its great firmness; its irregular and lobulated form; its yellowish, hard, and fibrous structure; and, in its advanced stages, by the presence of a semi-fluid, gelatinous matter, occasionally tinged with blood, contained in small cavities, disseminated through it; and by a tendency to softening; death, however, generally taking place before complete softening, or cancerous ulceration, has supervened. This tumour is not often met with in the substance of the brain, and very seldom as a primary affection. It seems to consist of a change in the structure of the part affected, rather than of a deposition of adventitious matter; and it is not enveloped by any cyst; but gradually disappears in the surrounding substance, which is sometimes softened. All the cases which have been recorded of scirrhus of the brain, are not in every respect similar to the above description, but an approximation to it merely; some, according to the loose accounts given of them, being intermediate between this and the cartilaginous conditions. The best illustrations of this form of tumour have been furnished by Cruveilhier (*Anat. Pathol.* t. ii. p. 80.), Rostan (*Récherches sur le Ramollissement du Cerveau, &c.* 1re ed. p. 80.), Andral (*Journ. de Physiol.* t. ii. p. 105.), Bouillaud (*Traité Clinique de l'Encéphalite, &c.* 1825.), Lerminier (*Ann. Méd.-Chirurg.* 1819, p. 225.), Monro (*Morb. Anat. of the Brain*, p. 55.), Wade (*Medic. and Phys. Journ.* vol. lv. p. 369.), Bayle (*Réch. sur la Phthisie Pulmon. &c.* p. 305.), and Copland Hutchison (*Trans. of Med. and Chir. Soc.* vol. ii. and iv.). All these cases were characterised by acute pain in the head, stupor, palsy, idiotcy, convulsive movements, and, at last, insensibility, coma, or complete apoplexy, and death; or by one or more of these symptoms; and several of them seemed to originate in external injury received at a more or less remote period.

121. *E. Bony tumours and calcareous concretions,* —*Osteoma* (Hooper),—are rarely observed in the substance of the brain. Cases have, however, been furnished of their formation, in more or less considerable masses,—near the right ventricle, in an idiot, by Kerkringius (*Obs. Anat.* p. 135.); in the corpus striatum, by Deidier (*Des Tumeurs, &c.* p. 351.), and Kentmann (*De Calc. in Hominib.* Tig. 1536.); in one of the corpora quadrigemina, by Tyson (*Phil. Trans.* No. 228.); in the union of the optic nerves, by Bleony (*Zodiac. Gall.* Obs. xiv. p. 81.); where they were attended by violent pain in the occiput, by Boyer (*Cruveilhier's Anat. Path.* t. ii. p. 84.); in the cerebellum, by Littre (*Mém. de l'Acad. de Paris*, 1709, p. 55.); in the cerebellum of an epileptic, by Lieutaud (*Hist. Anat. Méd.* l. iii. Obs. 179.); in the pons varolii, by Metzger (*Obs. Anat. Reg.* 1792, p. 3.); in the optic beds, by Caldani (*Opusc. Anat. Path.* 1803, p. 51.); in one hemisphere of an epileptic, by Otto (*Comp. Anat. Path.* p. 415.); in the cerebellic peduncles and protuberance of an idiot, by Home (*Phil. Trans.* 1814.); in the left hemisphere, by Andral (*Journ. de Physiol.* t. ii. p. 110.); in the cerebellum, with violent pain at a determinate part of the occiput, by Nasse (*Abercrombie on Dis. of the Brain*, p. 426.); in the centre of the medullary substance of the anterior lobe, with pulpy destruction of the surrounding part in one case, and in the cerebellum in another, by Dr. Hooper (*Morb. Anat. of the Brain*, p. 39.). Besides these, other instances are referred to in the *Repertorium* of Ploucquet, and the *Compendium* of Otto. In more numerous cases, the chalky, calcareous, or bony matter, is disseminated like sand in a diseased portion of brain, and can be detected only by squeezing or rubbing the part between the fingers. In some cases, the bony matter appears like minute spiculæ, or particles; and Dr. Hooper states that he has found each of them attached to a filamentous vessel.

122. Sabulous concretions are so constantly found in the *pineal gland*, or its peduncles, even of those whose cerebral functions were most healthy, that Soemmering conceived them to form a part of its natural structure in adults. But this part may be greatly enlarged, and contain calcareous matter to an excessive amount. A case of this description is given by Manget (*Theat. Anat.* l. iv. c. ii. p. 309.) and Salzmann (*De Gland. Pineal. Lapid.* Arg. 1733.).

123. *F. Hygromatous tumours, or cysts, containing a serous or albuminous fluid,* — *Hygroma* of Hooper), — are not infrequently found in some part or other of the brain. Dr. Hooper has described four varieties of these cysts: — *a.* That consisting of a *simple cell*, or *cavity*, containing a transparent, yellowish, or yellowish red, serous fluid. Their sides are somewhat harder than healthy brain, occasionally rough, and of a brownish hue internally, but mostly smooth and shining. They present no appearance of membrane lining the cell, nor of vascularity; are of the size of peas or nuts, and are most frequently met with near the external surface of the brain. They appear to be the remains of cavities formed by extravasated blood. *b.* Another variety is a distinctly *encysted tumour*, consisting of a membranous cyst, or vesicle, filled with a serous fluid. This cyst is delicate, is formed of a single membrane, and is provided with vessels coming from the surrounding brain, and which may sometimes be seen ramified over it. The fluid which fills it is colourless and limpid. This variety varies from a very small size to that of a small orange. It is sometimes solitary; but occasionally two or more may be embedded close together. *c.* Dr. Hooper describes *two other varieties*, one of which is formed of a cyst, which is opaque in some parts, and transparent in others, and distended with a sero-albuminous fluid. The cyst is not apparently vascular, but is much thicker than the preceding; and its contents coagulate by heat: *d.* The other is characterised by the remarkable thickness of its cyst, and the thick albuminous nature of its contents. It is generally found

embedded in the medullary substance of the brain.

124. *G. Hydatids.* — The existence of *true hydatids*, — both the *acephalocyst*, or headless hydatid, and the *cysticercus*, or bladder-tailed hydatid, — in the substance of the brain, has been doubted. Several cases of hydatids in this part have been adduced by authors; and instances have occurred to Andral and Calmeil (*Anat. Pathol.* t. ii. p. 779.), which they considered to belong to the latter of the above species of entozoa; but whether they actually were such, or some one of the cysts described above, rests upon the pathological reputation of these physicians. Those adduced by Home, Headington, Morrah, and Rostan, seem to have been merely varieties of *hygroma*. Dr. Hooper never met with hydatids in this situation, in his numerous dissections. Brera states that he has found them in the choroid plexus; and Dr. Monro relates a case, where a cyst, which he considered as a true hydatid, was found in one of the ventricles. But their connection with the membranes of the brain (§ 31.) has already been shown.

125. *H.* The *Hæmatomatous tumour*, — *the Hæmatoma* of Hooper, — is not common. It is mostly fungous, arising from a small base, separating the convolutions and cerebral substance about it, as it enlarges and rises towards the surface of the brain. It is soft to the touch; is elastic, and covered with a vascular and shaggy membranous tissue. When divided, its inner structure is vascular, mottled, of a whity brown, and, in some parts, of a bloody colour; and a humid substance adheres to the knife like cream. Interesting cases have been detailed by Rochoux (*Réch. sur l'Apoplexie*, Ob. 38. p. 149.), Hooper (*Op. Cit.* pl. x.), Monro (*Op. Cit.* p. 56.), and G. Gregory (*Med. and Phys. Journ.* vol. liv. p. 462.), in which these tumours were, exteriorly, of a reddish or reddish brown colour, lobulated, and surrounded by pulpy destruction of the cerebral substance. In two of the patients, violent headach and epilepsy, and, in one, palsy, followed by coma, preceded dissolution. This tumour must not be confounded with the solid nodules of extravasated blood, often found after apoplectic seizures.

126. *I. Encephaloid or cerebriform tumours*, — *Medullary sarcom*, — *Fungus hæmatoides*, — *Cephaloma*, Hooper. — These tumours are not frequent. Delineations of them have been given in Dr. Baillie's and Dr. Hooper's illustrations. They occur chiefly in young subjects; and are encysted, soft, compressible, and spongy, resembling the grey cerebral substance, with a tinge of red, and of the consistence of the fœtal brain. They are frequently divided into lobulated masses. When cut with a knife, the surface is smooth, and the knife is covered with an unctuous substance. I have met with one case in a boy of eleven years of age. M. Bayle found it in the cerebellum of a middle-aged man. (*Rév. Méd.* Avr. 1824, p. 77.)

127. *K. The Melanoid tumour*, — *Melanosis*, — *Melanoma*, of Hooper. — Melanosis has rarely been found in the brain. Dr. Hooper has, however, observed it in a tuberculous form, both in the cineritious and medullary structure. These tumours were of a jet black colour, soft, distinctly circumscribed, and closely surrounded by healthy brain. Dr. H. has found them of all sizes, from that of a mustard seed to that of a walnut. "They are so soft as to require a very sharp knife to cut them, which they soil. They are easily taken out of the brain with a forceps, and leave a clean cavity, without any cyst apparent to the naked eye; and if shaken in water, they colour it black, and a flocculent substance remains. In one instance, in which there were several of these tumours, some of them were of a blood or liver colour, and resembled hæmatoma (§ 125.); others were perfectly melanomatous; and several were of an intermediate colour, — a circumstance which is very much in favour of the hæmatoma and melanoma having an intimate connection, if they be not one and the same disease, modified by particular circumstances." (p. 41.)

128. All the tumours now described occasion alterations, generally of an inflammatory nature, with softening in the substance of the brain contiguous to them; and until those alterations have been in some measure produced, they often give rise to but little disturbance of the functions of the organ. However, when these changes become developed, the usual symptoms of *circumscribed inflammation of the substance of the brain*, with softening; *epilepsy*; loss, or perversion of one or more of the mental faculties — amounting often to *insanity*; *idiotcy*; *palsy*; *coma*, and *apoplexy*; are the usual effects. (See *the Articles on these diseases.*)

129. vii. Rupture of the Brain. — *Hernia cerebri*, — *Encephalocele*, — is occasionally met with. It consists of the protrusion externally of a portion of the brain through openings in the cranial bones. This lesion either may be *congenital*, or may arise *subsequently* to birth. In the *former* case it is generally connected with effusion of fluid in the ventricles. The protrusion of brain varies with the size of the aperture in the skull, and the quantity of effusion causing it. In some cases a large portion of the skull is wanting, and the protruding part of the brain has a wide base: in other cases, the opening in the cranium is small, and the protrusion is either very small, or attached to a narrow neck. Otto states, that in every case which he has observed, the lesion was owing to effusion, and not to hypertrophy of the substance of the brain; and that the aperture arising from deficient developement of the bones of the cranium was one of the consequences of the effusion. This agrees with my experience, and constitutes *hydrencephalocele* or watery rupture of the brain. In some cases large portions of the brain are protruded, in others but small. Frequently the protrusion consists only of the membranes forming *hydrencephalocele meningea*, and the water which they contain. Otto describes this as a rare occurrence. I have met with several cases at the Infirmary for Children, and in unusual situations, namely, through clefts in the parietal bones. In rare cases of hernia cerebri, the water is found both within the ventricles and between the membranes.

130. Congenital rupture of the brain occurs most frequently on the back of the head, through the enlarged occipital foramen, and the cleft upper cervical vertebra, or through a cleft in the upper part of the occipital bone, or in the lambdoidal suture. It is not frequent at the top of the head, especially at the great fontanel; and Otto says it is still more rare in the sides of the skull and

forehead, and the rarest of all in the orbits and sphenoidal sinuses. Two cases, however, of its occurrence at the sides of the skull have come before me. Rupture of the brain, occurring *after birth*, arises from the expansion of the brain by its own elasticity, or by increased determinations of blood, and its consequent detrusion through apertures naturally or artificially made in the cranium. I have met with cases, however, in which no protrusion of the brain had been observed after birth; and yet apertures, through which it might have occurred, were found in the middle or squamous parts of the bones, and must have been congenital. The inference is, in these cases, that a watery tumour of the brain had arrested the formation of the bone immediately over it, and that this tumour had subsequently disappeared, probably from the absorption of the aqueous effusion; but that the bone had not yet been formed in the situation where the ossific process had been interrupted.

131. viii. Laceration. — The *continuity* of the brain may be destroyed by external violence, or injuries penetrating the cranium, either with or without loss of substance. Concussions also will *lacerate* the brain, without the skull being penetrated or even fractured. The substance of the organ, particularly the septum and fornix, may be torn by large collections of water in the ventricles. There is every reason to suppose that, when the solution of continuity is simple, adhesions will take place. When there is loss of substance, the injury can be repaired only by granulation. If the *laceration* be accompanied with the effusion of blood, so as to form a large coagulum, requiring to be absorbed, the reunion of the opposite sides of the lacerated brain is effected by means of a fine cellular tissue; permanent paralysis being the usual consequence. When the granulations of the lacerated brain protrude through the fractured skull, owing to their luxuriance, or rather to the elasticity of the brain; and when the protrusion proceeds from the distension arising from the fulness of its vessels, the morbid condition has been improperly called *fungus cerebri*, — improperly, inasmuch as the term *fungus* is applied to a malignant and constitutional malady.

132. ix. Ecchymoses, and Alterations of Colour. — Besides the lesions now described, there are *others of a less remarkable kind*, of which a brief notice may be taken. *a*. The *cineritious substance* may be extremely *pale*, and even approximating to *white*; and it may also be of a very *deep colour*, and almost approaching to *black*, particularly in some cases of asphyxia and fevers, owing probably to the dark and imperfectly decarbonised state of the blood. The different layers composing this substance are sometimes also more than usually distinct, and separate easily from each other (M. Foville and Dr. Bright). In other cases they are very thin, as if in a great measure absorbed. This part of the cerebral substance likewise, in some instances, presents numerous *ecchymosed spots* of various sizes and depth of colour. *b*. The *medullary structure* is also sometimes *ecchymosed*, particularly after concussion; and variously *marbled*, and presenting blotches of a pink, purplish, greyish, or of a greyish yellow. These changes seem to proceed from excessive injection of the minute capillaries of the organs, and probably from partial extravasation of their contents, owing to over-distension, or a morbid state of the blood which had circulated in them shortly before death, and are most commonly observed after death from convulsions and malignant diseases.

133. As respects the *colour* of the brain generally, I may state that it is sometimes found unusually pale from deficiency of blood, in cases of anæmia and cachexia. But it is more commonly of a *deep* or *pink colour*, particularly in those who have died from apoplexy, strangulation, narcotic poisons, asphyxia; and in the insane, or those given to drunkenness. In some cases resulting from those diseases, or attended with cerebral congestion, dark red, *bluish*, or *purple coloured* spots, or even streaks, have been found in both the cortical and medullary structure. In cases of inflammatory irritation, a reddish or pink hue is observed. A *red* colour is rarely met with, but more commonly a *pale rose tint*, unless effusion of blood have occurred. I may also state, at this place, that if, in severe diseases of the brain, the blood be decomposed, or if the colouring particles be secreted in various proportions, the brain will present different shades of colour, both in its cineritious and in its medullary substance: it will thus be either a pale or dusky yellow, an orange, a brown, greyish green, a slate colour, and even here and there soot-coloured. Occasionally, also, in different changes of texture, although even without these, a deposition of a *melanotic* pigment takes place, chiefly in the course of the larger vessels, independently of the melanoid tumour (§ 127.). Otto never observed the brain generally tinged yellow in cases of jaundice, and doubts it having ever occurred, although Stoll says that he has seen it. I should add, that the above changes of colour are independent of marked softening or pulpy destruction of the cerebral substance.

Brain. — Anæmia of the. — See § 132., and art. Convulsions.

Brain. — Cerebral Plethora. — *Determination of Blood to the Head.* Classif. II. Class, I. Order (*Author*).

134. When the blood is determined in too great quantity to the brain, although the patient may not be altogether incapable of his usual avocations, yet much disorder may be present, which, if neglected, may lead to serious diseases, more especially to those which will be considered in the sequel of this article.

135. *Causes.* — The causes of general vascular plethora likewise occasion this affection. Those which are more peculiar to it, are inactivity of the secreting and excreting functions, mental exertion, retention of accustomed evacuations and discharges, full living, sedentary occupations, and want of exercise in the open air; organic diseases of the heart, particularly hypertrophy of the left ventricle, and those causes which are enumerated under the article Apoplexy.

136. *Symptoms.* — Cerebral plethora, and determination of blood to the head, differ in many respects from cerebral congestion, or *coup de sang* (§ 139.), but the symptoms accompanying them vary chiefly in degree. Where the disorder consists merely of plethora from local determination, somnolency, cephalalgia attended with scintillations, and objects appearing of a red colour, vertigo, noises in the ears, sometimes sleeplessness, moral and

physical excitation, intellectual activity; or, on the contrary, inactivity, inability of continued attention, stiffness, cramps, twitchings, &c. of the limbs; animation of the countenance and eyes, which are sometimes red or injected, with strong pulsation of the carotid and temporal arteries, full and somewhat frequent pulse, and slightly increased temperature about the head, are the usual symptoms.

137. *Morbid appearances.*—This state of disorder never of itself occasions death; but, as it sometimes occurs in the advanced stages of fatal diseases, it has been observed to consist of increased vascularity in the brain and its membranes, without further organic change; but it is sometimes accompanied with a slight serous effusion into the ventricles and between the membranes, particularly towards the base of the brain. This effusion seldom amounts to more than may be present in the healthy state of the organ, the excess being probably rather a consequence of death, than its antecedent.

138. *Treatment.*—Cerebral plethora may generally be removed by avoiding the causes inducing it; by promoting the abdominal secretions and excretions by the usual means; by the affusion of cold water on the head, and the daily use of the shower-bath, or by sponging the head with cold lotions; by clothing the lower extremities warmly, and promoting the cutaneous perspiration; by regular daily exercise; by due attention to the quantity and quality of the food; and by changes of air in obstinate cases, and sea voyages.

Brain.—Congestion of Blood in the.—*Coup de Sang.*—*Cerebral Congestion.* Classif. II. Class, I. Order (*Author*).

139. Congestion is an advanced as well as a modified state of cerebral plethora, and consists in too great an accumulation of blood in the vessels of the head, particularly in the venous capillaries and sinuses, occasioned either by too great a flux of this fluid to the brain, an exhausted tone of the capillaries and smaller vessels, or impeded return of it by the veins. This state of circulation in so important an organ as this is, necessarily occasions marked lesion, not only of the functions which it performs, but also of other functions throughout the system.

140. *Symptoms.*—Cerebral congestion is characterised by numbness, vertigo, noises in the ears, somnolency, brilliancy or watering of the eyes, cephalalgia, redness of the countenance, beating of the carotids and temporal arteries, loss of recollection, &c. These symptoms continue for some time in different degrees, sometimes disappearing, and after a while returning, accompanied with cramps, twitchings of the limbs, generally of both sides: at last the patient loses sense and voluntary motion, in a more or less sudden manner. But usually in the course of a few minutes, or, at furthest, some hours, the more urgent of these symptoms disappear; leaving, however, numbness of the limbs, which generally disappears in a short time, or in the course of one or two days.

141. In the more severe cases, and those which more nearly approach complete apoplexy, the attack is preceded by disorder of the stomach, or accompanied by nausea, or vomitings; and sometimes, during the loss of sense and voluntary motion, the stools and urine are voided involuntarily; respiration is more or less embarrassed, but not stertorous; the pulse is strong, frequent, and full; the temporal and carotid arteries beat strongly; and the skin is generally warm and natural. Cerebral congestion is almost always general throughout the brain, but it is also, although rarely, local, affecting only one hemisphere; and; owing to the numbness and temporary paralysis thereby occasioned, is confined either to one limb or to one side of the body; simulating apoplexy, or paralysis from hæmorrhage in the brain. That these local symptoms are, however, owing to partial congestion, and not to hæmorrhage, is evinced by the celerity with which they disappear under judicious treatment. When the cerebral congestion is very great, it constitutes a form of *apoplexy*, noticed in the article on that disease, and may occasion death without any further lesion than congestion merely.

142. *Appearances on dissection.*—The scalp, and even the bones of the cranium, in some cases, are of a red violet colour, and allow of a considerable quantity of blood to escape upon being divided. The vessels, and particularly the sinuses, are filled with dark blood. When the arachnoid of the pia mater is separated from the brain, a reddish patch, more or less deep, is formed, the vessels running through it being gorged with blood. The surface of the convolutions are of a more or less dark colour; and, when the cortical substance of the brain is divided, it is of a deeper hue than natural, the orifices of the cut vessels giving out drops of blood proportionate to their size. Upon dividing the medullary structure, which is usually not so white as in health, myriads of minute specks, becoming small bloody drops, rapidly form on the surface. The large vessels, and particularly the veins of the brain, are gorged with blood. When a person cured of repeated attacks of cerebral congestion, dies of a different disease, morbid appearances are seldom detected in the brain.

143. *Terminations and complications.*—Cerebral congestion may occasion *meningitis*; or *inflammation* and *softening* of the *substance* of the brain; or *hæmorrhage* in some situation within the cranium, giving rise to complete *apoplexy*, or *palsy*, or both; and serous effusion in the ventricles, or between the membranes; many of the cases of *apoplexy*, attended with extravasation of blood, thus commencing in congestion, the extravasation being a consecutive change. It may also supervene on organic changes of the heart and lungs, and in the progress of various fevers, and thus be complicated with these diseases.

144. *Causes.*—The causes of this state of the cerebral circulation, are those which have been already detailed in the articles Apoplexy and *Cerebral Plethora* (§ 134.).

145. *Treatment.*—*Blood-letting*, general, local, or both, to an extent which the constitution, habit, and symptoms of the patient indicate, are requisite. Next to blood-letting, active purging by calomel, followed by a dose of senna, croton oil, or some other active cathartic, and promoted by strong cathartic injections, such as the oleum terebinthinæ, oleum ricini, extr. colocynth. comp., &c. are required, and should be repeated, so as to procure copious evacuations, and keep up sufficient action in the alimentary canal. The affusion of cold water on, or cold sponging the head,

is generally beneficial; and when the temperature is increased, and the countenance and conjunctiva flushed, a thick oilskin should be placed under the patient's head, which ought always to be kept elevated, and covered with cold epithems. Due attention should be constantly paid to the state of the evacuations. Accumulations of bile in the gall bladder or hepatic ducts, and of fæcal matter and morbid secretions in the alimentary canal, frequently predispose to or induce an attack, which will seldom altogether yield to the means employed, unless these morbid collections are removed by appropriate means: and as long as the evacuations continue unhealthy, we may infer that the chief cause of disorder is not altogether removed. (See *Treatment of* Apoplexy.)

Brain — Inflammation of the. Classif. 1. *Class*, Febrile Diseases; 2. *Order*, Inflammations (*Cullen*). 3. *Class*, Diseases of Sanguineous Function; 2. *Order*, Inflammation, (*Good*). III. Class, I. Order (*Author*, see *Preface*).

146. Nosol. Defin. — *Pain of the head more or less violent, with suffusion or prominence of the eyes; generally tumid or flushed countenance, delirium, or sopor, or both, or a marked predominance of either; with symptomatic fever; and frequently with lesion of the senses and functions of relation.*

Pathol. Defin. — *Inflammation of either the membranes or the substance of the brain, or of both, generally with predominating lesion of either the one or the other.*

147. The recent researches of anatomists and pathologists have tended to advance our knowledge of the phenomena of inflammations of this important organ. The investigations of M. Magendie, who has shown that its membranes exhale in health a limpid serum for the purposes of protecting the parts they surround, of facilitating the movements to which they may be subjected, and of accommodating and imparting a certain degree of superficial pressure, so that they may not suffer from the varying positions and states of vascular plethora to which they are obnoxious, have indirectly thrown considerable light on the pathology of the brain. Much, however, is still required to be known, not only as to the further relations which these membranes hold to the cerebral organs, in the performance of their healthy functions, but more particularly as respects the connection which subsists between their organic lesions and their symptomatic or functional disorders.

148. We know that the more internal and the most vascular of these membranes are chiefly appropriated to the distribution of the circulating fluid by means of the minute capillaries which it transmits to the external surface of the brain. We may thence infer that the functions, and even the organic conditions of the brain, in these situations especially, will be greatly modified, or even altogether changed, by the varying condition of the circulation in this membrane. When, therefore, it is the seat of inflammation, disease will be more or less extended to the substance of the brain; and will more or less influence the functions of this organ, particularly in the parts which it supplies with blood. The membranes, however, exterior to the pia mater, may be affected to a considerable extent without this latter participating much in the disorder: and here our knowledge is both imperfect and deficient in precision: for we are not enabled to state that in such cases the functions of the brain itself are undisturbed, or, if disturbed, in what manner the lesion of these exterior membranes affects this organ; and, being imperfectly informed respecting all the offices of these membranes, we are less able to trace the relation between healthy function and the pheanomena which inflammation of them present. Surrounded thus with difficulties, which the advances of science will doubtless diminish, are we therefore to leave the subject without investigation, or relinquish the attempt to place in order and explain those facts which we have already obtained, and which may be made subservient to a further elucidation of the subject?

149. In no other organ of the body is it so difficult as in the brain, to trace the relation between demonstrable change of structure and morbid manifestations of function. This is partly owing, no doubt, to the circumstance of its being a double or symmetrical organ; lesions seated only in one half or side of the brain, when unattended by absolute disorganisation, not occasioning a corresponding degree of disorder as long as the same part of the other side is unaffected. *Delirium* has been conceived to be a symptom indicating the existence of inflammation of the membranes of the brain; yet delirium is a disorder of those functions which we conceive to be performed by the cerebral substance itself; and every experienced practitioner must have observed, and numerous are the cases on record, in which inflammation to a great extent, and all its consequences — as thickening, adhesions, effusions of lymph, or even of purulent matter — have been observed, and yet there had been no delirium. It is, therefore, to be inferred, that, when meningitis is accompanied with delirium, the disease extends more or less to the pia mater or parts enclosed by it. This inference, however, might lead to a conclusion which seems not well founded, viz. that it is impossible to distinguish meningitis as a disease independent of inflammation of the substance of the brain. This, doubtless, is often difficult, because both diseases frequently co-exist in different degrees, or co-ordinately; yet still an extensive experience will show that they often exist separately: and hence the necessity of ascertaining what are the characters which are proper to each. In respect of diagnosis, the subject possesses interest; and although the treatment in both is, in its principal points, the same, yet on some occasions it requires to be modified.

Brain — Inflammation of its Membranes. Syn. *Meningitis, Paraphrenitis et Phrenitis*, Auct. Var. Recent. *Arachnitis*, Parent and Martinet. *Cephalitis Meningica*, Good. *Phrénésie*, Pinel. *Méningite*, Fr. *Die Hirnhautentzündung*, Ger. *Brain Fever*.

150. Defin. *Acute pain in the head, with intolerance of light and sound; watchfulness, delirium; flushed countenance, and redness of the conjunctiva, or a heavy suffused state of the eyes; quick pulse; frequently spasmodic twitchings or convulsions, passing into somnolency, coma, and complete relaxation of the limbs.*

151. We are rarely enabled to distinguish between inflammation of the arachnoid membrane and that of the pia mater by the symptoms during life, I shall therefore comprise under the head of *meningitis*, inflammations affecting one or more of the membranes of the brain.

152. SYMPTOMS.— As the uses of the cerebral membranes are not rendered sensible by manifest functions, it may be concluded that diseases of these parts may exist to a considerable extent, without any distinctive symptoms. The justness of this observation is but too frequently confirmed by experience; for there are few practitioners who have diligently employed their opportunities of *post mortem* research, and have not observed appearances of inflammation, without much disorder of the intellectual faculties, or of the movements of the body, having been manifested almost up to the moment of death. Such instances are not rare, particularly in persons advanced in life. More frequently, however, when the membranes are inflamed, the adjoining portions of the brain, the functions of which they are probably intended to facilitate, evince some sort of disorder, particularly of their usual functions. These symptoms, although indirect, are generally similar to those of the inflammation of the cerebral substance itself, and are the chief guides to lead us to the recognition of meningitis.

153. The *symptoms* vary according to the seat of the inflammation, the stage at which it has arrived, the severity of the attack, and the celerity of its progress. The disease in its usual form presents three periods: 1st, that of invasion; 2d, that of fully developed inflammation; and, 3d, that of compression. Some one of these periods, however, does not always exist, particularly when the inflammation is very general or very circumscribed, or when it is very acute or very chronic in its progress. Meningitis affects more frequently that part of the membranes which covers the convexity of the cerebral lobes, in adult subjects; and the portions about the base of the brain, in young children.

154. *A. Acute meningitis* of the convexity of the cerebral lobes is attended with violent pain, which is exasperated at intervals, and often with stupor or somnolency. It occupies various regions of the cranium, the frontal, occipital, syncipital, &c., and is augmented by motion, particularly by rotation of the head, which in children is often drawn backwards. In this class of patients the pain is expressed, particularly upon being roused, by a *peculiar cry*, which the experienced observer recognises as a diagnostic sign of the disease, and after uttering which the infant sinks into a somnolent stupor, in which it grinds its teeth frequently. The functional derangements occasioned by meningitis are usually of a *general* character, although the inflammation is more frequently of limited extent. This is owing to both sides being attacked at the same time; cases where the meninges are inflamed on one side only being very rare.

155. *a.* Pain in the head is generally preceded by chills or rigors, which may be viewed as the result and indication of the formation of the disease; but cases not infrequently occur, wherein the foregoing signs in a greater or less degree precede the rigors even for a considerable time. The face at first is often pale; but, as the disease becomes fully developed it is more frequently slightly tumid, flushed, and expressive of pain, and the eye-brows knit or contracted; the eyes are heavy or brilliant, injected and watery, generally nearly shut, incapable of bearing the light, and the pupils contracted. The patient thinks he sees fire, or scintillations of light; and sometimes the colours of bodies appear differently shaded. The slightest noise is insupportable, and all the senses are in a state of morbid activity. His answers are brief and quick, and there is an evident activity of mind, but as yet no delirium. His disposition, however, seems changed; and he becomes impatient, irritable, abrupt, and quick in his manner, and his countenance is expressive of irritation and pain. The temperature of the head is now greatly increased; the pulse is frequent and developed; the tongue rather dry, its papillæ more or less erect and distinct; thirst is complained of; the urine is scanty and high-coloured, and the bowels are obstinately constipated; but in some instances, in children, either relaxed or irregular, and the evacuations morbid and offensive. From the commencement of the attack there is generally vomiting, particularly in children, which recurs at intervals, is unattended with tenderness or pain at the epigastrium, and is manifestly sympathetic of disease within the head. In adult subjects, vomiting is sometimes absent. It is not infrequently remarked, that this stage either does not occur or passes unobserved in aged persons. The patient loses suddenly his recollection, as in congestion only of the brain; but to this succeed febrile symptoms, distinguishing it from this latter affection.

156. *b.* After an indeterminate period, commonly varying from one to three or four days, according to the intensity of the attack, violent delirium comes on, but not constantly. If the pain in the head continues, it is not complained of by the delirious patient; and the senses are no longer intolerant of their natural excitants; the pupils commence to dilate or to contract, and strabismus supervenes; the countenance has a convulsed appearance; the lips are drawn somewhat to one or both sides; the pulse is more or less developed, sometimes irregular and trembling, and is rarely at this period feebler or slower than natural; the tongue presents the same appearances already noted; the thirst, and frequently the vomiting, still continue. The temperature of the head continues excessive, but occasionally fluctuates, whilst that of the rest of the body is often not materially augmented.

157. *c.* To this state succeeds more or less marked exhaustion, which should not be taken for commencing resolution of the disease. The patient ceases to scream; and the symptoms of violence subside; but to these succeed startings of the tendons, carphologia, convulsive motions, and sometimes cramps, chiefly in the upper extremities. The pupils are dilated, contract with difficulty on exposure to light; the eyes are rolled in their orbits, become insensible, as well as the other senses, to the ordinary excitants; and a complete calm takes the place of the violent delirium; the patient even not answering questions put to him. He has had no sound sleep excepting a fatiguing stupor; he is now plunged in a profound coma. The limbs are, up

to this time, rigid and contracted, but soon become completely relaxed. This state is owing, generally, to the effusion of serum, which has now taken place; but it sometimes may exist without increased effusion; injection and congestion of the vessels of the brain, or compression, from whatever other cause, also producing it. At this period of the disease the face is pale, the eyes inexpressive, dim, half open, and drawn upwards; the cheek bones prominent, the temples hollow, the nose pinched, the ears cold; the lips dry, applied closely to the teeth, which are covered with a fuliginous coating at their base; the tongue is dry, hard, and brown; deglutition difficult, the abdomen distended with flatus, and the fæces and urine voided involuntarily. The skin is either cold, or covered by a viscid sweat; the pulse is small, unequal, or irregular; the respiration slow, sometimes stertorous; the expired air is cold and fœtid; and the patient dies generally in the course of a very few days, or from two to three weeks, and but rarely later.

158. These are the principal symptoms of acute meningitis of the cerebral hemispheres. They present irregular periods of exacerbation; the heat of skin and character of countenance varying at different times without any evident cause. The stages of the disease are not precisely marked; either of them may be wanting, and sometimes they seem as if confounded with each other. When the disease *terminates favourably*, the symptoms subside gradually; resolution taking place, sometimes with, but as frequently without, critical phenomena.

159. According to the observations of MM. PARENT, MARTINET, and ROSTAN, when the *membranes of the base* of the brain, or of the *ventricles*, are the seat of the inflammation, the symptoms are somewhat different. The patient then experiences less delirium, or even preserves his intelligence almost entire; his faculty of attention, and some of the other intellectual powers, being only diminished. He answers slowly, but rationally, to questions put to him; somnolency is almost continued, and coma more quickly supervenes. In other respects the symptoms are the same. Cephalalgia is complained of chiefly at the bottom and above the orbits; in general, the symptoms of irritation and excitement are less strongly pronounced than in the preceding form of the disease.

160. *B. Chronic meningitis* differs from the acute chiefly in the less intensity of the symptoms, and slow progress of the disease. In many cases the functions of sense and locomotion are but slightly disturbed, and usually the intelligence is unimpaired; at least, as long as the inflammation does not affect the membranes of the convexity of the hemispheres. When seated, however, in this place, according to M. BAYLE, who has devoted considerable research to this subject, delirium frequently is also present, but it is seldom violent; sometimes it is taciturn; and the patient generally is engaged with lofty or ambitious ideas.

161. Chronic meningitis commonly succeeds to the acute form of the disease; but it often presents the chronic characters from the commencement. There is generally continued headach, with slight somnolency, sluggishness, incapacity and want of desire for intellectual exertion, moroseness, irritability of temper, sometimes confusion of ideas, embarrassment of speech, and delirium, terminating in confirmed mania or maniacal idiotcy. The motions of the limbs are slow, difficult, or painful, and their muscles are subject to involuntary motions and twitchings, and sometimes are not under the control of volition, or are altogether paralytic. Vomiting and convulsions are rarely present, excepting in *infants*, where they are often the chief or almost only signs. In *children*, the peculiar knitting of the eye-brows, retraction of the angles of the mouth, whining or peevish cry, stupor, grinding of the teeth, scanty urine, obstinate costiveness, and increased heat of the head, are the chief symptoms; these being similar in kind, but much milder in degree than those accompanying the acute or sub-acute states of the disease. In many cases, both in children and adults, the functions of organic life present but few lesions of a marked description until towards the last period of disease, or shortly before death. It will be perceived that many of the phenomena here stated, belong to disease of the brain,—a circumstance which must necessarily obtain; for as the membranes surround the whole of this organ, and are one of the chief media of distributing the blood-vessels to it, any disease affecting its structure, or modifying the quantity or properties of the fluid secretion furnished by these membranes, for its protection, &c., must necessarily implicate the state of its functions.

162. *C.* The *duration* of meningitis necessarily varies with its intensity. In its *acute* form it extends from three or four days to twenty-eight, and even thirty; but more frequently from seven to fourteen days. In many cases it is difficult to assign the period of invasion; pain and somnolency having been complained of even for days before the occurrence of chills or rigors. The disease also not infrequently supervenes on other affections, and occasionally becomes *complicated* with them, particularly in the course of *hooping-cough*, and diseases of the prima via, when its invasion may be overlooked, or with difficulty ascertained. The more *chronic states* of meningitis have no determinate duration: they may proceed gradually and in a slight form, when, unexpectedly, from some exciting cause, or even without any evidence of such occurrence, they may assume an *acute* character, and terminate more or less rapidly.

163. *D.* The *organic changes* consequent upon inflammation of the cerebral membranes are observed chiefly in the pia mater, the arachnoid, and the reflection of the arachnoid covering the dura mater; and not infrequently, also, in the cineritious substance of the brain. These consist principally of injection and impregnation of the pia mater with blood, &c.; loss of the transparency of the arachnoid; effusion of serous or sero-albuminous fluids; and the various lesions particularly described in the preceding sections (§ 22—28.).

BRAIN — INFLAMMATION OF ITS SUBSTANCE.

SYN. *Phrenesis*, *Phrenismus*, Auct. Var. *Encephalitis*, *Enkephalitis*, Hildenbrand. *Cephalitis*, Auct. Var. Recent. *Encéphalite*, Bouillaud and other French Pathologists. *Cérébrite*, Foville. *Cephalitis Profunda*, Good. *Gehirnentzündung*, Ger.

164. **DEFIN.** *Pain of the head; vertigo; altered sensibility; spasms, or contractions, of one or more limbs; excited or deranged functions of sense and intellectual power; rapidly terminating in coma.*

165. I have stated that meningitis manifests itself to our senses chiefly by the lesion of the cerebral functions; and that this is occasioned in two ways, viz. by deranging and impeding the functions of the brain, which these membranes are intended to facilitate; and by imparting the inflammatory action to those parts of the brain contiguous to them. But although the relative connection of parts thus necessarily increases the difficulty of distinguishing the symptoms proper to the membranes, or to the brain itself, still there are certain signs which enable us to infer the degree to which either may be separately affected. We shall see in the sequel, that, in cerebritis, the organs of voluntary motion exhibit frequently morbid phenomena which are generally limited in extent; whilst we have seen, in meningitis, these organs are affected generally, and seldom or ever partially, excepting when complicated with inflammation of some portion of the brain; and if, in cerebritis, all the voluntary actions are affected, the inflammation has commenced in the membranes, and extended itself to the substance of the brain, — the disease existing as meningitis and cerebritis conjoined, which is, perhaps, its most common state, and in which I shall presently consider it.

166. SYMPTOMS. — *A. The more immediate functional derangements.* The functions of the brain consisting of sensation, volition, instinctive desires, intelligence, and moral sentiments, it is evident that the phenomena of the disease should be sought after in this series of manifestations; and that they will vary, in respect of their particular states, their intensity, and progress, according to the seat, the nature, and extent of the organic change.

167. *a.* When *cerebritis is general,* it often presents the same functional disturbances, and the same progress and stages, as meningitis: it is, indeed, very probable that both diseases co-exist, and that the inflammation commences in the pia mater. However, when the whole cerebral mass is inflamed, coma, with relaxation of all the limbs, takes place much earlier than in meningitis; and the disease developes itself with extreme rapidity; the symptoms of vascular excitement scarcely showing themselves, or, at least, for a very short time; and being frequently altogether absent. This difference is readily explained, when we consider that, in meningitis, the brain being only secondarily and slightly affected, it may still exercise its functions, although in a deranged manner; whilst in general cerebritis, the change being extensive, its functions must necessarily be suspended. The patient, after a rigor, which ushers in this as well as the majority of other inflammations, sometimes loses recollection; but he has generally experienced other symptoms previously, such as obstinate pain of the head, twitchings, pricking sensations, slight numbness or diminution of the sensibility, with painful muscular action, vertigo, sudden want of recollection, and tinnitus aurium. Sometimes the sensibility is morbidly increased at this stage, as well as the functions of sense; the intellects are active, or excited; and there is watchfulness, with other analogous symptoms, for a longer or shorter period before the patient is seized with rigors and insensibility.

168. *b.* These *precursory symptoms* M. ROSTAN considers as the result of an incipient disorder, which he conceives to be local congestion, and that inflammation has not then taken place; but they are, more obviously, signs of an early period of inflammatory action. These symptoms are frequently accompanied with general signs of plethora or determination of blood to the head: the pulse, particularly of the carotids, is hard, or full and developed; the countenance is injected; the skin hot, &c. The same precursory signs are likewise observed in softening of the brain; but in this affection the pulse is not augmented in frequency or fulness, the skin is cold and pale, and the countenance pale or shrunk. The symptoms now described indicate, at least, that morbid action has commenced in the brain; and that it is not so extensive or intense as not to subside under judicious treatment. But when the patient has had rigors, the functional disturbance, especially of locomotion, is particularly marked: then ensue clonic or tonic spasms of the muscles, such as startings of the tendons, carphologia, convulsions, cramps, rigid contraction of the limbs, &c. At a more advanced period, particularly when effusion supervenes, paralysis or relaxation, and loss of sensibility of a limb or limbs, take place.

169. *c.* When cerebritis is *general* (which is never the case without the pia mater being inflamed), these symptoms affect all the limbs simultaneously; when *local,* only some of them, according to the seat of inflammation. Spasms, convulsions, or paralysis, affect also the muscles of the face; there is a falling down of the upper eyelid; the eyelids are shut and contracted; the commissures of the lips are drawn to one side, either by their natural tonicity, when the antagonist muscles are paralysed, or from a morbidly increased action. Sometimes this exists on both sides, producing retraction of the angles of the mouth. Very frequently the muscles and limbs are remarkably painful; so that, when attempts are made to move them, or to straighten those that are contracted, or upon attempting to move himself, the patient screams out.

170. *d.* In *partial cerebritis,* the action of the muscles and the sensibility of the surface are also partially, but not permanently, affected; some parts being less disordered, whilst the affection extends to others; or they all become more severely and permanently diseased; the spastic contractions, which existed at first owing to inflammatory irritation, giving place to paralysis, in consequence of pressure or disorganisation. The intellectual faculties are also frequently disturbed. The patient's answers are abrupt, rapid, sometimes incoherent, and at other times made very slowly. When merely one hemisphere is affected, it has been supposed that the functions of the other will proceed so as to prevent the appearance of much disturbance of the mental faculties; but this may or may not be the case; and, at least, can only occasionally obtain. The mental disturbance, which is extremely various in its forms and states, according to the part of the brain affected, exists only during the first days of the disease, and is soon displaced by coma.

171. *e.* At the commencement, particularly when cerebritis is general, or affects the periphery or more superficial parts of the brain, as in meningitis, or meningitis complicated with superficial cerebritis, the functions of the senses are morbidly increased, the least light or noise, or the slightest touch, being insupportable; but when the disease is seated in the centre of the brain, where the senses transmit their impressions, there is either perversion, or complete loss, of these functions. The pupils are then frequently dilated and insensible; the eyes unaffected by light, the ear by sounds; and the other senses are similarly disturbed; the patient is either watchful, or is oppressed by a somnolency intermediate between sleeping and waking; and numbness, with twitchings, or local convulsions, are generally observed.

172. In the course of a period, varying from one to three or four days, or sometimes earlier, and occasionally later, the symptoms are changed, owing to the local affection having advanced to disorganisation. At this *period*, copious effusion of serum often takes place, occasioning symptoms of compression. The spasms and convulsions are replaced by relaxation and immobility; and the senses are paralysed, not only on the side opposite to the cerebral lesion, but on both sides simultaneously, owing to the healthy parts of the brain being compressed by the effused serum, or by the tumefaction of the parts inflamed. Sensibility diminishes rapidly, and is at last abolished; the intellects are obscured, and at last overwhelmed, and the patient becomes profoundly comatose; or, in the less acute or chronic cases, hemiplegic, and sometimes ultimately apoplectic, or epileptic.

173. *B. The mediate symptoms.* — During the first days of the disease, the countenance is full and coloured; the eyes brilliant and animated, their expression unusual; the temporal arteries, as well as the carotids, beat strongly; there is no appetite; the tongue is white, loaded, red at its margins and point, and the papillæ developed; there are nausea and vomiting; the bowels are costive; but occasionally in children there is diarrhœa from the commencement, and the evacuations are morbid and offensive; the skin is warm, the pulse strong and frequent, and the respiration accelerated. At a later period, a very manifest change ensues: the countenance is expressive of pain, irritation, and chagrin; the features begin to sink, and become pale; the eyes dull and half closed; and thirst is no longer complained of; deglutition is difficult, or cannot be accomplished; vomiting is produced with difficulty; the abdomen is distended with flatus; and the fæces are passed involuntarily, as well as the urine, which sometimes accumulates in the bladder from paralysis of this organ; the skin becomes cold, or covered by clammy sweat; the pulse is unequal, irregular, or variable; the respiration laboured, or stertorous; and the patient sinks. In rare cases, at this stage of the disease, the symptoms diminish, and the functions gradually assume their natural states, either with or without the occurrence of phenomena which may be regarded critical. The *alterations of structure produced by cerebritis* are fully described in preceding sections of this article (§ 48, *et seq.*).

Brain — Inflammation of the Membranes and Substance of the. Syn. *Phrenitis* (from φρὴν, the mind); *Encephalitis*, *Cephalitis* (from κεφαλη, the head) Frank and Hildenbrand. *Phrénésie, Encéphalite*, Fr. *Hirnentsündung*, Ger.

174. Defin. *Violent pain in the head; prominent suffused eyes; flushed countenance; violent delirium, followed by profound sopor.*

175. Having described inflammation affecting chiefly either the membranes, or the substance of the brain, I now proceed to consider inflammation attacking these structures simultaneously, or rapidly extending from the one to the other, chiefly from the former to the latter. This is certainly the more common form in which inflammation seated within the cranium manifests itself in adults, particularly in *hot countries*, and in temperate climates during *hot seasons*. In *children*, however, a more or less evident limitation of the inflammatory action to either the membranes, or the cerebral substance, especially the former, is frequently perceived; and the same remark may be extended to aged persons, in whom the substance of the brain is more liable to be affected, chiefly in a sub-acute or chronic form. That the division which I have made of inflammations of the brain, is founded in truth and that their diagnosis may be established in practice by a judicious and experienced physician, I have had numerous opportunities of proving at the Infirmary for Children, where the cases admitted with inflammations seated within the head have been entered as cases of meningitis, cerebritis, or encephalitis, as the membranes, the substance of the brain, or both, respectively, were considered chiefly affected.

176. It may be supposed, that the distinctions argued for, granting their accuracy, tend to little practical advantage. This is, however, a very serious mistake; and I cannot more fully demonstrate it, than by the following fact: — About ten years since, I was requested to see a child, attended by an able and scientific practitioner, who considered the case as meningitis, which had terminated in effusion; or, in other words, of acute hydrocephalus in its advanced stage, and perfectly beyond the reach of art. After an attentive consideration of its history and existing state, I expressed the opinion, that the disease was inflammation, chiefly affecting the substance of the brain, and that a decided treatment founded on these views might still be successful. Leeches applied behind the ears, and around the occiput, with the means which will be hereafter detailed, succeeded in restoring the child to health in a few days. Since this instance, I have witnessed similar mistakes. The diagnosis, prognosis, and the treatment adopted in these cases proceeded on the important fact already stated (§ 167.), that cerebritis will, owing to the turgescence of the inflamed organ, give rise at a very early stage of the disease to the most profound coma, relaxation of the limbs, and many of the symptoms occasioned by effusion of serum; whilst the greater temperature of the head, and strength of the pulsation of the carotids in the former, will often, independently of other signs connected with the history of the case, evince its real nature.

177. Seat. — In the greater number of cases, inflammation commences in the pia mater, and extends itself to the arachnoid on one side, and to the cortical substance of the brain on the other;

and not infrequently also to the arachnoid covering the dura mater, and the deep-seated structures of the brain. It is also very probable, that more than one of these different structures may be nearly simultaneously affected. It may, however, originate differently when it arises from external injury; as in the dura mater, the substance of the brain itself, or the arachnoid.

178. I. SYMPTOMS. — *A. Premonitory.* Encephalitis generally commences with a sense of heat and fulness in the head; frightful dreams, and unquiet sleep; forgetfulness; confusion of ideas; dimness of sight; vertigo; turgidity of the face and eyes; and moroseness of temper. These symptoms generally precede the occurrence of chills or rigors, and are entirely absent when the disease proceeds from external injuries. In *children*, unusual somnolency, or wakefulness; startings in sleep, or fretfulness; aversion from sudden or quick motion; dryness of the mouth and nostrils; and not infrequently a voracious appetite; are the chief precursory symptoms.

179. *B.* The *invasion*, or *first stage* of encephalitis, is indicated by severe chills or rigors; to which succeed a burning heat of the head; urgent thirst; sometimes, even thus early, an unnatural absence of thirst, and violent delirium; jactitation of the body; intolerance of light; fixed, pulsating, heavy, compressing, and most severe pain of the head, alternating frequently with stupor. Febrile heat rapidly increases; and the head becomes more turgid, and hotter; the eyes more prominent, suffused, watery, and intolerant of light; the pupils are contracted; the eyelids are generally shut, or imperfectly open; the eyebrows are knit; and the countenance is threatening and fierce. Hearing is quicker, is attended with ringing in the ears, and intolerance of sound. Epistaxis sometimes occurs, generally to a small extent, and with only transitory benefit. Insomnia, and *delirium* of various forms — morose, taciturn, furious, &c. — supervene; and, in proportion as the cerebral organs are excited, those viscera which are supplied with the ganglial nerves are rendered torpid, the patient being insensible to the wants of the digestive organs.

180. *C.* The *second*, or *advanced stage*, is generally characterised by a marked diminution of the sensibility, which was in the preceding period morbidly increased. The pulse, which was at first frequent, hard, and full, becomes slower, fuller, and softer; and, in some cases, quicker, smaller, or harder. The skin is dry; the urine scanty, and high coloured; the tongue is dry, and loaded at the root; the bowels constipated. In some cases, particularly those in which the cerebral substance is early and generally inflamed and turgid, instead of phrenetic delirium, an apoplectic sopor, often preceded by convulsions, quickly supervenes; with a slow pulse; stertorous, slow, or laborious breathing; turgid or bloated countenance; startings of the tendons; involuntary evacuations; torpor of the senses; and flaccidity of the limbs. In those cases in which delirium is present, and the pulse quick and hard, a similar state of coma to that now mentioned takes place sooner or later, if not averted by medical aid. In the one, the first stage is short and indistinctly marked; in the other, it is long, and often continuing the greatest part of the whole duration of the disease; the second stage sometimes appearing suddenly, and terminating rapidly. In both these states of the disease, the difficulty of swallowing is great, so that fluids are sometimes regurgitated by the nose; and when the substance of the brain is chiefly affected, deglutition is often nearly, or altogether abolished in the most intense cases. In this stage, the pupil becomes at first dilated, and occasionally again contracted; the patient, in some cases, squints, or has double vision; his speech is often much affected; and his mouth is drawn to one side. Deafness also comes on, or increases; and the sopor, or coma, is more profound—most probably owing either to incipient effusion of fluid, or to greater turgidity of the capillaries and veins, or to both these combined, in a part or the whole of the encephalon. The comatose symptoms appear early or late, according to the intensity of the disease, the extent to which the cerebral structure is affected, and the tone and energy of system. They sometimes partially subside, again recur, or alternate with convulsions. As the disease advances to an unfavourable termination, the pulse becomes remarkably quick, irregular, or intermittent.

181. *D. Duration.* — Encephalitis usually reaches its acmé about the third or fourth day. It then continues in full strength for several days, exhibiting slight remissions and exacerbations, and simulating continued fevers. In favourable cases, a *change* is sometimes observed on the fifth, seventh, or some other critical day, unless a fatal termination occur; and is generally attended with either copious perspiration, or hæmorrhage from the nose, free evacuations from the bowels, or a discharge of urine depositing a copious sediment. The disease may assume a *sub-acute* or a *chronic* form, presenting a diversity of symptoms, especially in its chronic state, according to the particular part of the brain affected; or it may proceed in a very slow, slight, and insidious manner, and escape detection until a dangerous or fatal change has taken place. The more chronic states may follow an imperfectly cured acute attack; and the latter may suddenly supervene on the former.

182. II. CAUSES. — *A. Predisposing.* The sanguineous and nervous temperaments; the epochs of infancy, childhood, and youth — particularly to meningitis; the period of dentition; advanced age — especially to cerebritis in a sub-acute or chronic form; the male sex; a large head and short neck; children of scrofulous parents, and those who evince precocious talent or acquirements; persons subject to perspirations or eruptions on the head; early or habitual exertions of the mental powers; the indulgence of the more active passions and affections; encouragement of vindictive feelings; anger; continued watchings; venereal excesses; the use of spirits, and narcotics, as opium, tobacco, &c.; a too warm state of the head; suppression of epistaxis, hæmorrhoids, or of any other accustomed secretion or evacuation; the neglect of sanguineous depletion after the habit has been established; the healing up of chronic ulcers and eruptions; and other disorders of the brain,—are most frequently the predisposing circumstances and causes of the disease.

183. *B.* The *exciting causes.*—*a.* Those which act more *directly* on the encephalon, are blows, fractures, falls, counter-strokes or concussions of

the head, all which may not be followed, for many days, by any evident symptoms; whirling children in the air, or tossing them in order to quiet them, or rocking them rudely in cradles; the improper use of narcotics and stimulants in order to quiet them; the action of the sun's rays; protracted study; excessive joy; violent fits of anger, excessive desire, jealousy, and all the exciting passions; unusual exertion or irritation of the senses of sight and hearing; exostoses on the inner table of the skull; and the absorption of purulent or morbid matters into the circulation. *b.* The causes which act more remotely or *indirectly*, are the diseases with which I have stated encephalitis to be sometimes complicated (§ 186.); nervous or bilious headachs; all painful affections; mania; inflammations of the ear; disororders of the stomach, diaphragm, liver, and bowels; affections of the sexual organs; ingurgitation and intoxication; the exanthemata, particularly when imperfectly developed on the external surface, or upon the disappearance of the eruption; the metastasis of gout, rheumatism, and erysipelas; suppressed hæmorrhages and evacuations, particularly the menses and the urinary secretion; the accumulation of sordes and morbid secretions in the prima via and gall bladder; the ingestion of irritating and narcotic poisons; indulging in cold punch (FRANK); violent fits of coughing; long exposure to great cold; and, according to GOELIS, the too free use of *belladonna*, and other narcotics, in the cure of hooping-cough.

184. III. DIAGNOSIS.—*A. Characteristic symptoms. a.* Pain is an early sign, but the patient often ceases to complain of it very soon, particularly if the cerebral substance be chiefly inflamed; when it is also gravative, and attended with stupor from the commencement. It is most acute when the membranes are affected, and is always aggravated by shaking the head, and the erect position. When the disease supervenes in the progress of fevers and bronchial affections, pain may not be complained of, owing to the impure state of the blood having blunted the sensibility. *b. Watchfulness and sleep.*—Insomnia is generally present during the first days, when the membranes are affected; and, in children, starting from sleep, and screaming. Heaviness, somnolency, sopor, or even coma, often preceded by convulsions, are early present when the substance of the organ is the chief seat, or the membranes extensively affected; and supervene early, but without convulsions, when the disease occurs in the course of fevers and bronchial affections; but a refreshing sleep is never enjoyed, unless after a favourable change. *c.* The *senses*, particularly sight, hearing and touch, are all morbidly active in the first stage, especially when the meninges are inflamed; but they are nearly abolished at this period, when the cerebral substance is chiefly affected. The eye often indicates mental oppression, even when bright and staring. The *sensibility* of the surface is unnaturally increased in meningitis or superficial cerebritis, but is diminished when the substance of the brain is deeply affected, and in the advanced stage, when the membranes generally are inflamed. In partial cerebritis, the sensibility of a limb, or part only, is often lost, and it may be conjoined with spastic rigidity, or paralysis, of the same or of another part. *d.* The *intellectual* and *moral* faculties are more or less disordered; they are unusually excited, or violently deranged, early in the disease; but sopor frequently supervenes without being preceded by this state, when the cerebral structure is inflamed. Reverie or wandering of the mind during night, is the least important form of mental disturbance, indicating a slight affection of the pia mater, extending to the cineritious substance; delirium through the day, and watchfulness in the night, are the most dangerous, and attend a severe affection of the membranes. *d.* The *respiration* is often quicker in proportion to the pulse in the first stage, and slower in the second; and in the torpid or somnolent state, when the substance of the organ seems chiefly to be affected, is often attended by deep-drawn sighs. *e.* The *digestive organs* are much affected, particularly in children. There are nausea and vomiting, especially at the commencement, and torpor of the bowels. As the disease advances, however, the bowels often become free, or even relaxed. *f.* The *muscles* and *limbs* are more or less pained, contracted, convulsed, particularly in the first stage, and when the cerebral structure is inflamed. The convulsions are often general or severe, on the supervention of the disease, in young subjects. They may be soon followed by coma, which may pass off, and the convulsions again recur, and terminate life. When the cerebral substance is partially affected, the spasms and contractions may be confined to one or more limbs, whilst the rest are relaxed; or complete paralysis may ensue. In the last stage, muscular power is generally lost, and the limbs are flaccid. *g.* The *pulse* is extremely variable. At first it is not remarkably frequent; but it often becomes slower, and again quicker than ever, and at the same time weak, small, irregular, or intermittent. It may be at one time either slow or frequent, and in a few minutes the reverse; but it is never natural in respect of fulness, regularity, or strength. It is generally stronger and fuller in the carotids than elsewhere; and in this situation it ought always to be felt.

185. *B. Encephalitis* may be mistaken for other diseases; but if attention be paid to the history of the case, and the descriptions now given, this can scarcely happen. It may, however, be confounded with *fevers*, *apoplexy*, *delirium tremens*, *mania*, and *nervous headachs*. *a.* In *fevers*, the disturbance of the cerebral functions, when prominently marked, generally occurs in their progress, as a complication or consecutive affection. The pulse is always more uniformly frequent and regular than in encephalitis; spasms, convulsions, or paralysis, seldom occur, unless the brain becomes inflamed; respiration is not laborious, nor deglutition difficult; nor are the eyes, countenance, and speech affected, as in encephalitis. In idiopathic fever, the muscular power is depressed from the commencement, but is neither generally nor partially affected by spasms, contractions, or paralysis; and the stomach is less remarkably disordered. There is not observed that falling of the pulse from its former frequency, afterwards followed by great rapidity, trembling, or irregularity, which take place in encephalitis. In fever, the general febrile symptoms are the earliest and most apparent disease; in encephalitis, the functions of the brain, of sense, and of the organs of volition, are prominently and early disordered, and the febrile symptoms much less re-

markable in proportion to the severity of the cerebral disease. When the coma is profound in encephalitis, the heat of the whole body, excepting the head, is either not augmented, or depressed. The delirium in fevers also occurs at a remoter period, and is much less violent in its character, than in encephalitis. *b.* The *disturbance* of the organic, and particularly the digestive functions, the presence of fever, and the acute character of the disease, distinguish it from *maniacal insanity.* *c.* The same symptoms, with the frequent addition of delirium, of disturbance of the senses and general sensibility, spasms or convulsions, somnolency, sopor, and paralysis, preclude the possibility of confounding it with *bilious* or *nervous* headachs. *d.* Somnolency, sopor, convulsions, and slowness of the pulse, distinguish it from *delirium tremens,* in which the spectral illusions, the remarkable tremors, timidity; copious, clammy, fœtid perspirations; and the specific cause of the affection; sufficiently characterise the latter, when occurring in a distinct and uncomplicated form. *e.* The spasmodic or convulsive symptoms, antecedent delirium, the mode of attack, and progress of disease; the absence of paralysis, or its slower accession when the brain is inflamed, distinguish encephalitis from *apoplexy,* in which the invasion is sudden, or more rapid, and the paralysis a simultaneous or consecutive symptom. The relation, however, between apoplexy and encephalitis is often intimate, particularly in cases of partial inflammation, or inflammatory softening, of the substance of the organ.

186. IV. STATES, FORMS, AND COMPLICATIONS. — Besides the more or less perfect limitation of inflammation to either the membranes or the substance of the encephalon, other states may present themselves deserving of remark. *a.* Encephalitis may result from the *metastasis* of gout, rheumatism, and erysipelas, or it may arise from the *extension* of the last-named disease to the brain. In these cases the membranes are chiefly affected; stupor and coma come on early, and are attended with general flaccidity of the limbs, subsultus tendinum, involuntary evacuations, and slowness of pulse; but local cramps, convulsions, or paralysis, are seldom present. *b.* The disease may be also *consecutive* of other diseases, as of inflammation of the ears (§ 58.), of the bones of the head or pericranium. In these cases it is first ex tended to the membranes, and afterwards to the substance of the organ; occasioning contraction, spasms, or paralysis of one or more limbs, or muscles of the face, terminating in coma, or alternating with stupor and general convulsions. It may also be consecutive of severe ophthalmia, inflammation of the parotids or testes, of the kidneys, of inflammation of the mucous surface of the bowels, especially in infants, and of the diseases of the lungs. *c.* Encephalitis may likewise *supervene on,* and be *complicated* with, the advanced stages of continued and remittent fevers, bronchial and pulmonary affections, hooping cough, exanthematous fevers, particularly scarlet fever, and small pox. In all these cases the membranes and superficial parts of the brain are principally affected, generally in a more or less diffused manner, occasioning first delirium, general convulsions in young children, great pain in the limbs, sensibility and soreness of the surface, followed more or less rapidly by sopor, coma; more rarely by local spasms and paralysis, involuntary evacuations, rapid irregular pulse, &c. The complication with typhoid, continued and exanthematous fevers, especially those of certain epidemic constitutions, is extremely frequent and important; and have given occasion for the opinions entertained by WILLIS, CHIRAC, WERLHOF, REIL, PLOUCQUET, CLUTTERBUCK, and MARCUS, respecting the proximate cause of fevers. To this complication also TORTI attributes the malignancy occasionally assumed by the remittents and intermittents of the south of Europe. When it thus supervenes on fevers and bronchial diseases, the symptoms are often more insidious, and of a less violent character, although the disease is equally rapid and disorganising. This is probably owing to the depressed state of the vital manifestations, particularly of the organic nerves and vascular system. Owing also to this circumstance, encephalitis, when thus complicated, requires a modified and less depletory treatment. Inflammation of the brain is also not infrequent after apoplectic seizures, particularly in the part of the organ surrounding extravasated blood. In these cases the disease generally occurs from five or six to ten or twelve days after the attack, and is attended with many of the symptoms of partial encephalitis, particularly spasms, paralysis, delirium, &c.

187. V. TERMINATIONS AND PROGNOSIS. — *a.* This is always a dangerous disease, and therefore a very cautious *prognosis* ought to be given. The termination of encephalitis in *health* occurs most frequently in persons of a sound constitution, and who have no hereditary disposition to the diseases affecting the encephalon. This change often occurs on critical days, when it is generally attended by some favourable occurrence, as a copious discharge from the bowels; a genial and universal perspiration; a copious discharge of urine, depositing a sediment; hæmorrhage from the nose, or the presence of the menses; a more natural state of the pulse and respiration; a quiet undisturbed sleep, distinct from the oppressive somnolency or sopor which is one of the chief signs of the severity of the disease; a more moist, natural, and clean state of the tongue and gums; a decline of the temperature of the head, and of all the other symptoms.

188. *b.* A *fatal termination* may take place, 1st, In the inflammatory stage, owing to the very general extension of the disease to the membranes and substance of the organ; the pressure and interrupted circulation arising from the turgescence of the inflamed organ annihilating its functions (§ 48. 167.): 2d, In a further advanced stage, from an effusion of serum, sero-albuminous fluid, or the deposition of false membranes (§ 21—28.): 3d, In the less acute cases, and at a still more advanced period, from suppuration or inflammatory softening of a portion of the brain (§ 50—76.): and, 4th, This issue may proceed from any two, or the whole, of these changes being conjoined in the same case. The *indications* of an unfavourable termination are, the persistance of the urgent symptoms after treatment; violent delirium, watchfulness, and restlessness; profound lethargy or coma, or the alternation of these states; violent general convulsions, followed by coma, or alternating with it; a morose delirium; retraction of the head; severe pains of the limbs, followed by cramps,

contractions, or palsy; hæmorrhage from the ears; difficulty or impossibility of deglutition; strabismus, or double vision; loss of speech; slowness of pulse, followed by a sudden increase of frequency; a trembling or irregularity of pulse; obstinate vomiting, particularly of a greenish fluid; singultus, continued or recurrent; the rapid healing of chronic ulcers; the appearance of the disease in the course of other maladies, particularly pneumonia, the exanthemata, and after apoplexy, and in the scrofulous habit, or in persons having an hereditary disposition to cerebral affections, or who have been recently affected by other maladies.

189. *c.* The disease may pass into an obscurely chronic form, which, together with the effects produced by its antecedent state, may give rise to paralysis, epilepsy, various states of mania or mental disturbance, idiotcy, &c. In these cases, many of the chronic changes which have been described as occasionally found in either the membranes or the substance of the brain, particularly those which affect parts only of these structures, have taken place, as softening, abscess, induration, tumours, ossific formations, &c. (§ 50. 71. 102, &c.).

190. *d.* When encephalitis arises from *rheumatism* (*Encephalitis Rheumatica*, J. Frank), the membranes, particularly the dura and arachnoid, are chiefly affected; and the danger has been considered, upon the whole, less than in other states or relations of the disease. The disposition, however, to effusion, and to many of the chronic organic changes described as frequently found in the membranes, is great. It often assumes a sub-acute or chronic form, and is usually attended with great distress, but is without delirium. The *gouty form* of encephalitis generally is observed in older persons than the rheumatic; is accompanied with much disorder of the stomach, liver, and bowels, and with deficient vital power; and is hence a more dangerous state of the disease. The same remark is applicable to its occurrence from the extension or suppression of *erysipelas*. In these, the re-appearance of rheumatism or gout in a joint or extremity; the eruption of the erysipelatous inflammation in any part of the surface, even in the face (J. P. Frank); the supervention of diarrhœa, the hæmorrhoidal flux, or any other discharge; are favourable circumstances. Encephalitis, occurring after the disappearance of the eruption in the exanthemata, or during the course of typhoid or epidemic fevers, or pulmonary diseases, or after attacks of apoplexy, paralysis, epilepsy, or mania, is much more dangerous than when appearing in a primary form, owing, 1st, to the depression of the vital and nervous powers; 2d, to the vitiated state of the circulating fluids; and, 3d, to the silent and insidious manner in which the disease of the brain often advances to disorganisation in these complications. According to Hufeland, encephalitis, supervening on the disappearance of the variolous eruption, is generally fatal. The *alterations of structure occasioned by encephalitis* are fully described in preceding sections of this article (§ 11, *et seq.*).

191. VI. Treatment.—*A. Of the idiopathic and simple encephalitis.* It must be evident that the treatment should be the same, whether the membranes or the substance of the brain be chiefly, or entirely, the seat of disease. The *causes*, the the age, the habit of body, and apparent state of vital power, are circumstances which ought to be duly considered when adopting the means of cure, or determining upon the extent to which they ought to be carried. *a.* The *antiphlogistic treatment*, in all its departments, must be rigorously enforced. Some discretion is, however, required as to the extent to which it should be carried, and the direction, choice, and adaptation of the individual means of which it consists. In ordinary cases, bleeding from the jugular vein; cupping between the shoulders, nape of the neck, behind the ears, or occiput; leeches applied in those latter situations, and bleeding from the arm, are upon the whole the preferable modes. Arteriotomy I consider to be attended with no advantages; and in this I am supported by the opinion of Hildenbrand and others; but bleeding from the feet, from the hæmorrhoidal vessels, and from the groins and insides of the thighs, are undoubtedly preferable when the disease arises from metastasis or the interruption of discharges, especially when conjoined with the treatment I shall presently describe as appropriate to those states. Hildenbrand, and several other German physicians, recommend the application of leeches to the insides of the nostrils, when the patient has been subject to epistaxis, or if a disposition to critical epistaxis be evinced. As to the extent to which depletion should be carried, no precise opinion can be given. It should be regulated according to the circumstances of the case, and its effects upon the circulation, and be conducted in the manner I have recommended in the article on the *Pathology of the* Blood (§ 64.). It ought never to be relied on alone: other means should be simultaneously, or subsequently, employed, with the view of diminishing local and general action, and thereby preventing the removal of more blood than may be indispensable.

192. *b.* The hair should be removed from the head as soon as possible, and a *stream of cold water* poured upon it from time to time, or every second or third hour, until the temperature be reduced to the natural standard; and, as morbid heat soon returns, *cold epithems*, or evaporating lotions, or even pounded ice enclosed in a bladder, should be constantly applied in the intervals between the *cold affusions*, and the head be kept elevated, and placed upon a thick oil-skin, or, what is still better, upon a piece of common painted floor-cloth, as long as increased action continues. Cold applications or affusions may, however, be injurious if too long persisted in. They ought never to be continued after the temperature is depressed to the natural standard, or a little below it, particularly if sopor or coma be present; and as soon as the heat returns, they should be again resumed. Simultaneously with the affusion, the feet and legs should be immersed in warm water, or in warm water made irritating by means of salt and mustard, and the saphena vein be opened. In some cases, particularly when suppression of the menstrual or hæmorrhoidal discharge has preceded the attack, the *semicupium*, or *hip-bath*, may be substituted for pediluvia.

193. *c.* The immediate exhibition of *cathartics* should not be neglected. From ten to twenty grains of calomel may be given at once, and, three or four hours afterwards, an active purgative

draught, which should be followed by cathartic enemata, particularly the *En. Cathart.* and the *En. Terebinth.* (F. 141. and 150.). By these, or similar means, a copious action of the bowels should be procured and continued. With this latter intention, pills calculated to promote the abdominal secretions may be given each night, a purgative draught the following morning, and an enema subsequently, if it be necessary. Calomel combined with digitalis, or with antimony, should be prescribed in full and frequent doses, in addition to the above, so as to change the state of morbid action, particularly when the membranes are chiefly affected. The following, or similar medicines, may be used, and their effects carefully watched: —

No. 55. ℞ Calomel. gr iij.—x.; Pulv. Jacobi Veri gr. iij.; Pulv. Digitalis (vel Pulv. Colchici) gr. j.—ij.; Syrup. Simp. q. s. M. Fiant Pilulæ ij. vel iij. tertiâ, quintâ, vel sextâ quâque horâ porrigendæ.

No. 56. ℞ Hydrarg. Submur. gr. iij.—vj.; Pulv. Jacobi Veri gr. iij.—vj.; Extr. Colocynth. Comp. gr. vj.; Syrup. Simp. q. s. Fiant Pilulæ iij. horâ somni sumantur.

No. 57. ℞ Infus. Sennæ Comp. ℥jss.; Magnes. Sulphatis ʒij. (vel Potassæ Tart. ʒjss.); Vini Antimon. Tart. ʒss.; Tinct. Jalap. ʒj.; Tinct. Cardam. Co. ʒj. M. Fiat Haustus, primo mane sumendus.

194. *d.* In addition to these means, the frequent exhibition of *refrigerants* and saline medicines, especially those consisting of the *liquor ammon. acet.*, *potassæ nit.*, *antimonials*, &c., will be of much service. The preparations of antimony, judiciously exhibited, have a remarkable influence in diminishing determination of blood to, and inflammatory action in, the brain; and I believe that the effect will be more decidedly beneficial, if their operation as an emetic be carefully avoided. Form. 24. 359. 406. 436. 456. and 854. are of the above description, and, as well as others of a refrigerant and diaphoretic nature, may be employed, in small or moderate, and frequently repeated doses. I may state, as the result of considerable experience, that I have found the *saline refrigerants* and antimonials most beneficial during the early stage of the disease, and where the membranes were chiefly inflamed. In the stage of coma, or when the substance of the brain itself is affected, and the pulse quick, weak, small, trembling, or irregular, antimonials are not admissible; the preparations of *camphor*, with *liquor ammon. acet.* and *spirit. æther. nit.*, being preferable. (See F. 405. 436. 441.)

195. *e. Sedative* and *diuretic* medicines, particularly *colchicum* and *digitalis*, combined with the *liquor ammoniæ acet.* and moderate doses of camphor (F. 395. 400. 514.), are extremely useful in the early stage of the disease, after depletion and the free evacuation of the bowels. In the advanced stage, however, much less advantage will be derived from them. After bloodletting has been carried as far as may be thought judicious, and if much restlessness and jactitation be present, great advantage will be derived from the exhibition of a moderate dose of *camphor*, *hyoscyamus*, and *James's powder*, in this or any other appropriate form: —

No. 58. ℞ Pulv. Jacobi Veri gr. iij.—v.; Camphoræ rasæ, gr. ij.—iv.; Extr. Hyoscyami gr. iv.—vij.; Syr. Papav. q. s. ut fiant Pilulæ iij. statim sumendæ et h. s. repetend.

No. 59. ℞ Mist. Camphoræ ℥j.; Liq. Ammon. Acet. ʒij.; Spirit. Æther. Nit. ʒss.; Tinct. Colchici Semin. ♏xij.—xx.; Syrup. Papaveris ʒj. Fiat Haustus, tertiis vel quartis horis capiendus.

196. *f. Derivatives* and *counter-irritants* are useful in many cases, when judiciously prescribed. In the early stage of the disease, and whilst great irritability or delirium is present, they are often prejudicial, excepting simple pediluvia, the semicupium and hip-bath, employed simultaneously with cold applications to the head. Great mischief has arisen from ordering blisters and mustard poultices too early in inflammations, but more particularly in encephalitis, when, instead of deriving the circulation from the inflamed part, they excite the nervous and vascular systems generally, and thus react upon the disease. It is chiefly in the latter stage, when sopor or coma is present, that benefit is derived from them. Some difference of opinion has existed as to the part to which they — particularly blisters — ought to be applied. If the coma be profound, some writers have advocated the application of blisters directly to the scalp. Without denying the possibility of circumstances arising to justify this practice, I believe that they will seldom occur. The most profound sopor, weak action of the carotids, a not remarkably frequent pulse, and a temperature of the head much and permanently below the natural standard, would only induce me to apply blisters to the scalp. When *derivation* can be attempted with safety, — when sopor is present, and morbid sensibility and irritability has nearly disappeared, and depletion has been carried as far as seems judicious, — a large blister to the nape of the neck, or between the shoulders, or over the epigastrium, mustard poultices to the insides of the legs or thighs, or irritating liniments (see the *Liniments* in the Appendix) in the latter situations, will often be used with advantage. The *semicupium*, *warm bath*, or *pediluvia*, are seldom of service when there is much general febrile excitement, particularly in children, unless when used simultaneously with cold affusion on the head. But when the lower parts of the body have their temperature reduced below the natural standard, and when the disease has appeared after suppressed discharges, &c., they are often of service, and may be made more *revulsive* by salt or mustard.

197. *g.* Various remedies have been recommended in the treatment of this disease, in a more particular manner than others. Amongst these, the most generally employed and most beneficial is *calomel*, when given in large and repeated doses, and judiciously combined, and until an impression is made upon the disease, or state of the circulation. In the *meningitis* of children, this practice is particularly requisite, as, without it, but little impression will often be made on the disease; and, with due attention, but little risk will be run of experiencing unpleasant results from it. Where we dread impending exhaustion, the calomel may be combined with small doses of camphor and ammonia, and a less restricted regimen allowed. MARCUS recommends strongly very large doses of *nitre*, which may be combined with antimony, or with diuretics; HEDGEWISCH, the preparations of *mercury* carried to the extent of salivation; CHAUSSIER, the *boracic acid*, very nearly as prescribed in F. 343.; several physicians in Italy and in Switzerland, especially BRERA, TOMMASINI, PESCHIER, LAENNEC, &c., large and frequently repeated doses of the *tartarised antimony*, so as to act upon the bowels;

Loefler (*Hufeland's Journ. der Pract. Arzneik*, b. iii. p. 694.), free *incisions of the scalp*; and Aretæus (*Curat. Acut.* l. i. ch. 1.), Celsus (l. iii. ch. 18.), Cælius Aurelianus (p. 30.), and Zacutus Lusitanus (*Med. Pr. Hist.* l. i. p. 85.), scarifications and cupping in the same situation. All these are undoubtedly advantageous, when judiciously prescribed. Besides these, there are remedies which are very generally employed, and which are beneficial in certain states of the disease only: these are, camphor, digitalis, hyoscyamus, opium, &c. In the early stage, *camphor*, unless in very minute doses, is prejudicial; but when sopor or coma is present, when depletion has been duly practised, the heat of the head has subsided, the energies of life are depressed or exhausted, and the symptoms are apparently the consequence of the lost tone of the capillaries of the brain, moderate and frequently repeated doses of this medicine are almost indispensable; particularly in the complications of the disease with typhus, or epidemic fevers, with gout or rheumatism. *Digitalis* as well as *colchicum* are principally required in the early stage, when either of them may be combined with *calomel*: if exhibited subsequently, they should be given with camphor, and their effects carefully watched. Both these medicines may be advantageously combined with aperients or with diuretics. Brera recommends digitalis as follows in the earlier stages of the disease: —

No. 60. ℞ Pulv. Fol. Digitalis gr. xvj.; Hydrarg. Submur. gr. x.; Pulv. Rad. Glycyrrh. ℈j.; Olei Junip. q. s. M. Fiant Pilulæ viij. Capiat binas tertiis vel quartis horis.

The combination of camphor with colchicum is often of service in the *gouty* and *rheumatic* forms of the disease. I found it recently of much advantage in a severe case of the latter.

198. *Narcotics* ought generally to be avoided; yet there are states of the disease, chiefly in adult and aged subjects, which are benefited by them. When lethargy or coma, or an obvious disposition to either, is present, narcotics are injurious, particularly in cerebritis; but when the membranes are obviously most affected, and the disease presents much of the phrenitic character; when great irritability, mental excitement, or exhausting watchfulness is present, particularly after depletions and other evacuations have been carried as far as seems judicious, and the pulse has been reduced, or become less febrile; a full dose of *hyoscyamus*, or even the preparations of *opium*, particularly the acetate or muriate of *morphine* (F. 315. 674.), the compound tincture of opium (F. 728, 729.), or Battley's sedative liquor, may be exhibited. In cases where the propriety of having recourse to these medicines admits of doubt, they should be combined with moderate or full doses of *camphor* (F. 554. 787.), or the *Spiritus Æther. Sulph. Comp.* (F. 375.)

No. 61. ℞ Camphoræ rasæ gr. j.—iv; Gum. Acaciæ, Sacchar. Albi, āā ʒss.; Magnes. Carb. ℈j.; Decocti Althææ ℥jss.; Spirit. Æther. Sulph. Comp. Tinct. Hyoscyami, āā ʒj. (vel Tinct. Opii Comp. (F. 729.) ʒss. M. Fiat Haustus.

199. *B. Treatment of the complicated states.* — There are certain consecutive and complicated forms of the disease which require a somewhat modified treatment. *a.* The *rheumatic* encephalitis, according to J. Frank, does not admit of cold applications to the head; in other respects, the means of cure do not differ from those already stated. I believe that, in its advanced stage, the application of a blister to the scalp is more likely to be of service in this than in any other form of the disease; and the same remark may be extended to the use of *colchicum* and *camphor* — the latter of which may sometimes be advantageously combined with the tartrate of antimony or James's powder.

200. *b.* In the *arthritic* complication, after general and local depletions, — the latter chiefly on the right hypochondrium, hæmorrhoidal vessels, and insides of the legs, — followed by active purging, stimulating and irritating pediluvia, sinapisms and blisters applied to the lower extremities, and colchicum combined with the sub-carbonates of the fixed alkalies, and diuretics, are chiefly indicated.

201. *c.* When encephalitis occurs in the *course of fevers*, or when it is seated chiefly in the substance of the brain, and assumes a *typhoid* character, from the depressed state of the vital powers, either at the commencement or in consequence of treatment, the infusions or decoctions of *arnica*, *senega*, or *serpentaria*, have been recommended by the German writers, after depletions have been carried as far as seems prudent. When the disease is thus complicated, depletions should be employed with caution; and those which are local and derivative ought to be preferred, *revulsants* being simultaneously prescribed: cold applications to the head require equal caution. In the early stage of this complication, J. Frank recommends a combination of *camphor*, cinnabar, and nitre, every two hours. The first of these is amongst the best medicines we possess in every stage of such cases; but it should, in the advanced periods, be exhibited in larger doses than early in the disease; and it may often be advantageously combined with *calomel*. A similar treatment is applicable when the disease appears in the course of *bronchitis* and other pulmonary diseases.

202. *d.* The *erysipelatous* complication of encephalitis often requires a more antiphlogistic and depletory treatment than the typhoid form of the disease; but such is not uniformly the case. I conceive that deep and large incisions into the scalp, particularly over the occiput, as recommended by Loefler, would be more applicable to this state of the malady than to any other, especially if there be much tumefaction of the scalp or countenance. When encephalitis follows, or is complicated with *apoplexy*, the treatment differs in no respect from that which has been recommended for the primary form of the disease. Incisions or scarifications of the scalp may be also practised in this complication.

203. *e.* The supervention of encephalitis on inflammations of the digestive mucous surface is not infrequent in children; and in diseases of the *liver* in persons of middle age, or advanced in life. In these cases the treatment is not materially different from that already advised. Local depletions over the region of the liver; full doses of calomel, so as to affect the mouth; cold affusions on the head, particularly in the former state of complication; external and internal revulsants, and diuretics; are generally indicated.

204. *f.* The appearance of the disease after *irritating* and *narcotic poisons*, particularly after opium, aconitum, belladonna, &c., is not infre-

quent. These occasion, first, congestion, and afterwards inflammatory action. In encephalitis from these substances, vascular depletions, cold affusion on the head; emetics, or the introduction of the stomach-pump; camphor or arnica, combined with antimonials or aperients; external derivatives, and active purging; are amongst the chief means of cure.

205. C. *Of the treatment of the more unfavourable and anomalous states of the disease.* — The practitioner, although he will very frequently, or even generally, find the treatment described above successful, may sometimes meet with cases in which the symptoms persist, notwithstanding repeated depletions and the other remedies prescribed: the energies of life being more or less depressed; the pulse becoming very rapid, irregular, trembling; the coma or stupor more profound; and the temperature, even of the head, much diminished. He may or may not have had recourse to derivatives; but, in either case, they may be continued or varied; and camphor, musk, valerian, ammonia, HOFFMANN's anodyne, and other restorative medicines, variously combined, may be exhibited. If the pulsation of the carotids, and temperature of the head, be not in such cases increased; or if they be diminished, and the energies of life be obviously depressed or exhausted, both in the affected organ and throughout the system; the above diffusible stimulants will often be inefficacious. In this case, the infusion of the flowers of arnica, or the infusion of serpentaria, either simply or combined with cinchona; camphor in larger doses, and given occasionally with calomel and small doses of opium; active frictions of the surface and lower extremities with rubefacient liniments; and in some instances, particularly if effusions between the membranes be suspected, with mercurial liniments, or inunction of the scalp; are the principal means that can be adopted. But if, notwithstanding those, the above symptoms continue or increase, — the evacuations being involuntary, and the patient unconscious of them; a vomiting, or rather a pumping up, of whatever is taken into the stomach, with singultus, and an intermitting, trembling pulse, that cannot be distinctly counted, being also present, — are we to continue to give the medicines which we have found inefficacious, thus leaving the patient to his fate? or are we to resort to still more active means? There can surely be no hesitation as to the part which ought to be taken. In a case of this description, consecutive of bronchitis, in a robust man of middle age, who was attended by Mr. FAXON, Dr. BREE, and myself, after depletions and cold applications had been carried as far as it was judged prudent, and blisters were applied on the epigastrium and nape of the neck, without benefit, full doses of calomel and camphor were given, the following medicines prescribed, and their action promoted by the enema terebinth. (F. 151.): —

No. 62. ℞ Mist. Camphoræ rasæ gr. iij.; Ammoniæ Carbon. gr. iv.; Mucilag. Acaciæ q. s. Fiant Pilulæ ij., omni secundâ horâ, cum Haustu sequente, sumendæ.

No. 63. ℞ Mist. Camphoræ ℥j.; Liq. Ammon. Acet. ʒijss.; Spirit. Æther. Sulph. Comp. ʒss.; Tinct. Capsici ♏ xij.; Syrup. Croci ʒss. M.

The following draught was also given, four hours after the exhibition of a large dose of calomel and camphor, with the view of deriving the circulation from the head, and of acting decidedly on the abdominal secretions; and was repeated every hour until three were taken.

No. 64. ℞ Olei Terebinth., Olei Ricini, āā ʒij.; Tinct. Capsici ♏ xij.; Olei Cajeput. ♏ vj.; Aquæ Menth. Virid. ℥jss. M.

The pulse soon afterwards became more distinct and regular, the bloated cast of countenance subsided, and all the symptoms improved. The patient afterwards quickly recovered, and is now in perfect health. At the time the above treatment was suggested by me, his recovery was considered almost impossible. Several years ago, I was consulted by Mr. HARRY COX respecting a very similar case, which was consecutive of erysipelas. In this a similar treatment to that now noticed was adopted, and the patient recovered from an extreme state of danger. This case is published in the twenty-third volume of the *London Medical Repository*. In those states of the disease which are characterised by profound sopor, depression of vital power, and the symptoms above referred to (§ 180. 205.), other means having proved insufficient, a judicious exhibition of the oleum terebinthinæ has very frequently a decidedly beneficial effect, particularly in the typhoid, erysipelatous, and other complications of the disease; and, when suitably prescribed, will generally allay the irritable state of the stomach, with which the worst forms of the malady are often attended even during their advanced stages.

206. The inexperienced practitioner should be aware that the existence of profound sopor or coma does not contra-indicate sanguineous depletions or cold applications to the head, if, conjoined with this state, the temperature of the head be at all increased, or the pulsations of the carotids strong or full. If these evidences of increased action be present, those important parts of the treatment ought not to be omitted; but the depletions should often be moderate or local merely; and, in my opinion, preferably from the scalp of the occiput or nape of the neck, by cupping, or by deep incisions of the former. When the disease is consequent upon suppressed discharges, a derivative intention may be had in view, and the lower extremities, the groins, the vicinity of the anus, &c., may be selected as the situations for depletion. In *traumatic encephalitis*, the fact that the disease either does not appear whilst the wound in the scalp remains open, or is averted by a long-continued discharge from it; and that the worst states of cerebritis often arise after injuries of the head, when the external wound has readily and prematurely healed, furnish a striking indication of the propriety of having recourse to incisions of the scalp in the other forms of the disease, and to issues and setons in the same situation subsequently, when their sequelæ indicate the propriety of having recourse to permanent irritation, with puriform discharge, for their removal.

207. D. *Treatment of the sub-acute and chronic states of encephalitis, particularly in children.* — *a.* One of the most frequent forms of sub-acute inflammation of the brain is observed *in infants*, principally affecting the substance of the organ, and often terminating in dropsy of the ventricles. It is chiefly characterised by want of animation, by slight sopor, indifference to all objects, absence of sound sleep, and a state that is different from waking. The child is dull, but fretful and irri-

table upon being roused or handled. The head generally droops, or reclines on one side; the countenance is usually pallid, but occasionally irregularly flushed; the eyes are dull, rolled about, or turned up; the pupils sometimes dilated, at other times contracted; and the infant often utters a plaintive moaning, and occasionally starts soon after having fallen asleep, as if pained or frightened. The hands are tossed about or raised to the head; the lower extremities alternately extended and drawn up to the abdomen; the head thrown backwards; and occasionally its temperature is slightly increased, whilst the heat of the rest of the body is either natural, or somewhat diminished. This grade of disease may continue for a long time; sometimes fluctuating, at other times passing into either a more acute or more chronic form, or at last terminating in dropsy; the bowels being either relaxed or irregular, but in either case with a morbid and offensive state of the motions. The shades of difference observed in this form of disease are numerous: the pulse is very variable, as well as the appearance of the tongue; which is, however, most frequently red at its point and edges, and white or loaded at its middle and base: in some of the more chronic cases, particularly when the disease is complicated with chronic disorder of the digestive mucous surface, it has what may be called a strawberry appearance, from the number of bright red dots scattered over it. This variety of the disease is often associated with torpor or imperfect function of the liver, with disease of the mucous surface of the stomach or bowels, or with both; and occasionally with bronchitis, especially during the period of dentition, when it often supervenes.

208. *b.* Another variety of this affection is also frequent in infants and children, and seems to be chiefly seated in the arachnoid. Dr. W. NICHOLLS has termed it sensitive erythism of the brain. It is characterised by a morbidly increased sensibility, which distinguishes it from the foregoing variety. The child often cries without any obvious reason; is generally wakeful, lively, but irritable; all the senses, even that of touch, are morbidly acute, particularly the senses of sight and hearing: it frowns, winks its eyes, or closes them upon exposure to light; it sometimes shrieks, clenches its hands with the thumb bent across the palms, tosses backwards its head, and presents many of the symptoms of the preceding form of disease; and not infrequently terminates in effusion; but, more frequently than the foregoing, between the membranes exterior to the hemispheres.

209. *c.* The *Treatment* chiefly consists of leeching behind the ears or on the occiput; frequent scarifications of the gums; the affusion of cold water on the head, or cold sponging; calomel purges, followed by castor oil or other cathartics, and occasionally promoted by terebinthinate enemata; frequent warm semicupia; the use of saline aperients combined with diuretics, and strict attention to diet and regimen, with change of air. After the several active calomel purges have been exhibited, and the evacuations have improved, and the more obvious symptoms are abated, small doses of hydrarg. cum creta may be given at night, either alone or combined with a little of the sub-carb. of soda or potash, and a weak saline mixture through the day, similar to the following, or to F. 440. and 441.: —

No. 65. ℞ Magnesiæ Sulphatis (vel Sodæ Sulph.) ʒij.; Potassæ Sulphatis ʒj.; Aquæ Fœniculi ℥ ivss.; Spirit. Æther. Nit., Vini Antimonii Tart., Spirit. Juniper. Co., āā ʒj.; Syrup. Scillæ ʒij. M. Capiat Infans ʒj.—ʒiij. ter quaterve quotidiè.

210. When the morbid sensibility or irritability continue notwithstanding the above treatment, and if the child be not very young, small doses of James's powder, and, if that fail of procuring quiet, of the pulv. ipecacuan. comp. may be conjoined with the hydr. cum creta, and given every night; or a little tinct. of hyoscyam., or of the extr. conii, may be added to the above mixture. In the soporose form of the affection, narcotics must be avoided, but the rest of the treatment strictly adhered to. Small doses of camphor and nitrate of potash may also be exhibited, — if in solution, with the spirit. æther. nit., and blisters applied either to the nape of the neck or behind the ears.

211. *E. Treatment of the sequelæ of encephalitis.* — After an attack of this disease, the patient may complain of vertigo, more or less torpor or weakness of the mental powers, cephalalgia, &c.; or of increased sensibility, and marked erythism of the brain and whole nervous system, watchfulness, incapacity for mental exertion, tinnitus aurium, languor, and pain in the limbs, &c. In all such or similar cases, the diet should be carefully restricted to food of easy digestion, in moderate quantity, and consisting chiefly of the farinaceæ. Change of air, easy travelling, avoidance of all mental exertion and anxiety, and attention to the secreting and excreting functions of the abdominal viscera and of the skin, will generally bring about perfect recovery. If these fail; or if the patient have irregular flushings, or increased heat of head; or if the carotids pulsate more strongly than usual; the shower-bath, cold sponging the head night and morning, and wearing the hair closely cut, occasional local depletions, the insertion of a seton in the neck; or keeping out an eruption, in the same situation, with the tartarised antimonial ointment; or blisters kept open behind the ears for some time; may be prescribed.

212. When the more severe sequelæ of the disease are present, — such as cramps, pains, or spasms of the extremities, hebetude or derangement of the mental faculties, obstinate headach, &c., — we should suspect the existence of a chronic state of the disease, and resort to occasional local depletions, cold affusions, or sponging of the head; followed by issues in the scalp of the occiput, or the inunction of the tartar emetic ointment in this situation; and to the mercurial preparation at bed-time, with cooling and deobstruent aperients on the following morning; and to the other means above recommended. When we apprehend, from the marked character of the above symptoms, or from the paralysed state of particular muscles or parts, that organic lesion has been produced, the means now recommended should be strenuously persisted in; and the mercurial medicines may be pushed to slight salivation, under the favourable circumstances of pure air and mental quiet; after which, gentle tonics, and a more invigorating treatment and regimen, may be cautiously tried.

213. *F. The regimen during the disease* should be strictly antiphlogistic. The patient's drink or beverage may consist of either of the *formulæ*,

No. 590—595. 915. contained in the Appendix; and attention should be paid to the state of the urinary discharge; particularly to the prevention of accumulations of urine in the bladder, which ought to be removed by the catheter whenever any interruption of its evacuation occurs. The *diet*, and regimen generally, should be as carefully regulated during convalescence, as in the progress of the disease; and attention ought to directed no less to the mental occupations, and moral emotions, than to the natural functions, and physical employments. Care should be taken not to carry abstinence too far in the meningitis or encephalitis of infants or children, particularly after large sanguineous depletions and doses of calomel have been employed. The exhaustion arising from too great abstinence, and from the treatment, will often simulate effusion into the ventricles; and be mistaken for it, if the history of the case be not carefully attended to in connection with existing symptoms.

214. BRAIN — SOFTENING OF THE. — *Ramollissement*. CLASSIF. CLASS, ORDER (*Author*, see *Preface*). — I have considered this change, apart from those proceeding from inflammation, although it is frequently a consequence of inflammatory action, occurring either in an acute, sub-acute, or chronic form, and characterised by deficient vital power; chiefly because I agree with MM. ROSTAN, RECAMIER, and others, in considering that it occasionally is unconnected with inflammation, particularly in aged persons.

215. SYMPTOMS.—This disease takes place slowly, and we may distinguish in it two stages, the recognition of which is of much importance in the diagnosis, inasmuch as when the first period does not exist, or when the physician cannot obtain a satisfactory knowledge of it, it is difficult to determine the particular kind of disease present. 1st, *The first period.*—*A. Direct symptoms*, *a. of non-inflammatory softening.* A continued, and more or less severe, pain in the head is generally complained of. To some, the existence of pain may appear pathognomonic of inflammation; but, as M. ROSTAN has justly said, this is an inference not borne out by close observation; for pains frequently occur, of a most severe description, unconnected with any form of increased vascular action, or capillary injection. Cephalalgia is, however, not always present. At this period, vertigo is oftener complained of, and there is generally a more or less marked diminution of the intellectual and moral faculties. The perceptions, attention, judgment, memory, and imagination, are more or less enfeebled; and the patient sinks into a species of senile mental alienation. Sometimes the mental disturbance is partial or slight, owing to the seat and limited extent of the softening. There are observed, moreover, slowness in the answers; some degree of embarrassment in the motions of the tongue; dejection and sadness of spirits; hypochondriasis, or an extreme indifference as to events; great inclination to sleep, with prickings, twitchings, and numbness in the limbs; and much difficulty of laying hold of objects, particularly those of small size. The sensibility is generally diminished; vision is often affected, being less distinct than usual, or partially or altogether abolished. It very rarely happens, that unequal dilatation of the pupils, or strabismus, occurs. The sense of hearing is generally impaired. These are the chief symptoms of *non-inflammatory* softening of the brain.

216. *b.* If the *softening* proceeds from *inflammatory action*, this period is more acute, of longer duration, and presents also certain important distinctions. The pain in the head is then more acute and sharp; the answers are abrupt and quick, and there is frequently delirium: the sensibility of the limbs is often increased, and the patient complains of pain in them, with stiffness, contractions, and cramps. This affection of the limbs may be mistaken for rheumatism, but is to be distinguished from it by the existence of cerebral symptoms, and the absence of increased heat, redness, or tumefaction. The senses evince excessive sensibility, and cannot tolerate their natural stimuli. (ROSTAN.)

217. *B. Indirect symptoms.*—*a.* The functions of organic life do not present undeviating symptoms, and assist but little the diagnosis; the appetite may be diminished, the thirst somewhat increased, and digestion more or less disturbed, and the mouth and tongue white and clammy. Sometimes there is nausea, or even vomiting, with epigastric tenderness; and there may be either constipation or slight diarrhœa; micturition is more or less difficult, or involuntary; or all these symptoms may be absent. The following are more constant in this non-inflammatory form of the disease: the pulse is slower and feebler than natural, a symptom which is not observed in inflammatory softening of the brain; the skin is pale, its temperature is lower than natural, and the respiration slow and gentle. *b.* In *inflammatory softening*, the pulse is strong, full, or frequent; skin hot; and there is much thirst, with many of the symptoms described in the *section* on *Cerebritis* (§ 164.), but generally in a sub-acute or chronic and slight form. Thus far, the symptoms do not seem very urgent; and they may be so slight, or so obscure, that the patient is not induced to have recourse to medical aid, or the physician overlooks the nature of his ailments.

218. 2d, *Second period.*— *A. Direct symptoms.* *a.* The patient now loses the use of some limb, or even one half of the body, either gradually or suddenly, but generally the latter. The greater part of the time his intelligence is but little disturbed, but he answers with extreme slowness, and is often incapable of making himself understood, excepting by the aid of painful gesticulation. In certain cases, either complete coma supervenes on the paralysis, or both come on simultaneously. If the latter, the patient often regains his recollection in a day or two afterwards. This change seems attributable to temporary congestion of the brain. The symptoms, particularly the coma and paralysis, are increased, the mental faculties and the powers of sense become entirely abolished, and the patient sinks under the most complete coma. (ROSTAN.)

219. *b.* In the *inflammatory softening*, in the place of paralysis, there exist pains, more or less violent, shootings in the limbs, with contractions, cramps, or convulsions, and severe headach. In either the inflammatory or non-inflammatory form of the disease, when the patient complains of pain in the head, and is asked its situation, he carries the unaffected hand slowly to his head, and indicates generally the side opposite to that

paralysed. In *encephalitis*, there is generally delirium; in the *non-inflammatory* form of *softening*, the intellectual faculties are enfeebled, or much weakened; the countenance is generally pale, colourless, or sometimes even sunk; whereas in *inflammatory softening* it is red, or more or less injected, or even tumid.

220. B. *Indirect symptoms.* — *a.* In this second stage of the disease, the organic functions are more or less affected: there is no appetite; the teeth and gums are dry, the tongue rough, brown, blackish, chopped or traversed by small fissures: deglutition is difficult: sometimes there is vomiting, first of the ingesta, and afterwards of bile: all the excretions are involuntary; frequently there is constipation: respiration is laboured, and at last stertorous; the pulse feeble, frequently irregular or unequal, or even intermittent, and the skin is cold. *b.* In *inflammatory softening* there is great thirst, redness of the tongue, sensibility of the epigastrium and abdomen, hot skin, a strong and frequent pulse, &c. (See § 170.)

221. The second period may be of longer or shorter *duration*. The morbid phenomena often continue stationary for a considerable period, and then make rapid progress; at other times the progress is slight, but constant; in some cases it is constant and remarkable. This disease very rarely retrogrades or evinces much amelioration; its progress is essentially continued and increasing. The *anatomical characters* of softening have been already fully described (§ 70, *et seq.*). It may be stated in general, that when it is the result of inflammatory action, as it most frequently is, 1st, The colour of the softened part is, more or less, deeper than natural, or of a rose tint; 2d, It contained a certain quantity of pus, sometimes infiltrated through the softened tissue; and, 3d, Febrile symptoms have existed previously to the death of the patient.

222. Treatment. — It is unnecessary to add any thing to what has been already advanced respecting the treatment of the inflammatory states of softening, which are essentially the consequence of partial cerebritis (see § 191, *et seq.*). When, however, the disease does not present an inflammatory character, it becomes necessary not only to enjoin abstinence from all debilitating means, but from the commencement to apply rubefacients, to throw irritants into the great intestines (see Enem. F. 141. 150.), and to have recourse to tonics, aromatics. &c., of which the sulphates of zinc, iron, or quinine, in small doses, with sulphuric acid, or the less heating astringent tonics belonging to the vegetable kingdom, are the most eligible; preserving, at the same time, a regular state of the alvine secretions and evacuations, and of the other digestive functions.

223. *Regimen.* — The gently tonic, chalybeate, and aperient mineral waters are of service in the non-inflammatory form of the disease; whilst those only which are aperient and deobstruent should be ventured upon in its inflammatory states, when they may be tried and varied; local evacuations, revulsives, particularly setons, issues, &c., being kept discharging at the same time. In both forms of the disease, gentle travelling, and change of air, and agreeable and quiet amusement, without undue mental excitement of any kind, will be of much service. M. Rostan's injunctions under this head may be summed up as follows: — Those alimentary and medicinal substances which exert a strong and speedy action on the encephalon, should be strictly shunned. Wine, spirits, coffee, and spices, are of this number. Excess at the table is dangerous. The diet should be mild and moderate, and the food easy of digestion, but not too nutritious. The impression of cold air on the head may be favourable: sudden passage into a heated place must be avoided: the patient should inhabit a cool situation. Whatever, by compressing the limbs or the organs contained in cavities, may favour cerebral congestion, must be rigidly proscribed. Warm, as well as cold bathing should be interdicted: tepid bathing alone may be permitted, although with much caution. Cold lotions to the head are advantageous in the inflammatory form of the disease, provided we do not permit reaction to be established; at the same time pediluvia containing mustard may be prescribed. The ordinary excretions should be kept up; but sexual indulgence, too violent exercise, strong emotions, long study, and watching, should be carefully avoided. The age, strength, constitution, habits, and state of the patient, and the character of the symptoms, must modify these precepts.

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BRONCHI, Diseases of the.

Syn. Βρόνχος, Gr. *Bronchus*, *Bronchia*, Lat. *Bronche*, Fr. *Die Luftröhrenäste*, Ger. *Bronchi*, Ital. *Air-passages*, *Air-tubes*, Eng.

1. Bronchi and Air-tubes — *their Alterations*. Under this head, the alterations of structure usually found in the air-tubes, from the larynx to the smallest subdivisions of the bronchi will be first considered, and subsequently the history of such of them as are more immediately seated in the bronchi, and are not treated under distinct heads, where some of them are placed, owing to their specific nature, and their relations to other parts.

2. I. Alterations of Structure in the Bronchi. — As the same lesions are found in the larynx and trachea, as in the bronchi, although certain of them are more frequent in one part than in another, no particular distinction depending on locality merely will be made, in order that repetitions may be avoided.

3. i. Alterations of the Mucous Membrane of the Air-passages. — These are the same in kind from the glottis to the air-cells, whether the vascularity, the structure, or the secretions of this membrane, be individually or collectively changed. *A. Passive or simple congestion* of this surface is not unfrequently found after death; and there is every reason to believe that it may take place during life, or at the moment of death, or even be a *post mortem* change. When occurring during life, it is most frequently met with in the debilitated, and when the return of blood to the left side of the heart has been impeded. Simple congestion of this membrane may be either partial or general. When *general*, and at the same time suddenly and intensely formed, it may terminate life with all the symptoms of asphyxy. (See Congestion of the Bronchi.) In a slighter form it accompanies various diseases, particularly the febrile exanthemata; but it is seldom found in a chronic form. Congestion of this membrane presents various depths of shade, varying from a dirty pale red, or a brick red, to a brownish or purplish hue; being sometimes equally deep throughout, in others of a different shade in different situations.

4. *B. Inflammatory injection*, or active congestion of the bronchial surface is generally *partial*, or affects one part of the air-passages more than another. It is also of a livelier colour, and is usually attended with some of the changes hereafter to be noticed. Partial or inflammatory redness of the mucous membrane is very much more common than general congestion. It may be limited to the trachea and larynx, whilst the bronchi are pale; and in this case it may be confined to one side of the tube. M. Andral has seen it cease abruptly at the medium line, particularly when one lung was affected; and then the inflamed side of the trachea has corresponded with the diseased lung. The redness may also be confined to the large bronchi, the mucous surface of the passages above and below its seat being pale; or it may be limited to the smaller bronchi, where it often occasions great dyspnœa and fever, with little or no cough. According to M. Broussais, the bronchi of the upper lobes are most frequently congested and inflamed. Congestion and inflammatory injection of the bronchial mucous membrane, although very often connected with diseases of the substance of the lungs, are not necessarily dependent on any of them; for this membrane may be pale from the glottis downwards in cases of acute, and still more in chronic, pneumonia. The same obtains in respect of tubercles, previously to their softening. In many cases, however, where tubercles exist in the lungs, the surface of the smaller bronchi are more or less inflamed or congested; and when the tubercles have advanced to softening, the bronchi nearest them are almost always red. Where tubercular excavations exist, the redness is still more marked and extensive, sometimes proceeding along the trachea to the larynx: bronchitis thus supervening to tubercular phthisis. In these and various other diseases, the inflammatory state of the mucous surface commences in the smaller ramifications, and spreads upwards to the glottis. But in other maladies, particularly those which first affect the Schneiderian membrane, throat, fauces, pharynx, &c., the injection of the bronchial surface is chiefly an extension of these; inflammatory action more frequently originating in some one of these situations, and extending itself more or less rapidly, according to the state of the patient, along the surface of the larynx, trachea, and large bronchi successively, until it at last reaches the minute bronchi, or even the air-cells and structure of the lungs. This is the usual direction in which inflammation of the mucous membrane of the air-passages commences and extends itself; but most frequently without reaching the smaller bronchial ramifications, and pulmonary parenchyma.

5. *C. Thickening of the mucous membrane of the air-passages* is a very common lesion, arising, 1st, from its congested or injected state; and, 2d, from its increased nutrition or hypertrophy. *a.* The former is most frequently observed in the larynx and small bronchi: it is sometimes found in children about the margin of the glottis, giving rise to a form of croup. *b.* True thickening, or hypertrophy of this membrane, occurs in various situations, occasioning very different phenomena accordingly, particularly in those who had been affected with chronic coughs. This form of thickening may extend throughout the larynx, or may be limited to the epiglottis, to the entrance of the glottis, to the chordæ vocales, or to the ventricles.

In the trachea it may occasion no marked symptom; but in the bronchi, particularly the smaller, it gives rise to sensible alterations of the sound of the pulmonary expansion. It may, when extensive, very materially impede the changes produced by respiration on the blood. Hypertrophy of this membrane may also be confined to a circumscribed point, forming thus a tumour rising above the surrounding surface. This form of thickening may assume a nearly cauliflower appearance, from its exuberance. These excrescences have been found in the larynx by MM. ANDRAL and FERRUS.

6. The *mucous follicles* may be enlarged independently of the membrane in which they are seated. When this is the case, a number of round granular bodies, of either a white, red, or dark brown colour, are found on the internal surface of the membrane, surrounded by two coloured circles—one round the centre, the other round the base. M. ANDRAL thinks that they have often been mistaken for tubercles, and for the variolous eruption.

7. C. *Other alterations of structure in the respiratory mucous membrane.*—*a. Atrophy* is said by ANDRAL sometimes to be observed in this membrane. *b. Softening* is much more frequent; and is most common in the larynx, especially in the situation of the chordæ vocales and ventricles, where it is sometimes very remarkable, and has been the only change of these parts observed in persons who had either lost their voice or been hoarse long before death. *c. Ulceration* is not infrequently found in this membrane. Ulcers may be seated in any part of the air-passages, but are more common in the *larynx* than in the trachea or bronchi. They rarely, however, occur in the larynx, without tubercular ulceration existing also in the substance of the lungs. They occasion various modifications of the voice, according to the parts of the larynx in which they are situated; being found in every point of its internal surface. Their size and number vary exceedingly. Sometimes only one very small ulcer is found, the rest of the larynx being in all other respects quite natural. In other cases, this part is nearly destroyed by numerous ulcers of various shapes and sizes; and in some cases, one large ulcer extends over one half or more of the larynx. Ulcers, when seated in the *trachea*, are chiefly found in its posterior or membranous part. M. ANDRAL states, that in some cases they are confined to one side of the trachea, which invariably corresponds to the diseased lung; or, if both lungs be diseased, to that which is most affected. Ulcers are not so frequent in the *bronchi* as in the larynx, but more so than in the trachea.

8. Ulcers in the internal surface of the air-passages sometimes extend no deeper than the cellular tissue connecting the mucous membrane to the subjacent parts. In this case the connecting tissue is much thickened at the bottom of the ulcer. But they frequently proceed deeper, destroying successively the different tissues, until the parietes of the tube are at last perforated, and a fistulous opening is formed between it and some neighbouring organ or part, as the œsophagus, aorta, parenchyma of the lungs, large blood-vessels, the pleural cavity, &c., or even the external surface; forming, in this last case, a direct communication between its interior and the external air. When a fistulous opening extends into an excavation in the parenchyma of the lungs, it is difficult to determine whether it produced, or was itself occasioned by, the excavation. When it is connected with a cavity arising from the liquefaction of tubercular masses, there can seldom be much difficulty in determining the precedency; but every cavity found in the lungs has not this origin. There can be no doubt that ulcers perforating a bronchial tube may excite inflammation of the substance of the lungs, and occasion either small abscesses, or ulcerations, which enlarge into considerable excavations. But, in the majority of cases, excavations communicating with the bronchi arise from the softening of tubercles; the bronchi being perforated from without inwards, instead of from within outwards, as in the case of ulceration commencing in their mucous surface. The bronchi or trachea may be also perforated from without inwards, by aneurisms, &c. of the aorta, and not infrequently by ulceration commencing in the œsophagus and extending through the membranous part of the trachea; an instance of which I lately had an opportunity of seeing in a patient of my friend, Mr. BYAM. Suppurated bronchial glands may also perforate the bronchi which they surround, and pour their contents into them. A similar result may likewise occur from purulent collections, hydatid formations, &c. of adjoining parts, as of the thyroid gland; instances of which are recorded by PORTAL and ANDRAL.

9. D. *Alterations of the secretions of the air-tubes.* — M. ANDRAL has very justly stated that alterations may occur, 1st, in the gaseous secretion; 2d, in the perspiratory exhalation; and, 3d, in the mucous secretion. *a.* Changes of the *gaseous exhalations* are but little understood, and are more matters of inference than of demonstration. There can be no doubt, however, that not only in various diseases, but also in certain states of the system and of the atmosphere, a very material alteration occurs in the proportions of the different gases naturally exhaled by the mucous surface of the lungs. That the successive changes in the system, certain conditions of temperature and of the air, different states of vital energy, and the constitutional differences in the various races of our species, modify very materially the quantity of carbonic acid gas and of azote exhaled from the lungs, may be considered amongst the surest established facts in physiology. (See my *Notes, &c.* p. 626.) Such being the case, it may reasonably be inferred that marked alterations of the gaseous exhalations also take place in disease.

10. *b.* The *perspiratory exhalations* evidently undergo changes in disease; but their nature and extent are but little known. The vapour exhaled from the respiratory mucous surface very probably may, when excessive, be condensed into a liquid state, and increase the watery fluid sometimes discharged from the lungs. M. ALIBERT states that he has seen, in certain diseases of the skin in which the cutaneous transpiration is suppressed, the pulmonary vapour issuing like steam from the chest, and descending again like an abundant dew. M. ANDRAL adduces, in his *Clinique Médicale*, the case of a person who suddenly discharged, whilst suffering from hydrothorax, an enormous quantity of a serous fluid from the bronchi, at the same time that the fluid which had been effused in the chest was absorbed.

11. *c.* Alterations *of the mucous secretion* of the bronchi have been successfully studied by a number of modern pathologists, but more particularly by M. ANDRAL. This secretion is modified both in its quantity and quality. It is often very greatly increased in acute and chronic affections, particularly those immediately affecting the respiratory passages; under which heads the principal changes of this secretion, with the different states and stages of disease, are described. The quantity of the mucous secretion may be so excessive as to nearly fill up the bronchi, trachea, and larynx, and to suffocate the patient. This sometimes occurs in adults; but, I believe, still more frequently in children, forming in one of its states a species of croup intermediate between true croup and bronchitis; and, in another state, the disease hereafter described as *asthenic bronchitis.* M. BLAUD considers the former, or that seated chiefly in the large bronchi, in which the secretion is consistent and glairy, a " form of croup, and calls it *croup myxagène.*" This excessive secretion of mucus is sometimes unattended by any alteration of the air-passages. The mucous secretion may become so viscid as to adhere to the sides of the bronchi; where it may accumulate so as to occasion a fatal dyspnœa, by preventing the passage of the air. In other cases, the mucus is transformed into a puriform fluid; sometimes without any trace of ulceration, or even of redness, in any of the bronchi; the alteration of the secretion being independent of any perceptible change of structure. More commonly, however, patches, streaks, or points of inflammatory injection of the mucous membrane accompany this state of secretion.

12. *d. Membraniform concretions*, or false membranes, form more frequently upon the internal surface of the air-passages than in any other mucous canal. Some pathologists have supposed them to be consequent on the most intense states of inflammatory action in mucous membranes; but this is evidently not the case: they are rather a result of a certain state of the system, probably connected with excess of the albuminous constituent in the blood, together with a disposition in the inflamed vessels to secrete it. (See art. CROUP.) These membranes are generally unorganised, and vary in thickness and consistence in different parts as well as in different cases. According to SCHWILGUÉ, they consist of albumen, with a small portion of carbonate of soda and sulphate of lime. M. BRETONNEAU has detected fibrine in them. They may exist in patches, or in continuous layers, or in perfect tubes; and extend from the larynx, where they usually commence, to the minute divisions of the bronchi. They rarely originate in this latter situation, and advance upwards; but they often commence in the pharynx, fauces, &c., and extend through the glottis, and down the trachea and bronchi. They are most frequently met with in children from two years of age to puberty; and are not confined to, although most frequent in, acute diseases. In some cases they assume, in children, a chronic character, but only when confined to the trachea; whilst a chronic state is most common in adults, when they are usually formed in the bronchi. When, however, they occur in the larynx, the tumefaction of the subjacent membrane, the spasms of the muscles, and their own thickness, often give rise to an acute or fatal disease. When seated in many of the small bronchi, they may occasion asphyxy by interrupting the changes produced by the air on the blood. It is probable that *fibrinous* or *polypous* concretions may sometimes form in the bronchi, from the coagulation of a portion of blood exhaled from its mucous surface. LAENNEC has described (*Rév. Méd.* 1824, t. i. p. 384.) a case which appears to be of this description. Such formations differ from the albuminous exudations, in their containing much fibrine, and being of a darker colour than the latter.

13. *e. Earthy or calcareous concretions* occasionally are found in the air-passages, and are sometimes coughed up. They consist chiefly of phosphate of lime; and are formed either in the substance of the lungs, and escape into the bronchi, or in the latter; but more probably in the air-cells. They have also been found impacted in the ventricles of the larynx. The cause of their formation is not well understood. They have been ascribed to chronic irritation of the small bronchi and air-cells; but this source is by no means well established. I have met with them in gouty persons, by whom particularly they are often expectorated during life, recovery generally taking place. *Hydatids* have also been found in the air-tubes. In some cases they may have been developed in this situation; but they much oftener escape into it from contiguous parts.

14. *f. Hæmorrhage from the respiratory surfaces* are amongst the most frequent changes to which it is subject. In the greatest number of cases of *hæmoptysis*, the blood is exuded without any ulceration or breach of surface: a slight redness of the mucous membrane being the only change that can be detected. When the hæmorrhage occurs in the smaller bronchi, the blood sometimes accumulates and coagulates in them; imparting a blackish or brownish black appearance to the lobules, and constituting the *pulmonary apoplexy* of LAENNEC. The occurrence of hæmorrhage into the parenchyma of the lungs is, however, more strictly deserving of this appellation. The extravasation and coagulation of blood in the small bronchi, giving to portions of the lung a blackish and indurated appearance, are most commonly, but not always, found in persons who have expectorated blood, or died from an attack of hæmoptysis; and are most frequent in those cases which supervene in the progress of diseases of the heart. M. ANDRAL considers, however, that the hæmoptysis is not from those sources which have been called apoplectic; but from a larger extent of mucous surface, and from larger tubes. (See art. LUNGS — *Alterations of*, and *Hæmorrhage from.*)

15. ii. ALTERATIONS OF THE OTHER STRUCTURES COMPOSING THE AIR-TUBES. — *A. The fibrous and muscular tissues* of the air-passages experience various changes. *a.* The *fibrous* structure of the bronchi are sometimes found either softened or hypertrophied. The thyro-arytenoid ligament is occasionally softened. It has then lost its brilliant colour, become opaque, or even changed into a cellular-like tissue, or an unorganised pulpy substance, leaving the thyro-arytenoid muscle exposed. In this case the voice is remarkably altered. When the fibrous tissue is hypertrophied, increase of thickness is the chief appearance. (ANDRAL.) *b.* The *muscular* structure, as it exists in the trachea, &c., may be either atrophied

or hypertrophied; it may also be softened and destroyed partially or in points by ulceration (§ 7, 8.). But it is chiefly where this structure assumes a different state and function, as in the larynx, that it undergoes marked alterations, giving rise to the most formidable and fatal diseases. The muscles of the larynx are, in some of those cases, softened, more or less atrophied, or even altogether destroyed; and, in others, infiltrated with either purulent or tubercular matter. (Bouillaud, Andral, and others.) M. Andral states, that he has more than once observed, on examining the larynx of persons who had been long completely without voice, the thyro-arytenoid muscle either remarkably atrophied, or its fibres infiltrated by different morbid secretions; this being the only lesion that could be detected.

16. *B. The cartilaginous structures of the air-passages* are most frequently diseased in the larynx. The cartilage of the epiglottis sometimes loses its natural form: it is scarcely ever ossified; but it is occasionally somewhat indurated, so that it imperfectly protects the opening of the larynx. It is not infrequently destroyed altogether by *ulceration*, commencing either in itself, or in the tissues enveloping it. Similar changes to these sometimes take place in the other cartilages of the larynx. Ulceration of these cartilages may be superficial only; or it may destroy more or less of their structure. It generally commences in the soft parts covering them; but in some cases, particularly of constitutional taint, there is reason to suppose that it originates in inflammation of the cartilages themselves, terminating in the ulcerative process, and the formation of purulent matter in the soft parts adjoining, which escapes by a fistulous opening, generally through the mucous surface into the larynx, and rarely externally. Ulceration may also commence in the articulations of the cartilages; filling them with pus, and destroying their ligaments and articulating surfaces. The thyroid and cricoid cartilages are naturally ossified in old age; and in consequence of disease, in earlier life. M. Andral states, that the arytenoid cartilages have never been ossified. The *rings of the trachea* are sometimes ossified, but seldom or ever otherwise altered. The cartilages of the bronchi are often hypertrophied, becoming more apparent, and forming more complete rings, than natural. They are also sometimes ossified. MM. Reynaud and Andral found the ultimate ramifications of the bronchi changed into osseous spiculæ, with minute canals (the cavities of the bronchi) running through them, in very old subjects. M. Andral states, that the bronchial cartilages may become so brittle from disease, as to break into fragments, project into the canal of the bronchi, or become altogether detached, and be ultimately expectorated.

17. *C.* The *cellular tissue* connecting the above structures is often the seat of disease. In the *larynx*, it is very frequently the seat of inflammation and congestion; and, in consequence of a chronic state of inflammatory action, it sometimes becomes indurated and thickened; diminishing remarkably the calibre of the glottis, impeding the action of the muscles, and affecting the form and movements of the epiglottis. This tissue, in the situation of the larynx and epiglottis, is occasionally infiltrated with *serum*, which, when considerable, constitutes the *œdema of the glottis*, first accurately described by Bayle. The infiltration may distend the folds of mucous membrane, surrounding the rima of the glottis, so as to obstruct more or less the passage through it. This change is generally consecutive of inflammation of the mucous membrane of the larynx, or of chronic affections of this organ. In some cases it is very chronic; in others very acute, quickly producing asphyxy. Instances of this latter form are to be found in the sixth volume of the *Archives Générale de Médicine*, and twenty-second volume of the *London Medical Repository*. *Purulent matter* is sometimes found in the cellular tissue of the air-vessels, either in the state of small abscesses, or infiltrating it to a greater or less extent; and either in the ventricles of the larynx, or in any other situation in the course of the air-passages. *Tubercular matter* has also been found in various parts of this tissue. Different kinds of *tumours* occasionally compress the nerves supplying the air-vessels, and give rise to symptoms similar to those caused by disease of their parietes. They are sometimes formed in the larynx, or in its immediate vicinity, occasioning more or less complete occlusion of the glottis. M. Ferrus has recorded a case where this result followed the developement of two fungous tumours in the larynx (*Archives Génér*. Août 1824.). Several writers have made mention of a *varicose state* of the veins of the air-passages amongst the causes of hæmoptysis; but M. Andral states that he has never met with this appearance in his numerous post mortem inspections.

18. iii. ALTERATIONS OF THE SIZE OR CALIBRE OF THE AIR-VESSELS.—The changes already described very often cause marked change in the air-tubes, either diminishing or increasing their calibre. *A. Diminution of their canals* are occasioned, *a*. by the formation of false membranes, chiefly in the larynx and trachea of children, and in the bronchi of adults: *b*. by thickening of the mucous membrane; occurring principally in the glottis and bronchi: *c*. by infiltrations of fluids into the sub-mucous cellular tissue, chiefly in the larynx and vicinity: *d*. by various substances formed in some part of these tubes, such as hydatids, coagula of blood, concrete mucus, &c.: *e*. by compression by some tumour situated externally to some portion of them, as by the thyroid gland, an aneurismal tumour, or enlarged bronchial glands. *f*. Lastly, there is every reason to conclude, that diminution or constriction of some part of these passages very often arises, although seldom in so permanent a manner as to be observed after death, from spastic contraction of the fibres or muscles belonging to them; particularly when foreign bodies escape into the trachea, or when it, the larynx, and even the bronchi, are irritated by morbid productions — the larynx more especially.

19. *β. Dilatation of the bronchi* was first described by Laennec, and afterwards illustrated by Andral and others. It is most frequently observed in the smaller ramifications; and may be so great as to be mistaken for tuberculous excavations. *a*. In some cases, the bronchi may be uniformly dilated throughout one or more of their ramifications, some of those which could not naturally receive a fine probe, having attained the size of a goose-quill; and, in some instances, even admitting the finger. These dilated branches are

sometimes visible on the surface of the lung, where they terminate abruptly. They occasionally also terminate, particularly near the top of the lung, in an indurated black portion of its substance, or in a cartilaginous mass, or in a calcareous concretion, either exterior or interior to the dilated bronchi. *b.* In other cases, the dilatation is limited to a particular point of the tube, and has the appearance of an excavated cavity in the substance of the lung, for which it may be mistaken, especially when it is met with in the upper lobe. The size of cavities arising from this species of dilatation varies from that of a hemp-seed to that of an egg. Several of these may co-exist. When they are placed near each other, they form, by their communication, a complicated sinus filled with puriform mucus, and closely resemble some kinds of tuberculous excavations. *c.* Occasionally they present a third form, consisting of a succession of dilatations, between each of which the bronchus recovers its natural diameter, the walls of the dilated portion being generally thin and transparent. One lung may contain a number of these dilatations. *d.* The *parietes* of the dilated bronchi are, in some cases, hypertrophied, or more fully developed than in the natural state; in other cases they are reduced to a delicate membrane, presenting neither fibrous nor cartilaginous tissue. (ANDRAL.) The dilated portions generally contain much mucus, or a puriform mucus.

20. These changes of the bronchi are seldom found, unless in persons who had suffered attacks of chronic bronchitis. They are most common in persons of middle or advanced age. But they are also sometimes met with in children who had died of hooping-cough, particularly in its more chronic states, and when complicated with bronchitis. I have occasionally found them in this class of subjects; but only consequent upon this disease. Dilatations of the bronchi, unless when very considerable, seldom occasion any change of the parenchyma of the lungs, beyond compressing and condensing it: they are frequently associated with either grey or dark induration of the adjoining pulmonary substance. (See CHRONIC BRONCHITIS, § 52. 61.).

II. CONGESTION OF THE BRONCHI. CLASSIF. I. CLASS, III. ORDER (*Author*).

21. DEFIN. *Urgent continued dyspnœa; little or no cough, and no expectoration; with an anxious, pale, or livid countenance.* — This affection is not often seen in a primary, severe, and general form; but it is very common in more slight and partial states; and as an attendant on typhoid, malignant, and pestilential diseases, and on exanthematous fevers, especially measles, scarlatina, and small pox, either shortly before the breaking out, or upon the premature disappearance of the eruption, when it often assumes a very general and severe form: and it not infrequently, in slighter grades, ushers in other diseases of the bronchi, particularly hæmorrhage, bronchitis, humoral asthma, &c. General idiopathic congestion of the bronchi, to such an extent and degree as to destroy life, although rare, is sometimes met with. Several cases have been recorded of persons who, without any apparent cause, were seized with urgent dyspnœa, increasing until it terminated in death; and, on dissection, the only morbid appearance observed was general congestion of blood in the capillary vessels of the mucous and sub-mucous respiratory tissues. (*See* § 3. *for a description of its anatomical characters.*)

22. The *symptoms* of this affection have not been sufficiently investigated; but they may be stated to consist of continued dyspnœa, more or less urgent; sometimes fever, little or no cough, and no expectoration; the sibillous or sonorous rhonchus in the large tubes, and absence of the respiratory murmur over the chest; diminished resonance on percussion; anxious, pale, bloated, or slightly livid countenance; purplish tint of the lips and nails of the fingers; anhelation, &c. When the congestion take place in the course of fibrile or exanthematous diseases, in addition to these, the pulse becomes very quick, small, irregular, or intermittent, and the oppression at the chest extreme.

23. The *causes* of these congestions are not well known. They appear, however, to be most frequently occasioned by the inhalation of poisonous gases or effluvia; by close, overheated, and crowded apartments; by the ingestion of sedative or narcotic substances, or indigestible or poisonous animal or vegetable matters; by inordinate distension or oppletion of the stomach; and by the transition or metastasis of other diseases, or by their determination to the bronchial surface in a more especial manner, as in the instances above referred to (§ 21.). When this affection proceeds from poisonous or indigestible substances, and not infrequently also when it arises from other causes, it is evidently associated with more or less congestion of the substance of the lungs. It often precedes other pulmonary complaints, as hæmorrhage, and that modification of asthma, called dry catarrh by LAENNEC. Congestion of the bronchi sometimes also occurs in the progress of several diseases of the heart attended with obstructed or impeded circulation through its cavities, particularly those of its left side; and is often one of those changes which supervene in the advanced stages of several acute diseases, especially the exanthemata, and to which death is more immediately owing. (See § 21.)

24. The TREATMENT must depend upon the state of the vital energies at the time, upon the nature of the causes to which the congestion is owing, and on the evidence of existing general plethora. The state of the pulse, in respect of frequency and fulness, will indicate the degree of activity characterising the attack; but generally, when the congestion is considerable, the changes which take place in the lungs during respiration being impeded, the vital energies become proportionately reduced, and the pulse weak, quick, and small. In the majority of cases, it will be necessary, notwithstanding, to abstract blood either by venæsection or cupping; and if the depression of vital power be urgent, to exhibit simultaneously stimulants by the mouth, and in enemata; to emdloy frictions with irritating liniments (see F. 305. 308. 311.), and revulsants, such as sinapisms, blisters, mustard pediluvia, &c.; and to inhale, at brief intervals, and for a very short time, stimulating vapours, particularly those of ammonia, camphor, aromatic vinegar, &c., with the view of exciting the nerves of the bronchi, and thereby removing the distension of the capillaries, and accelerating the circulation through them. When,

however, the patient, in addition to the symptoms indicating congestion, complains of a sense of heat, trickling, &c. in the course of the trachea, or under the sternum; and if the pulse retains its volume, and still more especially if it be sharp, full, or rebounding; we should infer that the fulness of the bronchial vessels is of an active description and most probably amounts to determination of blood; and, possibly, constitutes the early stage of hæmorrhage or of inflammation. In cases of this description, full blood-letting, either generally or locally, or both; and afterwards, counter-irritation and revulsion, irritating cathartic injections, the strict avoidance of internal stimuli, and the antiphlogistic regimen; must be prescribed.

25. In every case a strict reference should be had to the cause, associated circumstances, and the complications of the attack, and the treatment should be varied accordingly. When it seems to have been induced, or aggravated, by hurtful substances taken into the stomach, the exhibition of emetics, particularly No. 402. in the Appendix, ought not to be omitted; and, if they fail of operating, the stomach-pump should be used. The bronchial congestion preceding, accompanying or consequent on the eruptive fevers, is to be combated by cupping, revulsants, rubefacients, stimulating frictions of the surface, and by emetics.

III. Hæmorrhage from the Bronchi. — *Hæmoptysis* (from ἅιμα, blood, and πτύσις, sputum) frequently occurs, and often consists, as already stated (§ 14.), of a simple exhalation from the mucous surface. It is seldom, however, owing merely to the pathological state of the bronchi; but is either connected with some change in the substance of the lungs, or with impeded circulation through the heart; although the bronchial surface is generally its more immediate source. Being, therefore, intimately related to various changes of the lungs themselves, and often occurring in consequence of these changes, it will be considered in connection with them. (See Lungs — *Hæmorrhage from, &c.*)

IV. Bronchi, Inflammation of the. Syn. *Bronchitis*, Badham, Hastings. *Erysipelas Pulmonis*, Lommius. *Catarrhus pituitosus*, *Angina bronchialis*, Stoll. *Catarrhus suffocativus*, Auct. Var. *Bronchitis Catarrhosa*, Hildenbrand. *Peripneumonia Bronchitis*, J. Frank. *Bronchite*, Fr. *Die Entzundung der Luftröhrenäste*, *Bronchialentzundung*, Ger.

Classif. 3. *Class*, Diseases of the Sanguineous Function; 2. *Order*, Inflammations (*Good*). III. Class, I. Order (*Author*, see *Preface*).

26. Defin. *Cough with, or without rigors, often preceded by coryza, and followed by expectoration of a transparent, pale, glairy, and watery fluid; more or less febrile commotion, dyspnœa, and slight soreness, heat, or tightness of the chest, which are diminished as the expectoration becomes more abundant and opaque.*

27. This important disease, until Dr. Badham directed particular attention to it, was, according to the particular form it assumed, confounded with common catarrh, with pneumonia, under the appellation of peripneumonia notha, and with other diseases of the lungs and air-passages, more especially tubercular consumption, dyspnœa, &c. Dr. Young seems to have viewed it as a modification or extension of inflammation of the trachea, or even as synonymous with that disease, probably from their occasional complication, or succession to each other. J. P. Frank appears to have been among the first who directed attention to the frequency and importance of inflammation of the bronchial surface. "Cum vero," he observes, "profundius per tracheam penetrat, ac in bronchia descendit inflammatio; tunc in primo casu tracheitidis speciem, in altero peripneumoniæ imaginem refert, in qua ultima vix non constantem internorum bronchiorum phlogosin in centenis cadaveribus deteximus." (*Interp. Clin.* p. 110.) "Rectam habebis febrium catarrhalium saltem fortiorem ideam, si eas pro inflammatione bronchiorum, sive pro bronchitide consideres." (*De Cur. Hom. Morb.* p. i. t. i. c. vi.) Broussais also noticed the frequency and importance of inflammation of the mucous surface of the bronchi (*Hist. des Phlegmas. Chron.* t. i. p. 75. Paris, 1800.). But it is chiefly to the writings of Badham, Broussais, Hastings, Laennec, Villermé, Alcock, Andral, and Chomel, that we are indebted for our knowledge of it as a specific disease.

28. Bronchitis commences variously, and assumes different forms and states, according to the intensity of the exciting causes, the severity of the attack, and the constitution of the patient. I shall consider it chiefly with reference to its activity and duration, to the states of vital energy and age of the patient, to its forms and complications, and to its results. Its general prevalence, severity, and not infrequent fatality, require for it a more particular notice than it has received, even recently, from several systematic writers. This will appear somewhat singular, when I state that I know of no disease that is more frequent, or productive of a greater number of deaths, in children, than it, in its different states and complications.

29. i. Acute Bronchitis assumes different grades of severity, and a modified type, according to the habit of body and vital energy of the patient, and the extent to which the inflammatory action advances along the bronchial tubes. It presents itself in practice, as a *primary disease*, in three forms: — 1st, Common catarrhal bronchitis, in which only the mucous membrane of the large bronchi and trachea are affected by the specific and often infectious inflammatory irritation constituting *catarrh*: 2d, Sthenic or true bronchitis, in which the inflammatory action is more acutely marked — is of a more phlogistic description, probably from its further extension along the bronchi, and from both the mucous and the sub-mucous tissue of the tubes being affected: and, 3d, Asthenic bronchitis, where, owing to weak vital energy, the inflammatory irritation assumes a lower and more asthenic grade, and extends still more generally, or affects especially the minute bronchi, interrupting their functions, and preventing those changes from taking place in the blood which are requisite to the support of the nervous and vital manifestations.

30. *A. Catarrhal Bronchitis* (*B. Catarrhalis*); *Mild Bronchitis* (*B. Mitis*); *Pulmonary Catarrh*, *Bronchial Catarrh*, *Catarrhal Fever*; *Bronchitis serosa, &c.* — This is the most common form of the disease, and generally commences with coryza,

or with slight hoarseness or sore throat, and other symptoms of catarrh extending down the larynx, along the trachea, to the large bronchi; the affection of the former parts generally subsiding as the latter become diseased. But it sometimes appears without any signs of irritation, either of the Schneiderian membrane, or of the tonsils or fauces, evidently originating in the trachea or large bronchi themselves, particularly in delicate persons, or in those disposed to coughs, pulmonary disease, and habitual expectoration.

31. A sense of roughness, with frequent attempts to clear the throat, is generally the first *symptom* of the disease. This is accompanied with, or followed by, titillation of the larynx, exciting a dry hard cough; hoarseness of voice, with a sense of tightness across the chest, and sometimes slight pain or soreness upon coughing or breathing deeply. Accompanying these local symptoms, more or less constitutional disturbance is generally present. The patient complains of lassitude, pain in the limbs and back, slight shiverings, or cold chills, quickness of pulse, and increased warmth, with dryness of the skin. The cough, which was at first dry, is now accompanied with a slight expectoration of a somewhat saline, glairy, and thin fluid; and as it rises towards the glottis, increases the cough, and renders the fits more frequent, probably owing to its irritating quality; in this resembling the secretion in coryza, with which it so often originates. In the slighter forms of the disease, the expectoration becomes in two, three, or four days thicker, more abundant and tenacious, less irritating, and somewhat more opaque; and with this change, the constriction, pain, and soreness, are diminished, or very much relieved; the pulse also is less frequent; the skin cooler and more moist; the urine less scanty, paler, and deposits a sediment; and the cough less frequent, although often in longer paroxysms. As the amendment advances, the sputum decreases in quantity, but is more opaque, tenacious, and deeper coloured, being frequently greenish white. This amelioration is most remarkable at first in the morning, and, as convalescence proceeds, continues throughout the day. At last but little expectoration takes place, and is observed, as well as the cough, only morning and evening. In slighter cases, the chilliness continues throughout, or alternates, with some increase of heat and perspiration; the pulse is scarcely affected unless towards evening; the expectoration is neither abundant nor very viscid; the fits of cough not severe, and chiefly in the night and morning. Such are the usual symptoms and course of catarrhal bronchitis, constituting what is usually named a cold upon the chest. But it sometimes assumes other characters; and then pulmonary catarrh is no more applicable to it than to inflammation of the substance of the lungs, in which, also, it occasionally terminates.

32. This form of bronchitis appears to consist of catarrhal irritation extending to, or originating in, the mucous membrane of the trachea and large bronchi, to which it is chiefly limited, without materially affecting the sub-mucous tissue. It seems not to be actual inflammation, or, if inflammatory action be present, it is of a peculiar or, specific kind, probably owing to its being seated in, or rather limited to, the mucous membrane; in which light it is viewed by HILDENBRAND, who very justly considers catarrhal irritation to be distinct from true inflammation. This variety may assume an epidemic form, when its symptoms become somewhat modified (see INFLUENZA.); and repeated or prolonged attacks of it often favour the developement of tubercles in the lungs, or even originate them, in scrofulous and delicate subjects. It may also pass more or less rapidly into either true acute bronchitis, or into the chronic form of the disease, owing to the extension of inflammatory action more generally through the bronchi, and to their sub-mucous cellular tissue.

33. *B. True Bronchitis (B. Vera); Sthenic Bronchitis (B. Gravis Sthenica); the Acute Mucous Catarrh of* LAENNEC. — This more decidedly inflammatory form of the disease is sometimes preceded by coryza or sore throat; and as these begin to yield, the morbid action extends along the mucous membrane to the trachea and bronchi. But it frequently also commences in this last situation, particularly in those who are liable to pulmonary disease, and to chronic coughs, and assumes a severe form. After these preliminary signs, sometimes hoarseness, or loss of voice, and always a dry hard cough, with a sense of soreness, rawness, dryness, and heat, are complained of under the sternum, preceded by marked chills or complete rigors. The chills at first alternate with increased heat and dryness of the skin; and are soon followed by quickened and somewhat laborious respiration; dyspnœa or oppression at the chest; sometimes a dull pain on coughing; quick, full, and often strong pulse; sickness or loss of appetite; pain in the forehead, back, and limbs; loss of animal strength, with an inability to leave the couch or bed; foul loaded tongue; constipated bowels, and scanty high coloured urine. As the disease advances, the frequency of pulse, the cough, expectoration, and general febrile symptoms, increase, as well as the tightness and soreness of chest; the latter sensation often amounting to an obtuse pain extending between the shoulders, to the back, and to the attachments of the diaphragm to the false ribs, sometimes with pale anxious countenance, and great oppression and anxiety. As expectoration comes on and increases, the sense of heat below the sternum diminishes. The cough is generally excited by a full inspiration; and from being short and dry, or attended by but little expectoration, becomes longer, more severe, and convulsive, accompanied with a more copious expectoration; and subsequently, in some cases, terminates in scanty vomiting, which promotes the discharge of a watery or serous and frothy mucus, sometimes in considerable quantity, which had accumulated in the bronchi and trachea. The febrile and other symptoms are aggravated towards night, which is generally sleepless and disturbed, the position of the body being on the back; but the posture is often changed. In some cases, particularly those which are not remarkably severe, each exacerbation of the fever is attended by chills; and throughout the disease, the sensibility of the surface to cold is very great. In the more phlogistic cases, especially in plethoric subjects, the dyspnœa and oppression are very urgent, the face is flushed, and sometimes slightly tumid, and the eyes injected. At a still more advanced period,

the tongue is often red at its sides and point, and deeply loaded in the middle and base; the breathing becomes rattling or wheezing, owing to the air struggling through the mucous accumulation in the bronchi, and the exertions to expectorate greater. In extreme cases of this description, collapse, with diminished expectoration, purple lips, orthopnœa, quick depressed pulse, cold perspirations and extremities, with threatening suffocation, occur as early as the sixth or eighth day.

34. The chief characteristic of this true form of bronchitis is the state of the *sputum*, which ought always to be carefully examined. When the disease attacks a person who never expectorates whilst in health, the cough remains dry for a considerable time; and those who expectorate habitually, cease to do so when the inflammatory attack is very acute. If the disease be slight, the sputum is often increased from the commencement, and its quality changed. As long as the cough continues dry, the disease may be said to be in its first stage. In the course of a period which varies with the constitution of the patient and the treatment employed, each fit of coughing is followed by the excretion of a clear, transparent, serous or watery mucosity, which is at first slightly saline, but afterwards becomes tasteless. It is without odour. As the disease advances, it is a glairy mucus, resembling white of egg. When it is poured into one vessel from another, it flows with extreme viscidity. The more it can be drawn out into a fine thread, and the greater its tenacity, the more marked is the irritation of the surface secreting it; the greater also being the oppression, heat, and anxiety in the chest, the violence of the cough, and the general febrile symptoms. In these very acute cases, it adheres closely to the sides of the vessel containing it by long striæ. When the fits of coughing are severe, there is a froth or sort of lather on its surface; and, in some cases, it is streaked with a little red blood, which, however, is not combined with the mucus as in pneumonia. Early in the disease, whilst the expectoration is fluid, transparent, or watery, it often contains small whitish flocculi, proceeding from the mucous cryptæ of the pharynx and fauces.

35. In proportion as the inflammation advances to *resolution*, the sputum loses its transparency, and is mixed with opaque, yellowish, whitish, or greenish matter, which increases until it forms nearly the whole of the expectorated mass, and is attended by a marked diminution of the symptoms: its quantity also is lessened. The inspection of the sputa thus not only serves to indicate the nature of the disease, but also its various stages. In cases of a relapse or aggravation of the inflammatory action, the sputum again becomes transparent, frothy, more abundant, and viscid; and the other symptoms increase. In several instances the disease will continue to fluctuate for several days, exhibiting symptoms of slight amelioration, soon followed by slight relapse or exacerbations, often occurring on alternate days, or at the tertian period, and assuming from this circumstance a remittent character, until either a more decided improvement takes place, or a more marked aggravation terminating in some one of the ways hereafter to be detailed (§ 39.).

36. In the two forms of the disease now described, the minute bronchi so far escape, during the favourable course of the disease, as that no material interruption to the functions of the lungs, in respect of the changes effected on the blood during respiration, takes place in them; the air still passing through them and reaching the air-cells: but, in certain of their very severe forms and complications, and of their unfavourable terminations, and in the variety next to be noticed, obstruction to the free circulation of air, and to the changes produced on the blood, in the lungs, occurs to a greater or less extent.

37. *C. Asthenic Bronchitis* (*B. Asthenica*); *Peripneumonia Notha*[*] of Authors; *Acute Suffocative Catarrh* of Laennec.—This variety of the disease generally occurs in very young, or in aged persons, in those of a phlegmatic or cachectic habit, and of lax fibres and exhausted powers of constitution, or who have been liable to chronic coughs, and to copious expectoration of a thin watery phlegm. Severe paroxysms of cough, with wheezing and oppressed breathing; foul loaded tongue; scanty urine; complete loss of appetite; very quick, small, or irregular pulse; little or no increase of heat, excepting at night; cold extremities; vertigo; pain in the head; exacerbating fits of dyspnœa, with a scanty expectoration at the commencement, gradually becoming abundant and frothy; are its chief symptoms in persons advanced in life. It is much less acute or phlogistic in its character than the preceding variety; and its duration is longer. In the more severe cases, the countenance is pallid and anxious; the oppression of the præcordia extremely great; and a full breath taken to relieve it brings on a severe fit of coughing, which sometimes terminates in vomiting, and relieves for a time the symptoms by favouring the excretion of the accumulated mucosities. The tongue is often dry, and brownish red at its point and edges, and sometimes covered at its base with a dark coating; the breathing is much more difficult; the lips and nails assume a blue livid appearance; the face becomes lurid or dusky; the patient cannot lie down in bed, or, if he does, starts up, after falling asleep, with a sense of suffocation; and the symptoms indicate either collapse, and obstruction of the air-passages, or effusion of fluid in the thoracic cavities, or even both: stupor or sopor; weak, wiry, and very frequent pulse; marked diminution of the sputa, cold extremities, orthopnœa, clammy sweats about the face and neck, suppressed urine, &c. ushering in a fatal termination.

38. This is, upon the whole, the most common form of bronchitis which is met with in *children*, particularly in the metropolis, and among the children of the poor, ill fed, and ill clothed, and those living in cellars, ground-floors, and badly ventilated lanes and apartments, and is often remarkably prevalent during the winter and spring. In this class of patients its approach is often insidious; and it usually commences with coryza, but not infrequently also with chills, febrile symptoms towards evening, wheezing, quick breathing,

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[*] "*Peripneumonia notha* fortior nobis bronchiorum catarrhus est, quo in pituitosis, obesis, senibus, cachecticis, laxisque hominibus frigida et humida sub tempestate, ab accedente membranæ mucosæ hos canales investientis irritatione, copiosior, tenaxque pituita celeriori passu secreta bronchiorum fines opplendo, suffocationem sat cito minatur." (J. P. Frank.)

and cough. There is at first little or no dyspnœa; but the tongue is loaded, the pulse accelerated and full, the face pallid or tumid, and the child has lost its animation. As the disease advances, the breathing becomes more quick and laborious; and fits of dyspnœa come on, generally followed by severe attacks of cough, which often terminate in vomiting; on which occasion only the bronchial secretion is presented for examination, and is found to consist at first of a viscid, watery mucus, and afterwards of a yellowish white, or a tenacious matter. These exacerbations are followed by remissions, during which the child dozes, and appears relieved, and the pulse becomes less frequent. Thus the disease may continue, with alternate remissions and exacerbations, for many days, until either a permanent diminution of the symptoms takes place, or an increased frequency of pulse, stupor, lividity of the lips, nails of the fingers, convulsions, &c. supervene, and indicate impending suffocation, with congestion or watery effusion on the brain.

39. TERMINATIONS. — *A. Duration.* The *sthenic* variety of the disease usually runs its course in about seven or nine days; but it may terminate either way as early as the fifth; or it may be prolonged to the 21st, or even the 28th day. Its duration will, however, chiefly depend upon the treatment employed, the complication it may present, the severity of the symptoms, and on the age and constitution of the patient. The *asthenic* form of bronchitis generally runs its course in a slower manner; it seldom terminates either way in less than fourteen days, and generally continues for several weeks (§ 37.).

40. *B.* In *favourable* cases, the sthenic form of the disease begins to decline from the fifth to the ninth day. The change is first evinced by the state of the sputum, as above described (§ 35.); by an amelioration of the cough, dyspnœa, and febrile symptoms: in rare instances, by copious epistaxis; by a more general and copious perspiration than that which frequently terminated the febrile exacerbations; by a more copious discharge of a paler urine, depositing a sediment; and by a diminution of the dyspnœa, of the frequency and severity of the cough, and of the quantity of the expectoration, which becomes pearly, opaque, thick, yellowish, or greenish yellow; at last, febrile symptoms recur only towards evening, and the disease disappears as in the first variety (§ 31.).

41. *C.* This favourable change is not, however, always observed, particularly when the attack is very severe, when treatment has either not been soon employed, or has not been sufficient to remove the disease, or when the secretion into the bronchi has been very profuse, and expectorated with much difficulty. In such cases, it either lapses into the chronic state about to be described; or, owing to the extension of the inflammation, to the air-cells and substance of the lungs, gives origin to pneumonitis, and even to pneumonitis combined with pleuritis, which is thus superadded to the original disease; or, from the great extent of surface affected, the consequent irritative fever, and interruption to the pulmonary functions, and the profuse viscid fluid filling up the bronchi, collapse of the powers of life supervenes, and the patient dies, either with cerebral affection, or with the usual symptoms of asphyxy, consequent upon diminished discharge of the morbid secretion, and its accumulation in the air-tubes.

42. *a.* When the disease thus terminates in *pneumonia*, the sputum becomes more rounded, thick, tenacious, and streaked with blood, which is more or less intimately mixed with it, and sometimes of a dark colour, giving it a rusty appearance; and the cough is more tight, hard, and deep. The oppression also increases; the cheeks are flushed with circumscribed red; the pain of chest is more severe, or is now complained of for the first time; the skin is partially covered with moisture, sometimes very abundant in parts; the chest, which was hitherto sonorous throughout, is dull, in some part or other, upon percussion; and the auscultatory signs of severe and dangerous pneumonia appear, on which delirium and other unfavourable symptoms often supervene, and terminate, with coma, the life of the patient.

43. *b.* Bronchitis, as it occurs either in the sthenic or asthenic form, may also terminate in chronic pleuritis, and in effusion of serum into the pleural cavity, and in some instances also into the pericardium, particularly in persons advanced in life, and in those who have experienced difficulty in the circulation through the cavities of the heart. In some instances of this description, the expectoration, and many of the other symptoms, are suddenly or quickly diminished; but the dyspnœa continues, and signs of effusion become more apparent as those of bronchitis disappear. In these, the consecutive effusion occurs in the form of a translation or metastasis of the morbid action from the mucous to the serous surface. In other cases, symptoms of pneumonitis, or pleuritis, intervene between the change in the bronchitic symptoms and the occurrence of effusion, with pain, more or less severe, loss of resonance in some part of the chest, and other auscultatory signs, indicating the extension of the inflammatory action first to the small bronchi, and thence to the substance of the lungs and the pleura. Dr. HASTINGS has detailed some cases of this termination in his work, and I have treated several instances at the Children's Infirmary; but it is chiefly the aged who are liable to this unfavourable occurrence.

44. *c.* In other unfavourable cases, the disease becomes, in the course of a few days, characterised by failure of the energies of life; oppression and uneasiness increase; the cough is more frequent, laborious, and convulsive; the sputum is either more abundant, frothy, tenacious, and glairy, or gelatinous, and excreted with great difficulty, or much diminished in quantity from want of power to excrete it; the pulse is more rapid, small, weak, and irregular, or intermittent; the pain of head more distressing; the countenance is pale, and the face and neck covered with a clammy sweat; the respiration very frequent and wheezing, sometimes with an audible rattle; and, at last, delirium, lividity, at first of the lips, afterwards of the countenance, great prostration of strength, and coma, supervene, and the patient sinks with all the signs of imperfectly changed blood. In some cases, cerebral symptoms come on much earlier, with either violent or low muttering delirium, which soon terminates in most profound coma. In a few cases, this early accession of delirium, or of violent headach, with other symptoms of consecutive inflammatory action,

ending in serous effusion on the brain, altogether removes the original bronchial inflammation, or in others moderates it greatly and masks it. I have observed this in *children*, and once or twice in robust adult persons; but in both classes of subjects it is a dangerous occurrence. More commonly, however, the cerebral symptoms continue increasing, with those referrible to the bronchi, till life is extinguished.

45. In other cases of very acute bronchitis, with very high fever and severe local symptoms, particularly with quick, laborious, short respiration, dyspnœa, anxiety, great sense of heat under the sternum, and bloated countenance, collapse takes place rapidly, particularly if an appropriate treatment have not been early employed; and either delirium, coma, and other cerebral symptoms, or those more directly depending on the circulation of venous blood, appear, and the patient is speedily cut off. In weak and nervous patients, and during unfavourable states of the air, the inflammatory action sometimes seems to invade nearly all the respiratory mucous surface, and is soon productive of a copious mucous secretion, which, either from its difficult excretion or rapid secretion, in some cases, speedily suffocates the patient.

46. In *children*, and rarely in adults, cases occur, in which the inflammatory action extends upwards, to the *trachea* and *larynx*, occasioning all the symptoms of laryngitis in addition to those of bronchitis, and frequently terminating fatally with convulsions and the signs of congestion in the head. In many of the unfavourable cases of bronchitis in children, the extent of the disease, and the copious secretion, occasion suffocation more or less rapidly, with somnolency, bloated, or livid countenance, convulsions, coma, and, at last, complete asphyxy: and, on dissection, congestion of blood, with watery effusion, is found within the cranium; the bronchi are filled with a muco-purulent matter, and the vessels of the lungs are loaded with blood.

47. COMPLICATIONS.—The most common states of complication, in which bronchitis presents itself in practice, are, 1st, With catarrhal sore throat, coryza, &c. of which it is generally consecutive, and with catarrhal inflammation of the pharynx and œsophagus. 2d, With inflammation of the trachea, or larynx, or both, of which it is most frequently consecutive; but also sometimes antecedent, as I have occasionally observed in children. Indeed, we have seldom croup in London uncomplicated with bronchitis in some one of its forms or states. 3d, With measles, scarlatina, or small pox, on which it very frequently supervenes; particularly in measles, sometimes very early in the disease, and before the eruption breaks out; but oftener in consequence of its premature disappearance, or retrocession. 4th, Very commonly with hooping-cough, especially during certain seasons and epidemics. 5th, Not infrequently with continued fevers, particularly in its asthenic form. 6th, Often with disorder, or even sub-acute inflammation, of the digestive mucous surface, and diarrhœa, in children, when it also assumes this form; the stools being offensive, and the tongue red at its point, &c.* 7th, With disease of the liver, and accumulations of bile in the gall-bladder, chiefly in adults; the tongue then being very deeply loaded with a yellowish brown crust, or fur; and the stools dark coloured, and most offensive. 8th, In some cases with erysipelas, particularly its epidemic and infectious form. 9th, With pneumonia, or pleuritis; these being either consecutive of the bronchitis, or simultaneous with it. 10th, With dropsical effusion into the pleura or pericardium, especially in aged persons: and, 11th, With inflammatory irritation in the substance of the brain, or in its membranes, with disposition to effusion,—a complication most commonly met with in children.

48. All these diseases are greatly aggravated, and their danger increased, from being associated with bronchitis; and they frequently terminate fatally by one or other of the unfavourable states which the bronchial affection assumes. Bronchitis thus complicated also presents, in consequence, either a more acute character, or the asthenic form; and, being attended by a more marked disposition to invade the smaller ramifications and air-cells, or by a more profuse secretion of mucus, and a rapid depression of the powers of life, the unfavourable terminations above described quickly supervene. In several of these complications, particularly with pertussis, measles, scarlatina, continued fever, cerebral affections, and diseases of the lungs or pleura, bronchitis often escapes detection, until it becomes either one of the most important, or the most dangerous, or an actually fatal lesion. When thus complicated with measles or other exanthematous diseases, the eruption, if it still continue on the surface, often assumes, as the powers of life sink, a dark or purplish hue; and a slight dirty blueness of the skin, particularly of the face, hands, &c. is generally observed in other cases, indicating the impeded functions of respiration, and the consequent changes in the blood. The frequency and importance of the complication of bronchitis with measles, especially before the appearance of the eruption, during its progress, and after its decline; and the occurrence of the former complaint, both during and after convalescence from the latter; are deserving of the careful attention of the practitioner.[1]

49. ii. SUB-ACUTE BRONCHITIS is characterised by the symptoms of the sthenic form of the disease in a milder and more chronic form. The cough continues longer dry, and the expectoration scanty, or thick, viscid, gelatinous, or albuminous, with tightness of chest, and oppressed breathing. In this form of the disease, a plastic albuminous exudation sometimes forms in the large bronchi, and lower part of the trachea, or in the large bronchi of only one lung, and is moulded in the form of the air-tubes; and is either expectorated in fragments, or in large tubular branches and ramifications. Cases of this description are detailed under the appellation of bronchial polypi by the older writers, and figures given of them by TULPIUS and others. Mr. ILIFF has published (*Lond. Med. Repos.* vol. xviii. p. 207.) a case of this description, wherein this production retained its ramified and tubular form. I have met with two cases where the albuminous exudation had been formed in the

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* During some seasons I have occasionally admitted in one day, at the Infirmary for Children, several cases, in which it was difficult to determine whether the digestive or the respiratory mucous surface was most affected. This complication is not infrequent during convalescence fro the exanthemata, particularly measles and scarlet fev

bronchi, and expectorated in fragments. It generally occurs in an uncomplicated state.

50. iii. Chronic Bronchitis often follows severe attacks of catarrh; and is also frequently consecutive of acute bronchitis; but it sometimes occurs primarily in the chronic state, particularly in aged persons. It differs in nothing from the acute or sub-acute forms, excepting in as far as the symptoms are altogether milder, and their continuance longer; there being no distinct line of demarcation between its grades of activity and chronicity. The chief means, by which we are enabled to infer, that the disease has assumed a chronic form, when it is consequent on the acute, is the continuance of the sputum for several days, in undiminished quantity, and the persistence of the opaque, whitish yellow, or yellowish green appearance, which it assumed upon passing from the transparent, fluid, and viscid condition characterising the acute form.

51. Chronic bronchitis assumes various grades of severity, and presents different phenomena, according to the changes which have taken place in the bronchi. In its *slighter states*, and primary form, as it is often met with in persons advanced in life, and as it prevails during winter and spring, or variable seasons, it consists chiefly of a frequent and almost habitual cough, with scarcely any pain in the chest, continuing for weeks, or even months, or recurring every autumn, winter, and spring; being most severe in the mornings, and much easier through the day, with slight dyspnœa on exertion, and copious viscid mucous expectoration; but without any marked febrile symptoms, excepting slight acceleration of pulse. Its *severer forms* are met with in young or middle aged persons, after catarrh or acute bronchitis; and are attended with fits of coughing, and copious expectoration; with oppression at the chest and præcordia; with febrile symptoms, particularly towards night; with copious perspirations in the morning, which often seem to increase the cough instead of relieving it; with loss of strength, emaciation, and slight disorder of the digestive organs. The cough is increased after getting into bed, and very early in the morning. The breathing is quick and laborious, particularly on any exertion; and the patient complains of slight tightness of the chest. The pulse generally ranges from 90 to 120; being the former whilst quiet in bed, and the latter towards evening.

52. Attention to the *expectoration* is very important, in order to enable us to judge both of the accession of this state of the disease, or of its aggravation or change into the acute form, which is not infrequent, and of the concurrent or consecutive alterations which often take place. The sputum occasionally continues long in the state now described. It is generally then inodorous, and without taste. But it oftener becomes greenish, or yellowish white, or muco-purulent; is mixed with a colourless watery phlegm, and is more or less abundant. In cases of a worse character, particularly when hectic symptoms are present, it assumes a more purulent appearance; is sometimes streaked with blood, or mixed with dark specks of blood, or consists chiefly of pus. These changes, however, seldom occur without much antecedent fever, and attendant emaciation, night sweats, occasional diarrhœa, and the symptoms of confirmed hectic. In rarer cases, the sputum becomes remarkably fœtid; but this change cannot be imputed to any particular lesion of the bronchi or lungs, excepting sometimes to considerable dilatation of the former. The whole of the symptoms in this class of cases so very nearly resemble tubercular consumption, as to be distinguished from it with much difficulty, and only by attending to the appearances of the sputum, and by examining the chest with the stethoscope.

53. The *sputum* generally partially swims on the surface of water. When it is thin, transparent, viscid, and frothy, it usually altogether swims; but when it is thick, in tenacious, opaque lumps, or in fragments resembling portions of albuminous exudation, it generally sinks. In all these states it cannot be diffused in the water. When it consists of yellowish white, or greenish yellow matter, it partly sinks, and by agitation is broken into ragged portions, and is partially diffused; and the more it approaches a purulent state, the more completely and readily is it diffused, imparting to the water, by agitation, a yellowish white appearance.

54. Chronic bronchitis is also sometimes *consecutive* of the eruptive diseases; but these diseases have generally altogether or very nearly subsided before the bronchial affection supervened. It occurs primarily from the irritation of minute particles of mineral or vegetable substances floating in the air, as is shown in the article on Arts. It is sometimes also *complicated* with other chronic diseases of the lungs and pleura, more especially with *tubercles*; with diseases of the liver; with chronic inflammation, or other disorders of the mucous surface of the digestive tube, particularly of the œsophagus, stomach, and large bowels. In all these consecutive and complicated states, it presents no certain or unvarying forms; its chief character, its duration, progress, and termination, being modified by its severity, by the constitutional powers of the patient, by his diathesis, and by the quantity of expectoration. In some cases, the secretion from the bronchial surface is so profuse as to be the chief cause of the exhaustion and death of the patient.

55. iv. Anatomical Characters of Bronchitis. — *A.* When the body of a patient is opened, that has sunk under any disease whilst affected at the same time with a *mild and recent bronchitis*, some redness is found, generally in a circumscribed portion of the mucous membrane, and usually towards the end of the trachea, and in the first divisions of the bronchi. If the inflammation have been more *intense*, the redness extends to a greater number of these tubes, and exists, moreover, in the smaller ramifications. It sometimes happens that this redness is exactly limited to the bronchi of one lobe only; and it is the bronchi of the superior lobe which seems to be more particularly disposed to inflammation. The red colour of the bronchi presents itself occasionally under the form of a fine injection, which seems to exist both in the sub-mucous cellular tissue, and in the mucous membrane itself, and is usually attended by slight tumefaction. Sometimes the vessels cannot be distinguished, but only a number of small, crowded, red points, which are agglomerated the one around the other. Finally, an uniform red colour is occasionally observed. In some cases, the redness diminishes progressively from the large bronchi to the

small ones; in others, an opposite disposition is remarked. Occasionally the redness only exists in intervals, in the form of bands or of isolated spots, forming, as it were, as many circumscribed phlegmasiæ, between which the mucous coat is white and healthy.

56. *B.* When the inflammation is *chronic*, the mucous membrane generally loses its lively redness: it presents a livid, violet-coloured, or brownish tint. Finally, and what is very remarkable, in individuals offering all the symptoms of inveterate chronic bronchitis, with puriform expectoration, the mucous membrane of the lungs has been found scarcely rose-coloured, and even perfectly pale through its whole extent. Bayle and Andral have particularly noticed this fact. I would not wish to conclude that there is not, and least of all, that there has not been, inflammation in these cases; but I think a very copious secretion will often take place from mucous surfaces, and assume even a purulent appearance during its retention in the bronchi, from lost tone of the extreme capillary vessels, with, perhaps, an increased flux or determination of the circulating fluid in order to supply the discharge, all vascularity disappearing with the cessation of circulation. The other changes observed on post mortem inspection, particularly in the more chronic states of bronchitis, consist chiefly of thickening, softening, ulceration, &c. of the mucous membrane, dilatation of the bronchi, &c. (See § 7, *et seq.*).

57. v. Diagnosis.—The characters of the *cough*, and of the *sputa*, and the physical signs, are our chief guides in the diagnosis of bronchitis. The history I have given of the disease will be generally sufficient to enable even the inexperienced to recognise it: but it will often be necessary to arrive at more precise and certain information as to the extent of lesion, and its existence either in a simple or in a complicated form.

58. *A. Of the acute.* — *a. By auscultation.* In the first stage of the disease, the inflammation causes tumefaction of the mucous bronchial surface, and consequent diminution of the calibre of the tubes. This state occasions a modification of the respiratory sound in them: and, hence, either with the unaided ear, or with the stethoscope, we hear at first the "*dry bronchial rhonchus;*" consisting chiefly of a sibilous or whistling sound; occasionally with a deeper tone, resembling the note of a violoncello, or the cooing of a pigeon, particularly when the large bronchi are affected. These sounds (see Auscultation, § 14.), denominated the *sibilous* and *sonorous rhonchi*, are present chiefly in the early stage, and before expectoration takes place; and prove the accuracy of the rational inference of Dr. Badham, that the difficult breathing of this period is owing to the state of the mucous membrane; and I would add, of its sub-mucous cellular tissue also. To these sounds is added the *mucous rhonchus;* and in proportion as the bronchial secretion, to which it is owing, augments, this sound becomes predominant. When the inflammation is seated in the large tubes, the bubbles of mucous rhonchus are large and uneven; and the respiration may be still heard over the chest. But when the mucous rhonchus is fine, and is heard constantly, it may be inferred that the small bronchi are invaded. When this is the case in a severe degree, there is also slightly diminished resonance of the chiefly affected part upon percussion. As the disease proceeds, and the secretion passes into an opaque and thickened state, the mucous rhonchus becomes interrupted, sometimes with obstruction of the respiratory sound in a portion of the lungs, and passes into a sibilant or clicking sound. These changes arise from the entire or partial obstruction of one or more tubes by the thickened mucus, and are generally of temporary continuance: occurring now in one part of the chest, and disappearing; and now in another. This state of the bronchi fully explains the dyspnœa of this stage.

59. *b. Rational diagnosis.* — *α.* The *cough* in *bronchitis* is loose, diffused, and deep; in paroxysms, and attended with fever, often with wheezing. In *pertussis*, it is in severe paroxysms, unattended by fever or wheezing; is accompanied with a distinct whoop; and terminates in vomiting. In *croup* it is sonorous, clanging, and harsh. In *laryngitis*, it is suffocating, shrill, or grunting; and, on inspiration, attended with a drawing down of the pomum Adami to the sternum, and retraction of the epigastrium and hypochondria. In *pneumonia*, it is deep in the chest; frequent and short, often hard; and gives a metallic sort of noise. And, in *pleuritis*, it is short, dry, hard; sometimes slight, but always suppressed and painful. *β.* The *expectoration* in *bronchitis* is abundant after the second or third day, or even from the first: in *pertussis*, it only follows the vomiting: in *pneumonia*, it is more rounded, distinct, thickened, purulent, rusty, and intimately streaked with blood: in *pleuritis*, *croup*, and *laryngitis*, it is scanty, thin, frothy in the latter; sometimes with shreds or pieces of lymph, and entirely different in appearance from that of bronchitis. *γ. Pain* in *bronchitis* is scarcely complained of; and consists merely of a sense of soreness, heat, and tightness in the chest, particularly beneath the sternum, and is not increased on full inspiration: in *pneumonia*, it is more marked, especially in certain parts of the chest, generally nearer the lateral regions, and is increased on inspiration or prolonged expiration: in *pleuritis*, it is very acute, and a full inspiration is impossible: in *croup* and *laryngitis*, the pain is increased upon pressing the trachea and larynx. *δ.* The *countenance* in *bronchitis* is more frequently pallid or bloated; in *pneumonia*, it is generally flushed; and dyspnœa is greater in the former than in the latter. The breathing is *wheezing* and *hurried* in acute bronchitis; in pneumonia it is less so, and generally without the bronchial wheeze. The *pulse*, in the former, is frequent, full, free, developed, and soft; in the latter, full, hard, bounding or vibrating, and sometimes oppressed and undeveloped. The general febrile symptoms are more continued in pneumonia than in bronchitis; morning remissions, with free perspiration, being more frequent in the latter than in the former. The *physical signs* in pneumonia, pleuritis, &c., are the surest means of their diagnosis. (See art. Lungs — *Inflammation of.*)

60. Some cases of *asthenic bronchitis* may be mistaken for *humoral asthma;* and occasionally no very distinct line of demarcation can be drawn, both affections either insensibly passing into each other, or being complicated with one another. But, generally, the slow accession of the former,

the more continued and less urgent dyspnœa and tightness of the chest, and the presence of febrile symptoms, particularly great quickness of pulse, will distinguish it from humoral asthma; which is commonly characterised by the sudden accession of the paroxysms, their severity during the night, and the attendant orthopnœa, the more or less complete and prolonged intermissions, and especially by the absence of fever, and by the much more marked integrity of the vital and animal powers, than in asthenic bronchitis. In this latter disease, the patient is incapable of leaving his bed or his apartment: in asthma, he may attend to his avocations; or may, at least, change his room in the intervals between the fits. The diagnosis between the *sthenic* bronchitis and asthma is attended with no difficulty. (See Asthma, § 50.)

61. *B. Of the chronic.* — *a. By auscultation.* The physical signs of this form of bronchitis are not materially different from the acute. The respiration is extremely varied: being sometimes louder, at other times more obscure than natural, and generally accompanied with the *mucous rhonchus;* which, however, is not heard over the chest, but now chiefly in one part and then in another, and seldom during the whole of the respiratory act. The occasional occurrence of the *sibilous* and *sonorous* rhonchi indicates that the tubes are sometimes partially obstructed; but this is much less frequent than at the commencement of acute bronchitis; and it rarely happens that the respiration is entirely interrupted in a part of the lung. Very often, also, when the dyspnœa is considerable, or even urgent, the air is heard to enter the lungs as well as usual, the respiratory sound being either distinct or puerile. The resonance of the chest on percussion is scarcely diminished. When the bronchitis is very chronic, the tubes sometimes become *dilated*, from being weakened by the inflammation and strained by the paroxysms of coughing. When this state of the bronchi exists, the sputum is often fœtid, and several of the auscultatory signs of tuberculous excavations of the substance of the lungs are present. If the dilatations be large and rounded, it may furnish *pectriloquy* and the *cavernous rhonchus;* but if, as is more generally the case, it extend to several tubes, or if they be dilated along a considerable portion of their axis, a loud *bronchophony* is only heard. If this dilatation be extensive, bronchophony, bronchial respiration, sometimes with a "*veiled blowing*," and even slight pectriloquy, will be heard in corresponding parts of the thorax. On *percussion*, the sound is often somewhat less than natural, owing to the compression of the surrounding pulmonary tissue; and owing, also, to this cause, the dyspnœa is often great. Dilated bronchi remain long stationary; tuberculous excavations generally increase rapidly. The former are most frequently situated in the scapular, mammary, and lateral regions; the latter in the sub-clavian and sub-acromian regions of the chest. (See the diagnosis in *Tubercles* in the Lungs.)

62. *b. Rational diagnosis.* — It is chiefly with tubercles in the lungs that chronic bronchitis is liable to be confounded; and, indeed, without the aid of auscultation, the diagnosis between them is very difficult. When they both co-exist, and especially when the latter is attended with dilatation, we have seen that even auscultation does not easily enable us to ascertain the exact state of disease: however, by a careful comparison of the physical and rational symptoms of both, we may generally form a tolerably correct opinion. Early in chronic bronchitis, the absence of pain during inspiration, the capability of resting on either side, the pallidity of the lips and countenance, the appearance of the sputum (§ 34, 35.), and the wheezing noise on respiration, may readily distinguish it from tubercular phthisis. As the disease advances, the symptoms more nearly resemble tubercular consumption; but the pallor of countenance and absence of pain generally continue; or, if the latter be present, it is diffused over the chest, and the patient can draw a larger volume of air into the chest, and retain it longer, than in phthisis. The dyspnœa is less on exertion, consists more of a stuffing sensation, and is more relieved by expectoration; the sputum generally consists of a more considerable portion of mucus, and is more regularly abundant; and the perspirations are much more partial, the emaciation less, and the paroxysms of hectic much less regular, than in tubercular disease. The cough is very different. In chronic bronchitis, it is generally deep and sonorous, and in paroxysms; in phthisis, it is short and tickling. When we find copious purulent expectoration, but without broken-down portions of softened tubercles or of the pulmonary tissue; night sweats; hectic fever, with full deep cough, and absence of the physical signs of phthisis; — if, after repeated examinations, there can be detected neither a constant absence of the respiratory murmur, nor gurgling cavernous rhonchus, nor pectriloquy, nor marked defect of resonance on percussion, — we may safely conclude the disease to be chronic bronchitis. When this disease depends upon the inhalation of irritating substances, as Dr. Hastings very justly remarks, the cough and copious muco-purulent expectoration often continues for months, or even years, without much suffering, with pale countenance, slight lividity of the lips, &c. In these cases there can be no difficulty in the diagnosis.

63. vi. Prognosis. — *A. In the acute.* When the disease is slight, or limited to a few bronchi only, the disease generally terminates favourably. The change is indicated by a more perfect apyrexia in the mornings, less severe and less frequent cough, easier expectoration, and a thicker and more opaque sputum; which, however, generally assumes a more fluid and glairy appearance for a few evenings during the febrile exacerbation. A *relapse* of the disease is indicated by increase of the fever and cough, and a more transparent, fluid, and glairy expectoration. When the inflammation is very severe and general, as indicated by high fever, dyspnœa, &c., the prognosis should be unfavourable, or given with caution. If symptoms of collapse have appeared, and the mucous rhonchus be heard universally, and with little or no respiratory murmur upon auscultation; if the pulse become very frequent, small or weak, irregular or intermittent; and if the countenance be at the same time pallid and anxious, slightly livid, or the nails of the fingers and lips tending to purple; the danger from asphyxia is extreme. When the disease occurs in the course of continued or exanthematous fevers, in some epidemic states of hooping-cough, and in the other severe

forms of complication (§ 47, 48.); and when the signs indicating the unfavourable *terminations* already enumerated appear, the danger is also great, although it may not be extreme. The supervention of pneumonia or pleuritis, or of tracheitis or laryngitis; a sudden diminution of the expectoration; the occurrence of cerebral symptoms, of orthopnœa, or even continued dyspnœa, with expansion of the nostrils; a dark red colour of the tongue; are all unfavourable circumstances, and indicate imminent danger. On the other hand, when spontaneous evacuations occur, with a favourable change in the cough and expectoration, particularly on one of the critical days, although the attack has been extremely severe, a favourable result may be looked for; more particularly if the disease proceeded from cold, and was uncomplicated.

64. The *asthenic* form of the disease is very dangerous, when occurring at the extremes of age; but less so when it is unattended by marked depression of the powers of life, and by signs of the circulation of venous blood, — circumstances which, in connection with the frequency, weakness, and irregularity of the pulse, the quantity and appearance of the sputa, and with the difficulty of expectoration, constitute the danger.

65. *B. In the sub-acute and chronic.* — If it have arisen from catarrhal affection, and be unattended by much emaciation or hectic, this form of the disease will generally terminate favourably, although the expectoration present a puriform appearance. The more purulent, however, this excretion, and the more marked the symptoms of hectic, the greater the danger. But when the sputum seems to consist chiefly of mucus, although the quantity expectorated be great, a favourable issue may take place; and this will be more frequently the case when the chronic bronchitis has been consecutive of the acute. When there are constant dyspnœa, very frequent pulse, profuse sweats, and copious purulent expectoration, with emaciation, hectic fever, colliquative diarrhœa, associated symptoms of disease of the liver, or of the mucous surface of the bowels, with a smooth, glossy, or chopped, a dark red, or raw appearance of the tongue, a most unfavourable prognosis should be given; and if to these succeed aphthous eruptions about the mouth and tongue or fauces, little hope of recovery can be entertained. The causes and complications of the disease should also materially influence our prognosis. When it has arisen from mechanical irritation of the bronchi, patients often recover from a very unfavourable state, when the irritating cause has altogether been removed. The occurrence of bronchitis in the scrofulous diathesis, and its association with tubercles in the lungs, are dangerous circumstances. This *complication* is to be ascertained chiefly by means of the physical signs. If these indicate the existence of tubercles, or do not establish with certainty their absence, a very cautious opinion should be given. The mucous rhonchus, and dulness on percussion, with the rational symptoms of tubercles, are indications of a very dangerous malady. The rapid developement of symptoms of the acute, in the course of chronic bronchitis, must be viewed as an unfavourable circumstance. The extremes of age also increase the risk in this as well as in the acute state of the disease.

66. CAUSES. — *A.* The *predisposing causes* are, whatever lowers the energies of the frame, more particularly too warm or crowded apartments; sleeping with too many clothes; late rising, late hours, and too great sexual indulgence; very early, and far advanced age; the lymphatic and sanguineous temperaments; relaxed habits of body; febrile and exanthematous diseases, and the suppression of accustomed eruptions and discharges.

67. *B.* The *exciting causes* are, exposure to a cold and moist atmosphere, or to currents of air, particularly when perspiring: rapid vicissitudes of weather and season; wearing damp clothes or shoes, or sleeping in damp beds or linen; continued exposure to dry cold; quick refrigeration of the body after being over heated and fatigued, or upon coming from crowded apartments and assemblies; wearing too low or very thin dress, with exposure of the neck and chest; rapid atmospherical changes, particularly during autumn, winter, and spring, and especially from cold to heat; epidemic constitutions of the atmosphere; easterly and north-east winds; exposure to the night air after rain; the inhalation of irritating gases, vapours, or mineral or vegetable particles (see ARTS AND EMPLOYMENTS, as *Causes of Disease*, § 40.); sudden passage from the cold air into overheated apartments; catarrhal infection; miasmal exhalations in cold and moist states of the air; the imperfect irruption or retrocession of the exanthematous diseases; and the translation or metastasis of gout, rheumatism, erysipelas, &c.

68. vii. TREATMENT. — 1st, OF ACUTE BRONCHITIS. — *A. In its simple states.* M. BROUSSAIS gives a very concise view of the indications of cure in this form of the disease, which has been adopted, *verbatim*, by Dr. HASTINGS; without, however, referring to the original writer. M. BROUSSAIS very justly recommends that the excitement of the sanguiferous system should be moderated, by general blood-letting, acidulated and mucilaginous fluids, and abstinence from stimulating food; that perspiration be favoured, by saline and antimonial medicines, and by emollients, both internally and externally employed; and that the irritation and congestion of the diseased vessels be relieved by local depletions and emollient revulsants when erythism of the capillaries predominates, and by rubefacients and vesicatories when the nervous powers are depressed.

69. *a.* In the *first variety* of the disease, *blood-letting* is seldom requisite; saline and antimonial medicines, with demulcents, emollients, &c. being generally sufficient. When, however, fever is considerable, and the patient complains of soreness or slight pain in the chest, a moderate bleeding — preferably by cupping — will be serviceable; and full doses of antimony, or as much as the stomach will bear of the solution of tartarised antimony, in frequently repeated doses, will soon remove all febrile disturbance. The following mixture has generally answered this purpose in my practice (see also F. 393. 854.): —

No. 66. ℞ Mist. Camphoræ, Mist. Amygdal. Dulc., āā ℥ ij.; Liq. Ammoniæ Acet. ℥ jss.; Spirit. Æther. Nit., Vini Antimon. Tart., āā ʒ ijss.; Syrup. Tolutan. ʒ jss. M. Capiat coch. ij. larga secundâ quâque horâ.

70. In the *third variety*, or the asthenic form of the malady, blood-letting is generally required; but it ought to be resorted to with much caution, and early in the disease, as recommended by SYDENHAM and most practical writers of the present

day. From eight to ten ounces may be taken from a vein, but, I think, preferably from between the shoulders by cupping; and afterwards, revulsants, counter-irritants, and expectorants, may be employed. The admissibility of depletion, or of antimonials, or the extent to which they should be carried, and the propriety of having recourse to stimulating expectorants, necessarily depend, in this form of the disease, upon the degree of morbid action and of vital power presented by individual cases, and upon the quantity of the expectoration and the difficulty to excrete it. Moderate local depletions are more generally required when this state of disease occurs in children, than when it is met with in aged persons; whilst the latter are more benefited by expectorants, diaphoretics, counter-irritants, and diuretics, than the former class of subjects.

71. In the *second variety* of bronchitis, particularly when the patient is young, plethoric, or robust, blood-letting should be early and energetically employed, and be directed as recommended in the art. on the Blood (§ 64.); and a full impression made upon the circulation, short, however, of syncope. Immediately afterwards, the preparations of antimony, combined according to circumstances, should be given in full and frequently repeated doses, so as to prevent the return of excessive local or general action, and to promote a free and universal perspiration. The preparations of antimony that may be selected for this purpose are the ant. tartar., James's powder, or the kermes mineral (F. 637.); and the first doses of them may be advantageously combined with calomel. The following may be exhibited; or F. 24. 513. 530. 638., or other similar formulæ, contained in the Appendix: —

No. 67. ℞ Hydrarg. Submur. gr. vj.; Pulv. Jacobi Veri gr. v.; Camphoræ rasæ gr. j.; Extr. Hyoscyami gr. v.; Conserv. Rosar. q. s. ut fiat Bolus statim post venæsectionem sumendus.

No. 68. ℞ Mist. Camphoræ ℥j.; Liq. Ammon. Acet. ʒij.; Potassæ Nitratis gr. vj.—x.; Spirit. Æther. Nit. ♏ xx.; Vini Antimon. Tart. (vel Vini Ipecacuanhæ) ♏ xx.—xxx.; Tinct. Hyoscyami ♏ xv.; Syrup. Tolutan. ʒj. M. Fiat Haustus, tertiis horis capiendus.

When antimonials are given in as large doses as the stomach will bear, and frequently repeated after the first full depletion, a second will not often be necessary; or local blood-letting will be sufficient. But if the febrile excitement and the state of the pulse and of the blood drawn indicate it, venæsection may, in robust subjects, be again repeated to the extent already indicated. When this variety of the disease affects *children*, blood-letting, either general or local, according to the age, should be prescribed, with saline diaphoretics, followed by the semicupium or pediluvia. In all classes of subjects, *blood-letting* must be regulated according to the state of the pulse, heat of skin, the character and quantity of the expectoration, the presence of pain, and the prevailing character of diseases; attention to these circumstances being especially required in children and aged persons.

72. *b.* The choice of *diaphoretics* in this disease is deserving of notice. Early in the *first* and *second* varieties I have usually preferred tartarised antimony, generally in solution, and conjoined with the vin. ipecacuanhæ, or with the spirit. æther. nit., small doses of camphor, &c. But in infants or very young children, in the aged, and in the *third* or asthenic form of the disease, ipecacuanha seems preferable, — in the latter class of subjects particularly, combined with camphor. In the more catarrhal, or less acute, forms of the complaint, ipecacuanha, combined with nitrate of potash and opium; and, in the more sthenic states of the disease, the same medicines, in larger doses; will often prove equally serviceable as the preceding. While febrile excitement continues much increased, diaphoretics or diuretics are often exhibited with little advantage, as the restoration of these secretions is rather the consequence, than the cause, of diminished or exhausted febrile commotion. The object, therefore, should be, first to lessen the excitement by depletion, alvine evacuations, and sedatives; and then to make choice of those diaphoretics which produce a lowering and refrigerant operation, until the strength of pulse and heat of skin are reduced. Hence the propriety of adopting the medicines already recommended, and combining them with the nitrate of potash, and with each other.

73. *c. Emetics* are amongst the most beneficial remedies we can resort to in certain states of bronchitis, particularly in the *third* variety; and, in the *second*, after blood-letting: in children they are often remarkably useful. They have the effect of unloading the bronchi of the mucus accumulated in them, of relaxing the surface, and afterwards of promoting perspiration. For children, ipecacuanha should be preferred; and for aged persons, and the third variety of the disease, the sulphate of zinc. In the second form, and in all other subjects, the tartarised antimony is the best emetic that can be prescribed, as it operates both by vomiting, by lowering vascular action, and promoting perspiration. Emetics are more particularly required when the expectoration is difficult or suppressed, the cough severe and suffocating, and when the disorder depends upon the inhalation of irritating particles. They moreover tend to promote the operation of purgatives, which are generally much required in this disease. In cases of extreme depression, with suppressed excretion of the secretion, the stimulating emetics in the Appendix (F. 402, 403.) should be selected.

74. *d. Purgatives and cathartics* have been considered by several writers as of doubtful efficacy in pulmonic inflammations; and, when expectoration is established, as being even prejudicial. Such appears also to be partly the opinion of an able reviewer in the *Medico-Chirurgical Review* for Dec. 1820. But it is not quite in accordance with my experience, which, at the Infirmary for Children alone, must have amounted to some thousand cases of the different forms of the disease. It should be kept in recollection, that the expectoration in bronchitis is not a salutary discharge from the lungs, the promotion of which is a beneficial indication of cure; but that it is the product of a morbid state, of the nature of which it is an index; that this state is generally inflammatory, and always attended with determination of the circulating fluids, thereby keeping up the discharge. It is obvious, that whatever tends to increase the morbid determination to the bronchial surface will increase the disease, and, consequently, the expectoration; and that whatever derives from this situation will proportionately diminish both. That purgatives or cathartics, judiciously combined, have the effect of deriving from the lungs, by increasing the se-

cretions of the liver and digestive mucous surface, must be evident; and I have accordingly found them serviceable when thus prescribed. Severe attacks of bronchitis, moreover, are favoured by congestions and accumulations of bile in the biliary organs, and by sordes retained on the mucous surface of the bowels. In all those cases more especially — wherein the stools are generally very offensive — and at the commencement of all the forms of the disease, these medicines ought to be exhibited, with the view not only of promoting the abdominal secretions, and of removing fæcal matters and sordes, but also of deriving the circulation from the seat of disease; and the bowels should be kept very freely open throughout the treatment. It is, of course, understood that we are not to prescribe cathartics to the extent of depressing the energies of the frame too low, especially when they are already weak. Indeed, purgatives may be as much required, and as beneficially employed, in asthenic cases, as in others of a more phlogistic description, particularly if the bowels have been neglected; effects of a very different nature from that of mere evacuation arising from a judicious choice and combination of them. Thus, when prescribed with bitters, tonics, stimulants, or antispasmodics (F. 266. 471. 572. 880, 881. 887.), in the asthenic or suffocative states of the disease, not only will full alvine evacuations be procured, but also a tonic effect on the digestive organs; and, consecutively, a more moderate secretion in the bronchi, with an easier expectoration, will be produced. I have observed that the combination of purgatives, especially calomel, or those of the resinous class, with camphor, antimony, and hyoscyamus, according to the circumstances of the case, is particularly serviceable in bronchial diseases.

75. *e. Expectorants* have been much abused in inflammations of the bronchi; chiefly from the circumstance of the expectoration being too generally viewed as a salutary discharge which ought to be promoted, instead of its being a product of the inflammatory state, or of active determination to the surface of the air-vessels. I consider them quite inadmissible when there is much fever or heat of skin, or when the sputum is abundant and fluid, the patient having sufficient strength to bring it up; and generally in the *second* variety of the disease. On the other hand, in the *third* variety, or when the expectoration is arrested evidently from want of power to throw it off, or to excrete it, or from its great viscidity, expectorants will be of much service. In such cases, *ammonia* and *camphor* should be first tried, as being generally least detrimental in doubtful cases, and most quickly beneficial. Where the admissibility of expectorants is evident, especially in the asthenic form of the disease, and in aged persons, *squills, ammoniacum, galbanum*, or *senega*, may be directed; with the precautions, and in the forms, recommended when treating of them with reference to humoral asthma. (See Asthma, § 89. 103.; and ℞ No. 41—46.) When expectoration is rendered difficult, and the cough suffocative, from the tenacity and consistence of the sputum, as is sometimes the case, *attenuants* and *alteratives*, as the fixed alkalies combined with ipecacuanha, &c., or as prescribed in the article on Asthma (§ 103. ℞ No. 50, 51.), and exhibited with camphor or ammonia, will be found of much service. In nearly all states of bronchitis, *camphor* is a most valuable medicine. Its virtues have been singularly overlooked by the writers on this disease; but, when combined with *colchicum*, or with antimony, nitrate of potash, ipecacuanha, &c., and given in small doses, in the more inflammatory and febrile states of the disease; or when prescribed in progressively larger quantities, with *diuretics*, the spirit. æther. nit., opium, &c., as the vascular excitement subsides, and febrile heat disappears; and in large doses (from five to ten grains), with ammonia, ammoniacum, senega, opium, &c., when exhaustion and difficulty of expectoration from deficient power are urgent; it is one of the most valuable remedies we possess in this, as well as in several other diseases.

76. *f.* The *inhalation of emollient and medicated vapours* are occasionally of much benefit in the sthenic form of the disease, but chiefly in its first and second stages. The vapour arising from a decoction of marsh mallows, or from linseed tea, or from simple warm water, is the best suited to this state; and should be employed from time to time, the *temperature of the apartment* being duly regulated through the treatment, and constantly preserved from about 66° of Fahr. to 75°. Dr. Paris recommends, during the dry easterly winds of spring (when the disease is so prevalent), the vapour of warm water to be diffused in the patient's apartment. In the early stage it may be of advantage. In the case of the son of an eminent medical writer, attended by Dr. Gordon, Mr. Annesley, and myself, this was tried in the state of the air alluded to, but with no benefit. The case terminated fatally, from extension of the disease to the air-cells and substance of the lungs. When the expectoration becomes whitish, opaque, and thick, the vapour may be rendered somewhat more resolvent by adding a solution of camphor in vinegar, and extract of conium or hyoscyamus to the hot water, or to the emollient infusions now mentioned; and in the asthenic variety, particularly when the difficulty of expectoration, and the fits of dyspnœa, are distressing, or when the excretion of the morbid matter is impeded or suppressed from want of power, the medicated vapours and gases recommended in the chronic state of the disease (§ 98.), and in humoral Asthma (§ 88.) may be tried.

77. *g.* There are various medicines which are occasionally useful, when exhibited in appropriate states and periods of the disease. Amongst these, *narcotics* and *sedatives* deserve an especial notice. *Opium* should not be exhibited alone, as long as febrile action is great; but, in combination with antimony, or ipecacuanha, and nitre, it is often a most valuable medicine. It is best given in small or moderate doses, in conjunction with camphor and expectorants, where vital power is reduced and expectoration difficult (§ 37.). In general, when the skin becomes cool, the bowels are well evacuated, and the air-tubes remain irritable, opium, or some other narcotic or anodyne, is indispensable. Opium, and others of this class of medicines, particularly when judiciously prescribed, are then of service, not only in diminishing the irritability of the system and of the air-passages, and in lessening the cough, the frequency or severity of which often aggravates the inflammatory irritation of, and determination to, the bronchial surface, but also in equalising the circulation, in determining to

the skin, and promoting perspiration. In the more phlogistic states of the disease, and at its commencement, *colchicum* or *digitalis* will be often of advantage, in diminishing vascular action, local determination, and morbid irritability. They ought, however, seldom to be used at the same time. In the more sthenic cases, *digitalis* is very beneficially associated with the preparations of antimony. When the sputum is thick and opaque, *colchicum* is generally less beneficial than at an earlier period, excepting in conjunction with diuretics and camphor. When the skin has become cool, it is no longer of use. In the *third* variety, it is seldom indicated, unless at the commencement of the disease, or when combined with ammonia and camphor. Upon the whole, both colchicum and digitalis are less to be depended upon in acute bronchitis, than a judicious combination of antimonials with anodynes, &c. *Hyoscyamus*, *conium*, and the extracts of *poppy* and of *lettuce*, are also very generally serviceable in the different forms of bronchitis. But with them, likewise, the amount of advantage will entirely depend upon the manner in which they are prescribed. In the sthenic and febrile states of the disease, and at its commencement, they should be associated with antimonials, ipecacuanha, refrigerants, demulcents, and emollients (F. 24. 208. 427. 554.); with diaphoretics (F. 394. 568. 809.); and with diuretics (F. 818. 865. 893.); or in other similar forms, of which there are several in the Appendix. When the disorder assumes an asthenic state, or when expectoration is difficult, the cough distressing, and the skin cool, any of the sedatives particularised may be conjoined with either ammonia, camphor, or the fixed alkalies, or with other attenuants (F. 835.), and with expectorants, &c. (F. 356. 555. 558. 811. 895.) according to circumstances.

78. *h.* When the acute form of the complaint seems to be about lapsing into the chronic, the combination of *gentle tonics* with emollients and diaphoretics is often of service, as was first pointed out by M. BROUSSAIS, who allowed also red wines much diluted with water in this state. The infusion or decoction of cinchona, or the infusion of uva ursi, may be thus prescribed: —

No. 69. ℞ Decocti vel Infusi Cinchonæ ℥ iijss.; Liq. Ammon. Acet. ℥ jss.; Mucilag. Acaciæ ℥ ss.; Spirit. Æther. Nit. ʒ ijss.; Tinct. Camphoræ Comp. ℥ ss.; Extr. Conii gr. xx.; Syrup. Tolutan. ℥ ss. M. Capiat Cochleare unum amplum secundâ vel tertiâ quâque horâ, vel Coch. ij. quintis vel sextis horis.

79. *i. External meusures* ought not to be overlooked during the course of the disease. In respect of *local* or general *depletions* nothing need be added to what has been already stated. The former of these should always be preferred when doubts are entertained as to the propriety of taking any considerable quantity of blood; and, in the sthenic form of the disease, may be resorted to at an advanced stage, particularly when the change in the expectoration, and other symptoms (§ 35.), indicate a return or exacerbation of the inflammatory action. *Blisters* are not admissible in the early stages of sthenic bronchitis. But, in the asthenic disease, or when inflammatory action and febrile heat have been subdued by depletions, &c., blisters are of much service, and may be applied either between the shoulders or on the breast; and, in some severe cases, re-applied or kept discharging for some time. In young children, and in adult or aged persons, when the secretion of the bronchial surface is profuse, and the powers of life much exhausted, I have derived more permanent advantage from the use of the rubefacient *liniments* in the Appendix (F. 295, 296. 311.), rubbed assiduously twice a day over the chest or back, than from blisters. When blisters are employed, much benefit will sometimes arise from removing them as soon as slight redness of the skin is produced, and covering the part with a large warm bread and water poultice, which ought to be frequently renewed; or by applying a succession of warm fomentations. In some extreme cases of this description, I have seen much advantage derived from applying over the epigastrium and lower part of the chest, a flannel wrung out of hot water, and immediately afterwards soaked with the spir. terebinth., and allowing it to remain until severe burning heat of the skin is produced by it. If suffocation be threatened either by the profuseness of the secretion, by its difficult expectoration, or by exhaustion of the vital energy; and if we be, as we then unfortunately are, at a loss for any probable means of success; this will sometimes have a remarkable effect, and save the life of the patient, particularly when assisted by the internal use of camphor, ammonia, &c. At the time of my writing this, a case occurred, attended by Mr. FAXON and myself, where immediate relief and a speedy recovery followed this almost *dernier ressort*. And I have often witnessed a similar result, in other most dangerous cases of this description, from the internal as well as the external use of this most valuable remedy, particularly at the Infirmary for Children, where I have for many years had recourse to it in cases of danger.

80. The *tepid bath*, or semicupium, will often be of service early in the disease; and in its course sponging the surface of the chest, or of the whole trunk, with warm water and vinegar, and afterwards with the warm nitro-muriatic acid lotion (F. 834.), particularly towards the decline of the disease, when we dread its lapsing into the chronic, and in the asthenic variety, will often prove of essential service. The common *beverage* of the patient during the treatment should be regulated according to the state of febrile action, and its compatibility with the treatment directed. Barley water, with any of the vegetable acids, tamarind water, or any of the formulæ or drinks (vide POTUS), contained in the Appendix, may be directed.

81. *B. Of the complicated states.* — *a.* Bronchitis is not infrequently associated, particularly at its commencement, with *sore throat*; inflammation existing not only in the *fauces*, but extending to the *pharynx*, and through the larynx down the trachea and bronchi. This state of disorder sometimes obtains in *scarlet fever*, forming a complication of remarkable danger. I have also observed it, in a very severe form, affect six members of one family, and three of another, both living in the vicinity of the metropolis, in a low damp situation, all of whom had long previously had scarlatina. In some of these cases the danger was great, and all were severe and of the asthenic type. Purgatives, first consisting of calomel and James's powder, and subsequently combined with stimulants and tonics, were actively exhibited. Demulcent linctures (see LINCTUS, in the *Appendix*), or astringent, cooling, and antiseptic gargles; external revulsants, and rubefacients; the inter-

nal exhibition of camphor, combined with antimonials, hyoscyamus, diuretics, and afterwards with ammonia, mild attenuants, expectorants, and tonics; the liquor ammoniæ acetatis, with infus. cinchonæ, spirit. æther. nit., or spirit. ammon. arom., &c., formed also the chief means of cure. All the cases terminated favourably.

82. *b.* When the disease is complicated with *scarlet fever*, the treatment will altogether depend upon the character of the prevailing epidemic, and the circumstances of the case. Early in the complication, local depletions are sometimes required; and afterwards, full doses of camphor or ammonia, or of both, — particularly if the eruption prematurely disappear, or present a dark tint, or if the anginous affection assume an ash-colour, or a dark red, or brownish hue, — are amongst the chief remedies to be depended on. I have met with severe cases in which the bronchial disease either preceded, or followed, the efflorescence and decline of the eruption in scarlet fever; and in the course of this association most violent cerebral symptoms have supervened; thus forming a double complication. These cases, although extremely dangerous, are not necessarily fatal. Local depletion, sometimes to a very considerable extent, may be practised, chiefly by leeches applied over the sternum, behind the ears, or below the occiput, or by cupping on the nape of the neck; and calomel, antimony, revulsants, purgatives, camphor, ammonia, &c., according to the circumstances of the case, should be prescribed. Counter-irritation by rubefacient liniments is particularly required in complications of the disease with scarlatina or measles. Formulæ No. 299. and 300. may be used for this purpose, or the following: —

No. 70. ℞ Camphoræ ʒj.; Pulv. Capsici ʒss.; Olei Macis ♏xxx.; Olei Olivæ ℥jss.; Liq. Ammon. ʒvj. Misce. Fiat Linimentum.

83. *c.* The appearance of the disease with *measles*, either previous to, in the course of, or subsequently to, the eruption; or even its accession during convalescence, is a very frequent occurrence. This association was very common in the winter and spring seasons of 1829, 1830, 1831, and 1832; during which epoch, blood-letting was not so generally indicated, nor so well borne, as in former years, the bronchial affection being more frequently of the asthenic stype. In general, however, local depletions are required early in the disease, and, in some cases, may be carried to a considerable extent; often much further than in its association with scarlatina. I have sometimes found it necessary to deplete locally in both these states of complication, at the very time when I judged it proper to exhibit camphor or ammonia in considerable doses. But in many instances, particularly during the years above specified, patients have recovered as readily when no sanguineous depletion has been employed, as where it has. Bronchitis occurring either in the course of scarlatina, measles, or small pox, requires active counter-irritation and revulsion; and the means recommended for this purpose (§ 79.) to be decidedly enforced. The observations I have already made respecting the use of inhalation (§ 76.) also apply to such cases. When these exanthemata commence with bronchial symptoms, *emetics* are then of decided advantage. And, if they be accompanied with sore throat, purgatives ought to be given in decided doses, the bowels freely acted upon throughout, and enemata occasionally thrown up, particularly F. 140. 149. 794.

84. *d.* When bronchitis occurs in the course of *continued fevers*, the same general principles of treatment are required, as have been specified in respect of scarlatina and measles. In all these states of complication, this disease should be viewed as a marked manifestation, in a particular organ, of the morbid state prevailing more or less throughout the frame; and it should be kept in recollection, that this affection always, in some measure, impedes the changes effected by respiration on the blood, thereby increasing the morbid condition of this fluid existing more or less in all severe cases of exanthematous fevers, and at least the disposition to it that obtains even in simple continued fever. The extent to which depletion should be carried in this complication, or the propriety of employing it at all must depend upon the character of the fever, of the prevailing epidemics, and the particular symptoms and circumstances of the case. I have seen a strong, and regular-living man, with fever thus complicated, very dangerously depressed by a single small depletion. Purgatives are, however, better borne, particularly when combined with camphor or ammonia; and occasional large doses of calomel combined with camphor, and followed in a few hours by a cathartic draught, will be found of much service in promoting the functions of the liver, and enabling it to remove those elements from the blood, which so readily accumulate in it to a hurtful extent, when their elimination by the lungs is impeded. Much advantage will also arise from the use of blisters applied for a few hours, and often repeated; from the use of the rubefacient liniments above specified; and from the inhalation of the vapour of warm water, with a solution of camphor in vinegar added to it.

85. *d.* The association of the sthenic form of bronchitis with *tracheitis* and *laryngitis*, either affection preceding the other, requires full depletion, general or local, or both; large and repeated doses of calomel, with antimony; the tepid or warm bath, semicupium; internal and external revulsion, by cathartics, purgative enemata, &c.; emetics, particularly when the paroxysms of suffocation and stridulous respiration are urgent; the inhalation of watery, emollient, and anodyne vapours; and a free use of diluents, emollients, &c., with the sub-carbonate of soda, the sulphuret of potash, small doses of the sulphuret of ammonia, or of the sulphuret of copper, in extreme cases, until nausea or vomiting is occasioned, &c. Blisters are seldom of much service in this state of disease, particularly whilst the symptoms of croup are present. They ought never to be applied over the throat, as occasionally directed, and, in some cases, not without mischief; although recovery has taken place in others, notwithstanding the risk they occasioned of increasing the local irritation.

86. *e.* One of the most frequent complications presented to us in practice is that of bronchitis with *hooping cough*. In some cases, this complication commences with the usual symptoms of catarrh, on which those of bronchitis supervene; the characteristic signs of hooping cough, particularly the convulsive fits of coughing, with the

inspiratory whoop, and vomitings, not appearing for some days subsequently. In other cases—and those, perhaps the most numerous,—the inflammatory affection has not appeared until after the invasion of pertussis. When thus associated, bronchitis may be either sthenic or asthenic; the one or the other being more generally prevalent in some seasons than in others. During the years specified above (§ 83.), the asthenic state was most common; and I have seen several cases in which sanguineous depletion had been injudiciously practised, particularly as respects quantity. Cerebral symptoms are apt to occur during this complication, and also infiltration or hepatisation of a part of the substance of the lungs. These unfavourable terminations should be anticipated and prevented by small local depletions, — by leeches applied behind the ears; by the exhibition of camphor combined with ipecacuanha or antimonials, and narcotics, particularly conium or hyoscyamus; by diaphoretics with diuretics; and more especially by the use of the liniments and revulsants already recommended (§ 79.). (See HOOPING COUGH.)

87. *f.* The simultaneous occurrence of inflammatory action in both the *digestive* and respiratory mucous surfaces is not infrequent, particularly in children; and means calculated to benefit the one, generally aggravates the other, or risks the accession of cerebral disease. I have found small local depletions, followed by the pulv. ipecacuanhæ comp., combined with small doses of calomel, or hydrarg. cum creta and camphor; the warm bath and frictions, with the stimulating liniments already specified (§ 79.); the application of blisters for a few hours only, and often repeated; the liq. ammoniæ acet., with spirit. æther. nit., camphor mixture, diuretics, &c., constitute the principal means of cure.

88. *g.* The association of *hepatic disorder* with bronchitis is not rare. But the affection of the biliary organs does not always precede the bronchial disease: it often occurs in its progress; an increased, as well as a morbid, secretion of bile supervening, probably in consequence of the vicarious increase of function of the liver, and its irritation by, and elimination of, the morbid elements accumulated in the blood owing to the impeded function of the lungs. This complication requires the use of mercurial purges combined with camphor and antimony, particularly James's or kermes powder (F. 637.); external irritants and revulsants, cathartic enemata (F. 151.), &c. A similar treatment is indicated when the disease is connected with the translation of erysipelas, gout, or rheumatism.

89. *h.* If the inflammation extend to the *substance of the lungs or pleura*, the antiphlogistic treatment should be rigorously enforced: the solution of tartarised antimony ought to be given in frequent doses, and carried as far as circumstances will permit; internal and external revulsants resorted to at the same time; and diaphoretics and diuretics suited to individual cases prescribed. In some instances, either *colchicum* or *digitalis*, or both, may be substituted for the antimony; but they answer better, particularly the digitalis, after this medicine has previously been used. If we have reason to suppose that *effusion of serum* has taken place in the thoracic cavities, diuretics, and, amongst others, digitalis, should be employed; recollecting, however, that the accumulative and sinking effects of either digitalis or colchicum sometimes appear very rapidly, and in an alarming degree, when they are given either at the same time or after the exhibition of tartarised antimony. Disease of the brain or its membranes supervening in the course of bronchitis has been considered in the article BRAIN (§ 186.).

90. The SUB-ACUTE FORM of bronchitis requires in all respects the same treatment as the acute uncomplicated disease, but not carried so far; the activity of the means should have due relation to the acuteness of the attack, and the effects they produce.

91. 2d. OF CHRONIC BRONCHITIS. — M. BROUSSAIS has very justly stated the indications of cure in chronic bronchitis to be, 1st, to diminish the general excitability, and to keep the circulation quiet; 2d, to solicit the excitement and the fluids to other organs, particularly towards the skin; and, to these I would add a 3d, namely, to restore the healthy tone and functions of the bronchial surface, by means which seem to have this effect either directly or indirectly. It is obvious, however, that the accomplishment of the first and second intentions have an indirect influence in bringing about the third.

92. *a.* General *blood-letting* is inadmissible in this state of the disease; and even local bleedings should in many cases be employed with caution. Cupping, however, to a moderate extent, is very frequently required; and it is evidently more advantageous to repeat the operation to a small extent, than to abstract a large quantity at once. When the disease has existed long, and is attended with a copious discharge, much general debility, and absence of pain upon full inspiration, even local depletion cannot be ventured on. Next in importance to depletion is *counter-irritation;* and for this purpose several means are presented to us. When there is a tendency to acute action, or when the cough is at all painful, and the sputum puriform, either the tartarised antimonial ointment, or a large issue or seton in the side, is preferable; but when there is very marked relaxation of the bronchial mucous surfaces, blisters, and rubefacients, or a succession of them, seem more appropriate. I have, however, found, in a number of cases, the *liniments,* No. 296, 297. 311. in the Appendix, productive of much greater advantage, and more generally applicable, than either blisters or the ointments. They may be employed once or twice daily. The vapour arising from them, and diffusing itself around, has also a direct and beneficial effect, by being inhaled, upon the diseased mucous membrane. M. BROUSSAIS is very favourable to the use of *setons* and *issues;* and I have seen several instances of marked benefit from them, particularly in the obstinate state of the disease which simulates tubercular phthisis. He also recommends warm cataplasms to the chest, made rubefacient by the addition of mustard. I have seen advantage produced by warm bread and water poultices applied over blistered surfaces, and the seats of issues formed by the mezereon bark, and by the same kind of poultices, to each of which one or two table-spoonsful of the nitro-muriatic lotion (F. 834.) had been added. But it is chiefly early in the chronic disease, or when it has recently passed into this state from the acute, that issues and setons prove successful. They exhaust the energies of the system too

much to be of service in the latter stages, or when the discharge from the lungs is profuse, and the vital energies much depressed.

93. *b.* *Expectorants* have been much employed in this state of disease; and though more appropriate in it, than in the acute, they are often hurtful from their too exciting operation on the vessels of the bronchial surface. This is especially the case with squills, ammoniacum, and senega, which ought to be used with much caution, and never whilst the sputum is purulent, and pain or soreness complained of in the chest, with fever, heat of skin, &c. The best expectorants are those which are also astringent, or at least not very heating: amongst these, the *sulphate* or *oxide of zinc*, with small doses of myrrh or galbanum, and extract of *conium;* or small doses of *sulphate of quinine*, or of the *sulphate of iron*, with *ipecacuanha* and opium; or the *sulphuret of potash*, and the *Balsamum Sulphuris* (F. 21, 22.), are the most eligible, when the state of the expectoration, of the skin, and pulse, indicates the propriety of having recourse to tonic expectorants. *Opium* has been too much reprobated in cases of this description, as well as in acute bronchitis, owing to the dogma that it suppresses expectoration. I believe, however, that, when judiciously combined, particularly with ipecacuanha, with the muriate of lime, or either of the sulphates of potash, of alumina, or of zinc; or with the nitrate of potash; with camphor, with kermes mineral, or James's powder, according to the circumstances of the case, it is a valuable medicine; and that the diminution of the expectoration produced by it, and which has been unaccountably dreaded, is, when it occurs, a consequence of its changing the morbid state of the vessels forming the excreted matter. If it be the object — as necessarily follows from the doctrine of some writers — to preserve a copious and free expectoration in this disease, how can it ever be cured? Frequently have I seen this end pursued, as if it constituted all that was required, and squills, ammoniacum, senega, &c. given accordingly; and the more abundant and easy the expectoration thereby produced, the more rapidly did the powers of life give way, or complete hectic, with all its attendants, manifest itself. The following have proved serviceable when the pulse was soft, and not remarkably frequent; the skin cool and moist; the sputum very abundant, and consisting chiefly of mucus; and the weakness and emaciation considerable: —

No. 71. Pulv. Ipecacuanhæ gr. j.; Camphoræ rasæ gr. ss.—j.; Extr. Conii gr. iv.—vj.; Mucil. Acaciæ q. s. M. Fiant Pil. ij. ter die capiendæ.

No. 72. ℞ Zinci Sulphatis gr. vj.; Massæ Pilul. Galban. Co. ℈j.; Extr. Conii ʒss.; Syrup. q. s. M. Fiant Pilulæ xij., quarum capiat unam tertiis horis.

No. 73. ℞ Pulv. Ipecacuan. Comp. gr. xxv.; Quininæ Sulphatis gr. vj.; Pulv. Acaciæ ℈j.; Extr. Lactucæ ℈j.; Syrup. Papaveris q. s. M. Fiant Pilulæ xviij., quarum capiat binas ter quotidiè.

No. 74. ℞ Quininæ Sulphatis gr. vj; Pulv. Ipecacuanhæ gr. iv.; Camphoræ rasæ gr. iv.; Opii Puri gr. vj.; Pulv. Rad. Glycyrrh. (vel Extr.) ʒss.; Mucilag. Acaciæ q. s. Misce benè, et fiant Pilulæ xx., quarum capiat binas ter quaterve quotidiè.

No. 75. ℞ Balsam. Sulphuris ʒss.; Pulv. Ipecac. gr. vj.; Extr. Conii ℈ij.; Pulv. et Mucilag. Acaciæ q. s. M. Fiant, secundum artem, Pil. xx., quarum capiat binas quartâ quâque horâ.

No. 76. ℞ Solut. Muriatis Calcis ♏ xx.—xxxv.; Mist. Camphoræ ʒx.; Tinct. Opii Comp. (F. 789.) ♏ x.—xx.; (vel Tinct. Camphoræ Comp. ʒjss.) M. Fiat Haustus ter die capiendus.

94. *c.* In cases of this description, any of the formulæ given under the head *Balsams*, in the Appendix, may be employed. Dr. Armstrong strongly recommended the balsam of copaiva in chronic bronchitis; but it is seldom beneficial, and is certainly inferior to the other balsams and terebinthinates in this affection (F. 486, 487. 538. 571.). In the more advanced stages of chronic bronchitis, particularly when the colliquative sweats or diarrhœa occur, the most essential benefit has been derived from the following mixture, in several cases in which I prescribed it; but even where the bowels are regular, I have found it by no means productive of costiveness. At the time that I was giving this medicine to the third patient on whom I had tried it, a case, showing the success of a nearly similar treatment, was published by Dr. Hastings (*Midland Med. Repor.* vol. ii. p. 376.), — a coincidence fully evincing the propriety of the practice.

No. 77. ℞ Mist. Cretæ ℥vjss.; Vini Ipecac. ʒjss.; Tinct. Opii ʒj.; (vel Tinct. Camphoræ Comp. ʒvj.); Syrup. Tolutan. ʒiij. M. Capiat Cochlearia duo larga ter quaterve in die.

The cretaceous mixture will often be of service when used alone, or with a little of the muriate of lime, or with the addition of mucilage, or of hyoscyamus, or conium, or extr. lactucæ, or the extr. papaveris, according to circumstances. In this state of the disease, also, I have seen *sulphur* given with advantage in mucilaginous electuaries. Dr. L. Kerckhoffs states, that he has administered it with success, in conjunction with the powder of the white willow bark. M. Broussais relies chiefly upon *mucilages* and demulcents, combined with ipecacuanha and opium, and certainly with great justice. (See F. 284, *et seq.*). The extr. lactucæ, as recommended by Dr. Duncan, may occasionally be substituted for the opium. The decoctions of *Iceland moss*, and the infusions of *conium*, of *marrubium*, of the *uva ursi*, or of the *melissa* (F. 230. 237, 238. 245. 267.), with mucilages, anodynes, and ipecacuanha, are also very serviceable. I have given the preparations of *iodine* in a few cases, in small doses; and, in some instances, especially when there was little or no febrile action, nor much emaciation, benefit appeared to be derived from them.

95. *d.* When the disease is attended with dyspnœa, and profuse or difficult expectoration, *emetics* are of great, although often of temporary advantage, particularly in aged persons. Ipecacuanha, or sulphate of zinc, with the addition of diffusive stimulants (F. 402.), are the most appropriate in the majority of cases. After their operation, and if the strength be not very much reduced, the *digitalis* or *colchicum* may be prescribed, in conjunction with diuretics and gentle astringents (F. 203.). These active medicines are chiefly suited to the more febrile states of the disease, or when soreness or slight pain of chest are complained of, with a puriform expectoration; and are best combined with small doses of blue pill, camphor, and opium, — with pectoral *infusions* and *mixtures* (see App. F. 244. 426. 497.) with demulcents (F. 389.), and with diuretics (F. 194, 195. 236, 237.). Dr. Hastings recommends a combination of digitalis and colchicum; but I have seen more harm than benefit occasioned by it in some cases of chronic bronchitis, — a result which might, *à priori*, be expected from the associated operation of two most depress-

ing medicines, given in a state of disease characterised by irritative, rather than by acute, vascular action. I have found them most beneficial when exhibited singly with diuretics, or diaphoretics, in the chronic forms of bronchitis consecutive of exanthematous fevers (§ 54.); sometimes resorting also to the warm bath, followed by frictions of the surface with the liniments F. 297. or 311. The combination of colchicum and digitalis, in small or moderate doses, has proved more serviceable, in my practice, in tubercular disease of the lungs, or when bronchitis has been complicated with tubercles. In cases where the propriety of giving these medicines is doubtful, a combination of them with the alkalies, or their carbonates, and with tonic infusions or decoctions, or F. 515—517., or the following, may be prescribed: —

No. 78. ℞ Pulv. Colchici (vel Pulv. Digitalis) gr. j.—ij.; Massæ Pilul. Hydrarg. gr. ij.; Massæ Pilul. Galban. Comp. gr. v.; Extr. Opii gr. ss.; Syrup. q. s. M. Fiant Pil. ij. bis terve quotidiè sumendæ.

No. 79. ℞ Infus. Uvæ Ursi ʒ xij.; Acidi Sulph. Dil. ♏ xx.; Tinct. Digitalis ♏ x.—xv.; Tinct. Camphoræ Comp. ʒ j.; Syrup. Papaveris ʒ ss. M. Fiat Haustus, bis terve in die sumendus.

No. 80. ℞ Sodæ Sub-carbon. (vel. Liq. Potassæ) ʒ j.; Infus. Calumbæ (vel Decocti Cinchonæ) ℥ vj.; Tinct. Colchici Semin. ʒ j.—ʒ jss.; Tinct. Digitalis ♏ xxx. M. Capiat Coch. ij. larga ter in die.

No. 81. ℞ Mist. Diosmæ Crenatæ (F. 396.) ℥ vss.; Tinct. Digitalis ♏ xxxv. (vel Tinct. Semin. Colchici ʒ j.—ʒ ij.); Extr. Conii gr. xxvj. (vel Extr. Lactucæ ʒ ss.); Syrup. Tolutan. ℥ ss. M. Fiat Mist., cujus sumat Coch. ij. larga ter quaterve in die.

No. 82. ℞ Pulv. Acaciæ ʒ ij.; Mist. Amygdal. Dulc. et Camphoræ āā ℥ iijss.; Acidi Hydrocyanici ♏ vj.—xij; Spir. Æther. Sulph. Comp. ʒ ij.—iij.; Oxymellis Scillæ ℥ ss. M. Coch. ij. vel iij. larga ter in die.

96. *Prussic acid* is often of much service in the chronic forms of bronchitis, especially in their *complications* with disorder of the digestive organs, and may be exhibited with demulcents, gentle tonics, astringents, or expectorants, or as prescribed in the Appendix (F. 344. 858.). When the disease is associated with derangement of the hepatic functions, or even of the stomach and bowels, it will be necessary to give small doses of blue pill, or of the hydrarg. cum creta, with deobstruents and gentle tonics; and, on some occasions, full doses of calomel from time to time, either alone, or in suitable forms of combination, followed by a purgative.

No. 83. ℞ Pilul. Hydrarg. gr. vj. (vel. Hydr. cum Creta gr. xviij.); Pulv. Ipecacuanhæ gr. viij.; Extr. Sarsæ et Ext. Taraxaci āā ʒ j.; Gum. Assafœtidæ et Saponis Castil. āā ℈ j. M. Fiant Pilulæ xlviij., quarum capiat binas ter quaterve in die.

No. 84. ℞ Hydrarg. Submur. gr. vj.; Kermes Mineral. gr. xij.; Camphoræ rasæ gr. xij.: Extr. Taraxaci ʒ ijss.; Extr. Humuli ʒ jss. M. Divide in Pilulas lxiv., quarum capiat ij. vel iij. ter quaterve in die.

97. The treatment which has been already recommended for *Humoral* ASTHMA (*see particularly* § 100, *et omn. seq.*), and the tonics and astringents, especially the sulphates of zinc, iron, or quinine, already noticed (§ 93.), are applicable, with but little variation, to the more chronic and humoral states of the disease, especially in persons advanced in life, and in children, when it has assumed a chronic form after hooping-cough and the exanthemata. I have also occasionally seen benefit derived, in these states of chronic bronchitis, from the *chlorate of potash*, given to adults, in from two to six grains, three or four times a day. This medicine was often prescribed by myself and one of my colleagues, at the Infirmary for Children, during the years 1826 — 1828, and subsequently, in the more chronic forms of bronchitis, and in various disorders of debility; in which latter it was generally beneficial: but little advantage was frequently derived from it in this disease, unless in those forms of it now mentioned, where it was often of great use, particularly when the morbid action seemed connected with deficient tone of the bronchial vessels, and of the system generally. Mr. MURRAY, in a recent publication, states, that he has employed it successfully in consumption, — a name which has usually comprised most of the cases of this form of bronchitis.

98. *e. Inhalations* of medicated or tar vapours have been recommended by CRICHTON, PAGENSTECHER, HUFELAND, FORBES, HASTINGS, ELLIOTSON, GANNAL, and others noticed in the article on *Asthma*, and been disapproved of by some. I believe that they have frequently been used in too concentrated a state; or too much of the vapour has been diffused in the respired air, occasioning irritation of the bronchial membrane, instead of a gently tonic and healing effect. Whenever any of the vapours advised in this disease produce an increase of the cough, either its use should be left off, or its strength greatly reduced. The manner of having recourse to such vapours, as well as the choice of substances emitting them, have not, in my opinion, always been judicious. The tar vapour is occasionally of service, chiefly from the quantity of turpentine it contains; while the acrid empyreumatic fumes which it also emits, counteract whatever good effect the former constituent might produce. Would it not, therefore, be preferable to try the effects of the substance from which the advantage is obviously derived? I have done so in a few cases of this disease, and seen marked benefit result from it; and therefore recommend it to the notice of other practitioners. In former times, medication by fumigations and vapours was much resorted to; and it is probable, that the early use of incense and various balsamic and aromatic fumes in religious rites had some relation to their prophylactic effect against disease, or even to their curative influence; the more especially, as the priests of antiquity also exercised the healing art. In several of the productions attributed to HIPPOCRATES, the inhalation of vapours and fumes of various resinous and balsamic substances is recommended; and a number of writers in the 16th, 17th, and 18th centuries, have advised a nearly similar method, and employed camphor, benzoin, amber, frankincense, myrrh, storax, assafœtida, sulphur, cloves, the balsams, &c. for this purpose. This practice was employed by BENEDICT (see his *Theatrum Tabidorum*) in consumptive diseases: and BOERHAAVE gives several formula, in his *Materia Medica*, for fumigations with the above substances. MEAD, in his *Monita et Precepta*, offers several judicious remarks on this subject. He observes — "that fumigations with balsamics, &c. is of vast service in some cases: which is to be done by throwing the ingredients on red coals, and receiving the fumes through a proper tube directed to the windpipe." After noticing the undeserved neglect of this practice, and the propriety of thus applying medicinal substances directly to the seat of disease, he states, that the smoke of the balsam of Tolu conveyed into the lungs, or the smoking this substance like tobacco, is of signal service in

diseases of this organ. (p. 58.) It appears from the writings of Fracastori that the fumes of cinnabar were much employed by inhalation in the treatment of the constitutional forms of syphilis, at an early period of the history of that disease, when it assumed a pestilential form.

99. Notwithstanding the unsuccessful attempts of Beddoes to revive the practice, by employing the elementary and permanently elastic gases, but according to views too exclusively chemical, the practice of inhalation has long been neglected, or undeservedly fallen into the hands of empirics. Very recently, however, it has been brought again into notice by M. Gannal, Mr. Murray, and Sir C. Scudamore; and *chlorine gas*, the fumes of *iodine*, and watery vapour holding in solution various *narcotics*, have been recommended to be inhaled. I have tried those substances in a few cases of chronic bronchitis; but in not more than two or three cases of tubercular phthisis. The chlorine was used in so diluted a state as not to excite irritation or cough. The sulphuret of iodine, and the *liquor hydriodatis potassæ concentratus* (F. 328.) were also employed; one or two drachms of the latter being added to about a pint of water at the temperature of 130°, and the fumes inhaled for ten or twelve minutes, twice or thrice daily. The tinctures or extracts of hyoscyamus and conium, with camphor, added to water at about the above temperature, were likewise made trial of; and, although the cases have been few in which these substances have been thus used by me, yet sufficient evidence of advantage has been furnished to warrant the recommendation of them in this state of the disease.

100. *Inhalations* also of the fumes of the *balsams*, of the *terebinthinates*, of the odoriferous *resins*, &c. are evidently, from what I have seen of their effects, of much service in the chronic forms of bronchitis: and I believe that they have fallen into disuse, from having been inhaled as they arise in a column or current from the substances yielding them, and before they have been sufficiently diffused in the air. When thus employed, they not only occasion too great excitement of the bronchial surface, but also intercept an equal portion of respirable air, and thereby interfere with the already sufficiently impeded function of respiration. M. Nysten has shown (*Dict. des Scien. Méd.* t. xvii. p. 143.) that ammoniacal and other stimulating fumes, when inhaled into the lungs in too concentrated a state, produce most acute inflammation of the air-tubes, generally terminating in death; and refers to a case in which he observed this result from an incautious trial of this practice. I conceive, therefore, that the vapours emitted by the more fluid balsams, terebinthinates, the resins, camphor, vinegar, &c., and from chlorine and the preparations of iodine, should be more diluted by admixture with the atmosphere, previously to being inhaled, than they usually are. According to this view, I have directed them to be diffused in the air of the patient's apartment, regulating the quantity of the fumes, the continuance of the process, and the frequency of its repetition, by the effects produced on the cough, on the quantity and state of the sputa, and on the respiration. The objects had in view have been gradually to diminish the quantity of the sputum, by changing the action of the vessels secreting it; without exciting cough, or increasing the tightness of the chest, or otherwise disordering respiration. From this it will appear, that the prolonged respiration of air containing a weak dose of medicated fumes or vapours, is to be preferred to a short inhalation of them in their more concentrated states. The want of success which Dr. Hastings and others have experienced, evidently has been partly owing to the mode of administering them, and partly to having prescribed them inappropriately. When the patient complains of acute pain in any part of the chest, as in some of Dr. Hastings's cases, they are as likely to be mischievous as beneficial. Where benefit has been obtained, it will be found that it was when the fumes of the more stimulating of those substances were diffused, in moderate quantity, in the air of the patient's apartments; or when he passed, at several periods daily, some time in a room moderately charged with the vapour or fumes of the substance or substances selected for use. (*See the remarks on Inhalation in Humoral* Asthma, § 88. *for an account of various medicines that may be employed in this manner.*)

101. *f. Sponging the surface of the chest*, and trunk of the body, first with tepid, and afterwards with cold lotions, has often been practised by me with advantage in several states of this disease. When the expectoration has been profuse, the debility great, and little or no febrile heat present, I have preferred for this purpose the nitro-muriatic acid lotion (F. 834.), in a warm or tepid state, night or morning, or both. When the disease is more active, the habit of body being, nevertheless, relaxed and debilitated, a solution of common salt in water, or the lotion, ℞ 54., seems preferable; and the directions given respecting this treatment in the article Asthma (§ 116, 117.) should be strictly followed. I have observed much benefit derived from the application, for a considerable time, of one of the plasters, F. 111. 115. 118, 119., between the shoulders; whilst cold sponging the anterior of the trunk with the lotions referred to has also been directed.

102. *g.* The *complications of chronic bronchitis* require generally no particular modification of treatment from that now detailed: indeed, some of them have been already noticed. I may, however, add, that, in the chronic asthenic states of the disease frequently met with in aged persons, and often occurring in children after exanthematous diseases, hooping-cough, and bowel complaints, the flowers of *sulphur*, the preparations of *zinc*, the oxide of *bismuth*, and the *chlorates* of *potash* and of *lime*, have severally been of great service, especially when combined with narcotics — with opium in the aged, and conium in the young, — their constipating effects upon the bowels being duly obviated by the occasional exhibition of purgatives. The chronic bronchitis complicated with, or consecutive of, hooping-cough, the characteristic cough of the latter either still continuing, or having altogether disappeared, is frequently attended with *dilatation* of the bronchi. In these cases, balsams, inhalation, the use of tonics, particularly the sulphate of iron, quinine, the liniments already noticed, frequent doses of sulphur, or moderate doses of

the chlorate of potash, are required. If the child be not very young, either of these latter may be combined with belladonna, or with conium, and given in honey or syrup of squills; or with simple syrup, sugar, powdered liquorice root, or with the compound tragacanth powder. When the disease is associated with chronic irritation of the mucous surface of the bowels, the chlorate of lime will be of much service, and will soon restrain the latter affection; the use of the *liniments* already recommended (F. 296. 311.), in addition, generally contributing to cure the bronchial disease. Either of these liniments has often been sufficient of itself to remove all disorder, both in the consecutive states, and in the different complications noticed at this place; and, when bronchitis seems to have a tendency to terminate, or has actually terminated, in effusion, they have powerfully assisted the treatment. When, however, dropsies supervene, in addition to them, colchicum or digitalis, with astringent tonics; squills, with blue pill, taraxacum, or extract of sarsaparilla; the preparations of *iodine*, alone or with narcotics; supertartrate of potash, with the sub-borate of soda, particularly this last; and various other diuretic and deobstruent medicines in different forms of combination — of which numerous examples are given in the *Appendix* — and the general plan of treatment recommended in the article Dropsy; should be employed.

103. *C. The regimenal treatment* of bronchitis requires strict attention. — *a.* In the *sthenic acute* disease it should be strictly antiphlogistic; and, at the commencement of convalescence, a farinaceous diet adopted, until out-of-door exercise may be taken, or shortly before. In the *asthenic states* of acute bronchitis, this regimen is chiefly applicable to the commencement of the disease: subsequently, nourishment in small quantities, suited, in kind and frequency of partaking of it, to the state of the symptoms, the powers of the digestive organs, and feelings of the patient, should be permitted; and even animal food of a digestible nature, in moderate quantity, may in some cases, particularly in the aged, be permitted once a day. The decoction of Iceland moss, jellies, mucilaginous and emollient soups; shell-fish; the different kinds of white fish, dressed either with sweet oil or the oil obtained by boiling their fresh livers; the lighter kinds of animal food; and, in the case of infants, attention to the milk of the mother, or a healthy wet-nurse; are all occasionally of service during early convalescence from the *acute* forms of bronchitis, and in the progress of the more febrile states of the *chronic* disease. In the more asthenic cases of this latter, or when the expectoration is profuse, the skin cool and moist, and the habit of body lymphatic, relaxed, or wasted, animal food, especially fresh beef or mutton, underdone, and in moderate quantity; new-laid raw eggs; or a due proportion of digestible and stimulating food; will be found most serviceable. In nearly all the *chronic* states of the disease, particularly in their advanced stages, a light nutritious diet is necessary.

104. *b.* The patient's *beverage* should receive particular attention. Lemonade, imperial, barley-water, and the cooling and aperient drinks prescribed in the Appendix (F. 588—595. 916.), should be employed in the sthenic form of the acute disease. In the asthenic and chronic states, the red Bordeaux wines, or the wines of Burgundy — the former generally reduced by one third or one half water; or beer or ale, also reduced, to which a little of the liquor potassæ, or of Brandish's alkaline solution, has been added, may also be tried at meals; and either of these, or of the more cooling beverages, adopted, that may be found to agree best with the patient. If the disease evince a disposition to terminate in dropsy, the imperial drink, with the addition of a little borax, or F. 590, 591., will be most serviceable. In the advanced period of *chronic*, or during convalescence from *acute*, bronchitis, the sulphureous mineral waters will often be beneficial. Those of Harrowgate, Leamington, or Moffat, may be tried; or of Enghein, Bonnes, Barèges, or Cauterets (Roche); or the artificial waters of Ems or Carlsbad.

105. *c.* Few diseases are more benefited than chronic bronchitis by *change of air.* A residence on the southern coast, particularly at Torquay, and in various other parts of Devonshire, during the winter and spring months, guarding against vicissitudes of climate, — which, however, is milder and less variable in this part of the island than any where else; wearing flannel next the skin, especially during winter and spring; gentle exercise on horseback, or the use of the swing; and constant attention to the state of the bowels; are severally of great importance. During the progress of convalescence, as well as in the earlier stages of disease, particularly if the secretion from the bronchi continue, it will be necessary to resort occasionally to an emetic; and in a day or two subsequently, notwithstanding the bowels may be freely open, to an active cathartic. In these cases, the addition of a vegetable bitter or tonic to a purgative medicine, — as the sulphate of quinine to aloes, or the infusion or extract of gentian to senna, — will have a decidedly cathartic operation, without lowering the energies of the frame. There are few diseases more benefited, either in their progress or decline, than those now discussed, by active purging; but it will often be requisite to combine the purgatives with stimulants or tonics, in order that an active or continued operation on the bowels may not exhaust the patient. During convalescence, the free use of purgatives requires a liberal and invigorating diet.

106. V. Dilatation of the Bronchi. — The *anatomical characters* and *physical signs* of this change of the bronchi have been already described (§ 19.). It is almost entirely a consequence of, or an attendant upon, the more chronic cases of bronchitis, or of hooping-cough complicated with bronchitis. The expectoration, besides being copious and puriform, is often fœtid, — a diagnostic symptom of this alteration, without which, M. Louis, and other pathologists, who have devoted much attention to pulmonary diseases, have sometimes failed of distinguishing it from phthisis.

107. The Treatment of this alteration is nearly the same as that which has been recommended in the more chronic states of bronchitis. The means which are especially indicated consist of the *inhalation* of balsamic and terebinthinate fumes; of those of chlorine, iodine, &c. (§ 99, 100.); the internal use of balsams, tonics, and bitters, particularly the sulphates of quinine, or of zinc, or iron;

and other preparations of cinchona or steel; with the use of the liniments already noticed (§ 102.); or the nitro-muriatic lotion on the chest. The chlorate of potash, or of lime, seems indicated in this form of the disease. An open state of the bowels, an occasional cathartic, nutritious diet, and change of air, are also evidently required. In other respects, the treatment already detailed (§ 101, *et seq.*) may be followed; or modified according to the peculiarities of the case.

108. VI. ULCERATION OF THE BRONCHI (see § 7, 8.) is another alteration which is produced by, or is attendant on the advanced stages of, chronic bronchitis; most frequently, however, when complicated with tubercular phthisis. It is not infrequently met with, particularly after bronchitis occasioned by the mechanical irritation of mineral, vegetable, or animal molecules. The existence of ulceration, when seated in the bronchi, is not indicated by any sign in addition to those which accompany the most chronic states of bronchitis, or tubercular disease, when it arises from, or is complicated with, this change. When affecting the LARYNX or TRACHEA (see these articles), it may frequently be suspected, or occasionally prognosticated. In a case which occurred in the trachea, a prognosis to this effect was given by me long before death.

109. The TREATMENT of this lesion, even could its existence be ascertained during life, cannot be different from that required in some other states of chronic bronchitis. That ulceration may take place in the bronchi, and heal, as evinced by the appearance of cicatrices, has been ascertained by M. LAENNEC, and other pathologists. In addition to the means of cure already described, the establishment of local drains of the most active kind is obviously required. Blisters and issues applied to a distant part have not been found of use by M. LAENNEC. He prefers the repeated application of small moxas as near the seat of disease as possible, and the preservation of absolute rest and silence. The inhalation of emollient, anodyne and balsamic vapours and fumes may likewise be tried; and, if the disease be devoid of marked febrile excitement, the expectoration abundant, and the powers of life consequently reduced, the treatment advised for dilatation of the bronchi (§ 19.) may be employed in all its parts. (For the *treatment* of other organic changes of the air-passages, see arts. CROUP, LARYNX, LUNGS — *Hæmorrhage from*, and TRACHEA).

VII. BRONCHIAL FLUX. — *Bronchorrhœa* (from Βρόγχος and ῥέω.) SYN. *Bronchorrhée* (Roche). *Catarrhe Pituiteux* (Laennec). *Mucous Flux.*

CLASSIF. I. CLASS, III. ORDER (*Author*).

110. DEFIN. *A flux of watery mucus, or phlegm, from the chest, with more or less cough, but without fever; frequently occasioning exhaustion.*

111. This affection varies considerably. It is often a variety of chronic bronchitis; being consecutive of it in persons advanced in life, or those of a relaxed and phlegmatic or pituitous habit of body. In other cases it appears from the commencement, or consecutively of slight catarrh, as intermediate between chronic bronchitis and humoral asthma. This appellation may, upon the whole, therefore, be viewed as applicable to those cases which are attended with a more abundant, fluid, and transparent expectoration, than is observed in chronic bronchitis, and are devoid of fever and all other signs of inflammatory action; whilst they are equally without the severe dyspnœa, the paroxysms of suffocation and cough, and the intermissions, characterising humid asthma.

112. Bronchorrhœa proceeds generally from similar *causes* to those which produce common catarrh, or bronchitis, even although it be not consecutive of some one of the forms of bronchial inflammation. It is very frequently, either at its commencement, or recurrence, connected with cold and moist states of the atmosphere, or occasioned by exposure to cold in some one or other of its forms. When it occurs as a sequela of bronchitis, it may be viewed as arising from lost tone of the vessels and of the bronchial surface, the flux or determination to this part still continuing, from peculiarity of habit or some other cause, after all inflammatory and febrile symptoms have been removed. Thus it is very frequent in aged persons of relaxed fibres, who have experienced repeated attacks of pulmonary catarrh.

113. *Diagnostic symptoms.* — Bronchorrhœa may be distinguished from chronic bronchitis, tubercular phthisis, and humoral asthma, by the following characters: — The quantity of fluid expectorated is very great; being, in some cases, as much as four or five pounds in the twenty-four hours. The sputum is colourless, ropy, transparent, slightly frothy on the surface, and resembling the white of egg mixed with water. It is without the thickened sputa generally accompanying chronic bronchitis. There is considerable dyspnœa, but the chest sounds well throughout upon percussion; and the cough is slight comparatively to the quantity of the expectoration, being evidently no more than is occasioned by the discharge of the secreted fluid. The pulse and temperature of the skin are natural, and there are no night sweats. The appetite is generally unimpaired; and emaciation is not remarkable, or not at all observed, unless the quantity of the sputum be extremely great. M. NAUCHE states, that the expectoration in this state of disease is always more or less acid, and reddens turnsole paper, whilst that proceeding from inflammatory action restores the blue tint to this paper after being reddened by acids. *On auscultation*, the respiratory murmur is commonly weak, but is very rarely suspended. The sibilous rhonchus is heard more or less distinctly, and often mixed with the sonorous, and occasionally with the mucous rhonchus, the bubbles of which seem to burst upon the surface of a fluid of less consistence than in bronchitis.

114. Bronchorrhœa usually commences with catarrhal symptoms, and frequently without fever. In other cases, after bronchitis has continued chronic for a longer or shorter period, the expectoration becomes less consistent and less opaque, more abundant, and similar to that described; and the affection becomes established, — aggravated at times by disorder of the stomach or bowels, or by changes of the air, especially by cold and moisture, or by arrest of the cutaneous transpiration from any cause, — and ameliorated at other times by a warm dry air, an open state of the bowels, and light nourishing diet, taken in

moderate quantity. Vacillating in this manner, the disease may continue for years if it be not severe, without materially affecting the strength. But more frequently the discharge increases, after irregularly prolonged, and more or less slight intervals; the patient loses his flesh, and becomes paler; his strength is impaired; dyspnœa increases; and, in some cases, the affection either runs into humoral asthma, or the quantity of expectoration is augmented so as to exhaust his energies, and to occasion suffocating paroxysms of cough. In rarer cases, the quantity of the bronchial discharge has been so great as to occasion the exhaustion and death of the patient. M. **Andral** has detailed two cases of this description, wherein, upon *dissection*, no evidence of inflammation or congestion could be found in the air-tubes. M. **Roche** has described, what he has designated an acute form of this affection, which other French pathologists have named *catarrhe suffocant*; but it differs in no respects from the more humoral states of asthma, described in its more appropriate place, and presenting all the symptoms of spasm of the air-passages, with a copious viscid expectoration; the spasm and other symptoms subsiding after the bronchi and trachea are unloaded of the secretion accumulated in them. Bronchorrhœa has, in rare instances, been the means of removing other diseases. M. **Andral** states that he has seen hydrothorax disappear after the establishment of a copious bronchial flux.

115. **Treatment.** — After the full exposition that has been given of the means of cure in the different states of chronic bronchitis, to some of which bronchorrhœa is closely allied, it will be sufficient to enumerate succinctly the various means which are applicable to this affection. As the disease essentially consists of an increased secretion and exhalation from the respiratory mucous membrane, with a determination of the circulation to that quarter, and deficient tone of the vessels distributed to it, the obvious *indications are*, to increase the secretions from other surfaces and organs, thereby to derive from the lungs, and to restore the lost tone of this membrane and its vessels. In some cases, accordingly, it will be advantageous to commence with an ipecacuanha or sulphate of zinc *emetic*, and afterwards to act freely upon the secretions and alvine excretions by purgatives. I have never seen a case of the disease which has not been much relieved by purgatives; taking care, however, that they should not lower the energies of the constitution, by combining them with tonics, bitters, or stimulants, and allowing sufficient light nourishment to admit of this mode of derivation being satisfactorily employed. In the intervals between the exhibition of purgatives, diuretics and diaphoretics may be exhibited, and the cutaneous functions promoted by wearing flannel next the skin during the winter and spring months.

116. *Expectorants* are very much employed in this affection; but some of this class of medicines are seldom of benefit in it, unless combined with opium. The *balsams* and terebinthinates (F. 484—487. 489.); the sulphate of zinc, with myrrh, or the compound galbanum pill; and either of these, with camphor and opium; are often of service. In addition to these, *inhalations*, as recommended in another part (§ 99, 100.), may be employed. Although astringents and inhalations are often required, yet we should be cautious in using them when the disease has been of very long continuance, particularly in persons advanced in age, or when there is any irregularity of the action of the heart, or physical sign of organic change about this organ, complicated with it; inasmuch as the arrest of an habitual discharge will, in such circumstances, risk the supervention of effusion in the cavities of the thorax. It will be more judicious, in these cases, to confide in purgatives combined with bitter tonics; in diuretics, and in diaphoretics, so as to moderate the discharge, and prevent its increase, or its exhausting effects upon the system. At the same time the vital energies should be promoted by a light nutritious diet, moderate exercise, and change of air, with the sulphureous or gently tonic mineral waters. In other cases, where the age of the patient, the regular or healthy state of the heart's action, the absence of leucophlegmasia, and the circumstances of the case altogether, are such as to preclude dread of the consequences of suppressing this discharge, cold sponging the surface of the body by the nitro-muriatic lotion, &c. (§ 101.), and the liniments already noticed (F. 296. 311.), with the internal use of the more astringent tonics, particularly the sulphates of iron or of quinine, in addition to the measures already recommended, may also be practised.

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BRONCHOCELE (from Βρόγχος, throat, and κήλη, a swelling). SYN. *Hernia Gutturalis, Gossum, Luftröhrenbruch, Kropf*, Ger. *Goître*, Fr. *Broncocele, Gozzo*, Ital. *Thyrophraxia*, Alibert. *Cynanche Thyroidea*, Conradi. *Goître*, "*Derbyshire Neck.*"

CLASSIF. 4. *Class*, Local Diseases; 6. *Order*, Tumours (*Cullen*). 6. *Class*, Excernent Function; 1. *Order*, Affecting the Parenchyma (*Good*). IV. CLASS, IV. ORDER (*Author*, see *Preface*).

1. DEFIN. *Chronic enlargement of the thyroid gland, sometimes with change in the surrounding parts, generally increasing slowly, often continuing for years, and depending upon constitutional causes.*

2. I. CAUSES, AND MORBID RELATIONS. — This disease is *endemical* in Derbyshire, and some other parts of this country; but most remarkably so in Switzerland, various adjoining districts, and in some places in South America. It usually occurs during the early epochs of life, most frequently about the period of puberty, in persons of a weak and lax fibre, and generally in females; it very seldom being observed in Great Britain in males: but the comparative frequency of it in the latter sex is greater in Switzerland, and other parts where it is very prevalent, and is connected with cretinism. In a considerable number of cases which have come before me in females, I have never met with any before the period of commencing puberty, — not even at the Infirmary for Children; although the menses have often been delayed for a year or two, or even longer, when the tumour has appeared at this epoch; and I have seldom observed an instance in this sex unconnected with some kind of irregularity of the menstrual discharge, or disorder of the uterine functions. In two cases, occurring in married females, who were under my care, unhealthy or irregular menstruation had existed during the continuance of the goître; in one case for eight years, in the other for five: upon its disappearance, pregnancy took place in both. Suppression of the menses has sometimes caused its sudden appearance and rapid developement; and it more rarely has originated during pregnancy and the puerperal states. Authors have adduced conclusive proofs of its occurrence hereditarily, independently of endemic influence.

3. Dr. GOOD has attributed the disease, in a great measure, to poverty, and the nature of the food: the rich being exempt from it. This is, however, very far from being the case. I have seen several cases of bronchocele in the richest in this metropolis. He is also wrong in attributing it to the use, in Derbyshire, of *oaten cakes*. In Scotland, where this article of diet is in general use, bronchocele is rare.

4. That it chiefly depends upon certain physical causes is shown by its prevalence in certain districts in preference to others, and by the circumstance of its disappearance when persons affected by it endemically have changed their residence. M. ALIBERT mentions his having seen it disappear after a residence in Paris. It has been very generally imputed to the water used by those affected. Since the time of PLINY, it has been attributed to the use of snow water. But it prevails in several places where this cause does not exist, as in Sumatra, and several parts of South America. The Swiss who drink snow water are free from the disease, while those who use hard spring water are most commonly affected. Captain FRANKLIN states, that at a part in his journey to the Polar Sea, where bronchocele prevails, it is confined to those who drink river water, and that those who use melted snow escape. Mr. BALLY ascribes its frequency, in a district in Switzerland, to the use of spring water impregnated with calcareous or mineral substances; and he states, that those who use not this water are free from both goître and cretinism. Dr. COINDET observed that the inhabitants of Geneva, who drink the hard pump waters, are those most liable to bronchocele. Its prevalence in Nottingham is ascribed by Dr. MANSON to the same cause; which also seems to occasion it in Sussex and Hampshire, in the valleys of which counties it is frequently met with.

5. That this is, however, not the only cause, may be inferred from other physical circumstances connected with its endemical prevalence. Its great frequency in low, moist, marshy, and warm valleys, and the exemption of the inhabitants of dry and elevated situations, have been shown by LARREY, FODÉRÉ, SAUSSURE, REEVES, CLARK, VALENTIN, POSTIGLIONE, and J. JOHNSON, as respects various districts in Switzerland, the Tyrol, Carinthia, the Vallais, and the north of Italy. Similar facts have been adduced by Dr. GIBSON, and HUMBOLDT, in regard to the United States, and South America. It is most probable, however, that the exhalations from the soil of those localities are not the only, but a concurrent cause, cooperating with others possessing equal influence in the production of the disease, and particularly with the nature of the water. But it as certainly sometimes appears where neither of those causes can be traced, as in London; disorder of some kind in the uterine functions being the most frequent morbid relation it has presented, as far as my experience has gone. Its connection with cretinism in the districts on the Continent above alluded to, and the occasional appearance of the disease at very early periods of life — it being even sometimes congenital, in these countries, as well as being more common there in the male sex than in this country — are matters of some interest, and not readily admitting of explanation; since poverty, close, confined, and ill-ventilated apartments, are not the chief causes of those phenomena, as shown by their absence in the poorest classes in this metropolis. Dr. PARRY has seen goître follow diseases of the heart, and epilepsy. FLAJANI has noticed the common occurrence of palpitations and affections of the lungs from the disorder it has occasioned of the respiratory function. When the tumour is very large, or hard, or when it has increased suddenly, it not infrequently occasions most urgent symptoms, by its pressure on the trachea, œsophagus, and jugular veins.

6. As respects the *external and internal apr*

ances of this tumour, I may briefly observe that it affects generally the whole gland; but is also sometimes confined to the lateral or to the middle lobes: it is more rarely larger on one side than another. At first it is commonly compact, rounded, and equal; but, as it increases, it is either soft and flabby to the touch, or unequal, irregular, hard, and obscurely lobulated. It is usually free from pain, and is not discoloured. When it is greatly increased in size, and is soft, it appears pendulous, chiefly owing to its lower parts being most enlarged. When the tumour is divided, the cells of the gland are found, according to Hunter, Baillie, and B. Bell, filled with a more or less viscid fluid; and are of various sizes, generally from that of a pea downwards, not only in different cases, but even in the same gland. In the older, harder, and more irregular forms of the tumour, melicerous, steatomatous, cartilaginous, and ossific deposits have been met with in parts of it, by Celsus, De Haen, Freytag, Giraud, Hedenus, and others. The usual state in which this disease presents itself, obviously, is that of an increased secretion into the cells of the gland, distending them more or less; the other changes sometimes observed, being consequences of obscure irritation induced in parts of it during its continuance or growth.

7. II. Diagnosis. — It is necessary to be aware that other diseases of either a more acute or malignant character may affect the thyroid gland and its vicinity, and be mistaken for bronchocele. 1st, The gland may be either healthy, or but little enlarged; the tumour consisting chiefly of thickened surrounding cellular tissue, sometimes containing cysts filled either with a serous, albuminous, or purulent matter. Large *encysted tumours* may also form in the course of the trachea. But these may be readily distinguished by their situation, form, and fluctuation. 2d, The gland itself may be the seat of *chronic or acute inflammation*. In this case the swelling increases more rapidly, but seldom attains a large size; and is generally attended by redness of its surface, and increased temperature. It is also painful, particularly on pressure, and is very hard. I lately saw a case of this description, in a married female of about thirty, who was also seen by Mr. Lloyd, where the inflammation had proceeded to suppuration, and had terminated in an external opening. I believe that inflammation of the gland never occurs but in scrofulous habits. 3d, The gland may also be the seat of *scirrhus*, which may ultimately go on to carcinomatous ulceration; but this is a rare occurrence. In this case the gland is very hard, seldom large, sometimes scarcely increased in bulk, and is the seat of sharp darting pains. It is only met with in persons advanced in age. Alibert states, that he has observed a case of goître pass into cancer; but I doubt the fact; cancer having a very wide and indeterminate signification with this writer. The disease can scarcely be mistaken for aneurism of any of the thyroidal arteries, if any share of attention be directed to the subject. Bronchocele has been considered in the light of a strumous disease — as a form of scrofula. Dr. Postiglione, however, contends that no connection exists between these diseases. As respects the state of morbid action in the gland, the concomitant phenomena, and the respective terminations of both diseases, there is certainly no intimate relation between them.

8. III. Treatment. — Previous to the use of iodine in the cure of bronchocele, numerous remedial means were recommended by writers. Of these, the most common were frictions with various liniments; dry rubbing; stimulating and astringent lotions; cold bathing, and cold douches; mercurial applications; plasters with cicuta and ammoniacum, or with ammoniacum and hydrarg.; repeated blistering; leeches applied to the tumour; electricity and galvanism; moxas, issues, and setons; ligature of the arteries supplying the gland; and extirpation of the gland itself. Amongst the internal remedies recommended, I may notice the various preparations of mercury; digitalis combined with camphor (Ossiander); sulphuret of potash; muriate of barytes (Postiglione); cicuta or belladonna, either alone, or with the muriate of baryta; the muriate of lime; preparations of potash and soda; various mineral springs; the use of sea water, and of distilled water; the ammoniated muriate of iron; burnt sponge, given either alone, or with mercury; and the ashes of the *fucus vesiculosus* (Russell).

9. Of all these, the most celebrated was burnt sponge; and, after the discovery of *iodine*, this substance, which, having been found by Dr. Straub, of Berne, to be contained in officinal sponge, was recommended by him in 1829, and adopted by Dr. Coindet, of Geneva: and so successful has this medicine proved in the treatment of bronchocele, that, of a hundred and twenty cases treated with it by Dr. Manson, of Nottingham, seventy-nine were cured, eleven greatly relieved, and two only were not benefited by it. Of several cases of the disease which have come before me since the introduction of this remedy into practice, there has not been one which has not either been cured or remarkably improved by it. I believe, however, that although it has been found the most certainly beneficial of any medicine ever employed in bronchocele, some other practitioners have not derived an equally uniform advantage from its use. I can account for this only by considering that it has been given in too large and irritating doses, or in an improper form; and without due attention having been paid to certain morbid and constitutional relations of the disease during the treatment. The cases of two females who were lately completely cured by the remedy confirm this inference. They had both had the tumour for several years, one for nine years; and had, on former occasions, gone through long courses of iodine, prescribed by judicious and eminent practitioners, but without advantage. When this medicine was ordered by me, it was, therefore, with great difficulty that they were induced to have recourse to it again. It was ordered in very small doses, often repeated, and strict attention was paid to the state of the secretions, and to the uterine functions. In the course of a fortnight an improvement was manifest; and of a few weeks longer, a great decrease of the tumours had taken place. One of these females, a married woman, who had been once pregnant nine years before, upon the disappearance of the tumour came with child; soon after which it somewhat suddenly reappeared, but the resumption of the iodine again dispersed it. The preparations given

in the Appendix (F. 204. 277, 278. 302. 323, 324.) are those which an extensive experience of its effects in various diseases, as well as in this, has led me to adopt.

10. In respect of the *use of iodine* in bronchocele, the weaker preparations should be at first preferred; and care should be taken never to exhibit them to the extent of irritating the stomach or bowels: when this effect is produced, little or no benefit will be derived from them. The success which Dr. Manson and M. Lugol have derived from this valuable medicine, I know from experience to be chiefly owing to the small and soluble doses in which they exhibited it. In some of the more obstinate cases, it will be often requisite to assist the operation of iodine by other means. Sometimes the occasional use of emmenagogue aperients will be of much service; and when the uterine functions evince disorder, as they very frequently do in cases occurring in females, I have usually directed either the sub-borate of soda, or milk of sulphur, to be taken, in the form of electuary, every night (F. 89. 281.). A calomel purge will also be sometimes of service. I have generally preferred the internal to the external use of the medicine in this disease. In some more obstinate cases, they may be both employed; but its external application should be of the mildest kind. In some cases, a moderate blood-letting may be premised; and some writers recommend that leeches should be applied to the tumour itself. Nearly all the cases which I have seen, having occurred in females, in whom it appeared requisite either to promote the menstrual discharge or to subdue uterine irritation, I have usually directed the bleeding, when practised, to be performed in the feet, or leeches to be applied to the groins. Dr. Coster has adduced a case in which galvanism materially assisted the iodine in removing bronchocele.

11. Dr. Kolley has stated, that iodine should not be exhibited where there is a disposition to congestion in the head and internal viscera; when febrile and inflammatory symptoms are present; when gastric, hepatic, or intestinal disorder exists; and when there is a disposition either to hydrocephalus or to pulmonary consumption. This is in some respects just; but after depletions, and when the more marked symptoms of these disorders are subdued, iodine may, notwithstanding, be exhibited, if its effects be carefully watched, and if the mildest and weakest preparations be selected, and these be combined with anodynes and narcotics. I have observed that a continued course of iodine has sometimes had the effect, particularly during cold weather, of producing pains in the limbs or joints resembling rheumatism, which have continued to increase if the medicine was not for a time relinquished. This effect has never appeared during a course of less than six weeks. It has generally soon disappeared after an aperient operation from sulphur, and one or two warm baths. A change to warm weather has also removed it.

12. If iodine fail of reducing the tumour, and if its pressure occasion urgent symptoms, recourse must be had to *surgical aid*. For a full exposition of this part of the treatment, I must refer the reader to Mr. Cooper's *Surgical Dictionary*, and limit myself to a brief enumeration of this class of measures. The first and most important of these is the insertion of setons in the tumour. This practice was recommended by Dr. Quadri, of Naples; and practised first in this country by Mr. Copland Hutchison, and with success. According, however, to the experience of Mr. James, Mr. Cooper, and Mr. Gunning, this practice is liable to occasion dangerous hæmorrhage, sloughing of the tumour, and irritation and inflammation of the trachea or larynx. Mr. Lyford has, however, employed setons successfully; whilst Hedenus states, that he has seen tetanus occasioned by their introduction. It has been recommended to cut off the supply of blood to the gland by tying its arteries; and the advice has been followed by Blizard, Walther, Coates, Brodie, and Earle. The cases thus treated by Blizard, Coates, and Brodie, terminated unfavourably; whilst those by Walther and Earle succeeded. Lastly, the tumour has been altogether removed by excision. Dessault first performed this operation successfully; Gooch attempted it in two cases, but failed; Dupuytren and Klein also failed; whilst Vogel, Theden, and Graeffe, performed it with success; and Hedenus, of Dresden, succeeded in six cases in which he resorted to this operation.

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BULIMIA. (See Appetite.)

BULLÆ. — Blains. Syn. Φλύκταιναι, Gr. *Phlyctenæ*, *Ampullæ*, Auct. Lat. *Bullæ*, Plenck. *Ecphlysis*, Good. *Dartre Phlyctenoide*, Alibert. *Bulles*, *Ampoules*, Fr. *Blasen*, *Wasserblattern*, Ger. *Blebs*, Eng.

Classif. 6. *Class*, 3. *Order* (Good). 4. *Order* (Willan). IV. Class, IV. Order (*Author*).

1. Defin. *An eruption of large vesicles containing a serous or sero-puriform fluid; frequently succeeded by yellowish or yellowish brown scabs, and sometimes by ulcerations.*

2. Plenck first separated the individual eruptions belonging to this order from the vesicular

eruptions, to which they are intimately related, and formed them into a distinct class. Willan afterwards adopted a nearly similar arrangement, comprising under this head erysipelas, but leaving out rupia. M. Biett has, however, with stricter propriety, excluded from it the former disease, and introduced the latter. Adopting, therefore, his classification, this order of eruptions embrace *pemphigus*, *pompholyx*, and *rupia*. These forms of bullæ proceed from internal causes; but various irritants, applied externally, will also give rise to a similar eruption. The influence of cantharides and other rubefacients, of excessive heat or cold, of friction, of poisons, &c., in occasioning vesications, is well known. In a pathological point of view, both the *bullæ* produced by internal causes, and the *vesications* formed by external causes, depend upon very nearly the same state of the *rete mucosum*. This tissue is more or less inflamed, or affected in such a way as to secrete a greater quantity of serous fluid than can be exhaled through the cuticle, which is thereby separated from the vascular tissue, and, by the increase of this fluid, elevated into blisters, or bullæ, of various dimensions.

3. The eruptions of this class are both acute and chronic. The parts affected are often preceded by more or less redness, and occasionally by a very slight elevation. But, in many instances, no such inflammatory appearances are observed before the serous effusion beneath the cuticle takes place. After an indefinite period, varying from a few hours to four and twenty, a small vesicle appears, and gradually enlarges, until it reaches, generally within eight and forty hours, a great size. The bullæ thus formed are at first tense, and the fluid contained in them serous and transparent; but it sometimes becomes, especially at a later stage, sero-purulent, and rarely sero-sanguineous. After an uncertain time the bullæ pass from a tense to a flaccid state, the included fluid, at the same time, assuming a very slightly opaque and thickened condition. If they be situated where the epidermis is very thin, or occur in very young infants, they often break before this change in the fluid takes place. But where they are more persistent, the humour becomes thicker, and often forms scabs of a light yellowish colour. The affected parts of the skin are afterwards either provided with a new cuticle, or are affected with more or less severe ulceration. Bullæ may thus appear in any part of the surface, and even in the scalp, and be more or less numerous, or thickly scattered over the body. I have observed them so extensive, as respects both number and size, as to occasion death, obviously from the constitutional disturbance and irritation resulting from the loss of the cuticle over more than two thirds of the whole surface of the body.

4. These eruptions are also either idiopathic or symptomatic — most frequently the latter. They may also be infectious, or dependent upon the air of an hospital. Thus I have seen them prevail (chiefly in the form of pemphigus) at one time, in Queen Charlotte's Lying-in Hospital, to the extent of affecting nearly all the infants born there during several months, notwithstanding fumigation and whitewashing were resorted to; no other disease having occurred there during that period. In a chronic state, they are usually symptomatic of irritation or other disorder of the digestive organs, more especially of the alimentary canal; of chronic bronchitis, and of general cachexy. They are sometimes observed as an attendant upon small pox, and very rarely in the other exanthemata.

Bibliog. and Refer. — *Bateman*, Synopsis of Cut. Diseases, &c. 7th ed. p. 193.; and Med. and Phys. Journ. vol. xi. p. 230. — *Tilesius*, in *Martens's* Parodoxien, &c. Leips. 1802, b. ii. heft. i. p. 18. — *Rayer*, Traité des Maladies de la Peau, &c. t. i. p. 142. *Cazenave* et *Schedel*, Abrégé Pratique de Maladies de la Peau, &c. Paris, 1828, p. 125.

CACHEXY. Syn. *Cachexia* (from *κακος*, ill or bad, and *ἕξις*, a habit). A *bad Habit of Body*.

Classif. Constitutes the 3d *Class* in Dr. *Cullen's* Nosology; and the 4th *Order* in the *Class*, Diseases of the Sanguineous Function, in Dr. *Good's* Arrangement. I. Class, V. Order (*Author*, see *Preface*).

1. Defin. *Depravity of the constitution, without fever, affecting more or less the solids, the circulating fluids, and the secretions.*

2. The chief characteristics of this state are, want of vigour and vital cohesion of the soft solids, with defective digestion and assimilation, diminished animal warmth, universal languor, and deficient strength or activity. The skin is usually pale, yellowish, or lurid; and the white of the eyes in some cases almost transparent. As this state advances, the countenance becomes pale, white, or bloated; the skin loses its vital tint, and changes either to a dirty white, or to a yellow hue. The muscles are flaccid, and deprived of their healthy elasticity; the mind is inactive; the breathing difficult upon exertion; the feet and ankles swollen; the pulse slow and soft; the eyelids œdematous; the urine turbid; the alvine evacuations irregular and offensive; the sleep oppressed, and all the vital manifestations are enfeebled and languid. In females, more or less of these symptoms are associated with suppressed, retained, morbid, or irregular menstruation; pains in the forehead, back, loins, or limbs; palpitations; and longings for noxious or unwholesome articles of food, or for what is not food. (See Appetite — *Morbid*, and Chlorosis.)

3. This state of disease appears to be chiefly the result of diminished vital energy, produced by various mental and physical causes; in consequence of which state the food is not sufficiently elaborated and assimilated, the circulating fluid does not experience the requisite degree of change resulting from nervous influence, and the action of the viscera, and the secreting functions are imperfectly executed, whereby the whole mass of blood is impoverished or depraved, the manifestation of the nervous and muscular systems are feebly performed, and, ultimately, the whole of the structures more or less vitiated. (See Blood — *Alterations of, in Disease.*) Cachectic maladies are very frequently associated with, or preceded by, obstruction, or other disease of some important viscus. If the pulse does not exceed 80 or 84, particularly towards evening, we may conclude that the lungs are sound; and if the pulse be regular, and the sleep undisturbed, we may infer that the heart and its capsule are not, at least, seriously affected. The viscera most frequently diseased are the liver, mesenteric and lymphatic glands, the spleen, pancreas, kindeys, uterine organs, stomach and bowels; and the affection of these is sometimes a cause of, at other times an

attendant on, or even consecutive of, the cachectic state; the vital endowment of the frame being the first to experience the morbid change. It would appear that the earliest manifestation of this change takes place in the ganglial system; the internal viscera and circulatory organs, whose functions are actuated by this system, becoming next disordered, generally in such a manner as to attract the attention of the observer to the nature and source of disturbance.

4. The TREATMENT of cachexies chiefly consists of light nutritious food, taken in such quantity as the digestive organs can easily dispose of; healthy air, or change of air, with gentle and regular exercise, short of fatigue; of tonics combined with deobstruents and gentle aperients, in order permanently to excite the languid powers of life, and to promote the functions of the secreting organs; and of the use of chalybeate and deobstruent mineral waters, with frictions with stimulating liniments, and pleasant mental occupation. The sulphate of quinine, or the preparations of cinchona, particularly its compound tincture, with small doses of the oxymuriate of quicksilver; the various vegetable tonics, bitters and aromatics, with the mineral acids, especially the chloric acid; the preparations of iron; the chlorates of potash, soda, and lime; sarsaparilla, with guaiacum, &c.; the balsamic and terebinthinate substances; camphor, and the essential oils, and the preparations of iodine; are most serviceable in cachectic diseases, either exhibited singly, or combined with laxatives or purgatives so as to promote the secreting and excreting functions. As the various disorders of this description are often connected with obstructed function, or infarction, of some important viscus, it will frequently be requisite to exhibit at the same time, or in conjunction with some of the above remedies, small doses of blue pill, or of the hydrargyrum cum creta; or to combine them with rhubarb, aloes, or other purgatives, and often to add to them aromatics or warm gum resins. The object in these cases is to promote a regular action of the viscera, by increasing their vital energy; and this is better attained by adopting measures calculated to benefit the general health, and to increase the action of the stomach and bowels, than by the occasional use of active and debilitating cathartics; which, however, operate more efficiently and much more beneficially in those cases, when combined with bitters and tonics, — a fact long since insisted on by HOFFMANN, and others. (See also MERCURIAL CACHEXY, SCROFULA, and SYPHILITIC CACHEXY.)

BIBLIOG. AND REFER. — *Bonetus*, Sepulchretum, l. iii. s. xx. obs. 1—14. — *Wedel*, De Cachexia. Jen. 1715. — *Stahl*, Diss. de Cachexia. Halæ, 1710. — *Hoffmann*, De Cachexia, Opera, t. iii. p. 318. — *Nicolai*, Diss. Sistens Genuinam Cachexiæ Indolem. Jenæ, 1760. — *Vogel*, Diss. Sistens Cognitionem Morborum. Goet. 1763. — *Wedekind*, Ueber die Kachexie im Allgemeinen, &c. 8vo. Leips. 1796.

CACHEXY, AFRICAN. SYN. *Cachexia Africana, Negro Cachexy*, Dirt-eating. *Mal d'Estomac*, Fr.

CLASSIF. I. CLASS, V. ORDER (*Author*, see *Preface*.

1. DEFIN. *General cachexy, with vitiated functions of the stomach and bowels, and a propensity to eat chalk, clay, or other dirty and unwholesome substances, generally affecting the aborigines of intertropical countries, &c.*

2. This disease is a complication of cachexy with anæmia and pica, or depraved appetite (see APPETITE — *Depraved*), at least in its advanced stages. It is very common amongst the natives of Africa, and the slaves in the West Indian colonies; and is attended with loss of appetite, continued pain of stomach, whiteness of tongue, difficulty of breathing upon the slightest exertion, drowsiness, inactivity, and general debility, despondency, with fondness of solitude, paleness of the face, lips, and palms of the hands, coldness, and often œdema of the extremities, glassy state of the *tunica adnata*, weakness and smallness of pulse, scanty, pale, or milky urine, whitish or clay-coloured stools, with other signs of depressed vital power and deficient assimilation. Owing to the depressed energies of the frame, and particularly of the digestive organs, a vitiated state of the juices of the stomach, with morbid acidity of the *primæ viæ*, evidently prevails; occasioning sensations which probably excite the patient to have recourse to chalk, clay, or other absorbent matters to relieve them, and which occasion whatever vitiation of appetite may be additionally observed. This morbid condition appears, however, not to be limited to the stomach, but to be extended along the alimentary canal: the mucous surface of the bowels are in a state of morbid irritation, giving rise to offensive evacuations; the lacteal and mesenteric glands become irritated and obstructed, owing to the passage through them of unhealthy chyle and morbid secretions, and subsequently incapable of conveying sufficient nourishment into the circulation; the blood is thus rendered poor, pale, and in all respects such as is described in the article on the BLOOD (§ 34. *et seq.*): and the liver, pancreas, spleen, lungs, and heart, become pale, atrophied, and sometimes softened, from being deprived of the requisite nourishment, and supply of the circulating fluid. And at last the patient sinks, from depression of the vital power and anæmia, presenting the following appearances on examination:—

3. The *stomach* is often flabby, softened, apparently distended, and pale. The liver is sometimes enlarged; occasionally atrophied, hardened, and generally very pale. The bile is usually watery, pale, or straw-coloured: the gall-bladder has contained biliary concretions in a few cases. The mesenteric glands are always enlarged and hardened. The mucous follicles of the intestines are often morbidly developed. The heart is soft and flabby; the blood in its cavities and large veins is watery and thin; and sometimes fibrinous concretions are found in these situations. Serous effusions, to a greater or less extent, are also frequently found in the thoracic and abdominal cavities.

4. CAUSES.—This affection is very nearly allied to chlorosis: but whilst the latter affects females, and most commonly about the period of puberty, the former occurs in both sexes, and sometimes at as early an age as six or seven years. It is generally attributable to depressing or debilitating causes — mental or physical. The despondency and grief occasioned by separation from the place of nativity and friends, and by a state of bondage, often *dispose* to it; and thus it is not infrequently accompanied with nostalgia. The lax and weak habit of body, and the indolent disposition of the negro, seem also to favour the appearance of the

disease, particularly in those who have been badly nursed and neglected in early life. The chief *exciting* causes are, poor diet, hard labour, harsh treatment, exposure to cold and moisture, insufficient clothing, and venereal excesses early indulged in. The causes of the disease, the symptoms it presents in its progress, and the appearances observed after death, are altogether irrefragable evidence that it proceeds from great depression of the vital energies, especially of the digestive organs; occasioning, in its more advanced states, anæmia, imperfect nutrition, and vitiation of the fluids and soft solids of the frame.

5. The Treatment is in no respects different from what has been recommended in general terms in respect of Cachexia and *Depraved* Appetite (see these articles). Warm clothing, and a digestible nourishing diet, are indispensable to recovery: and to these should be added, regular but moderate exercise; bathing, followed by frictions of the surface; tonic, aromatic, and saline medicines; the use of the carbonates of the alkalies, combined with tonics and hot spices. Warm stimulating laxatives, such as the compound tinctures of rhubarb or aloes, or the bitter aperient tincture (F. 699.); the elixirs prescribed in the Appendix (F. 103—106.); the preparations of iron, cinchona, and myrrh; are severally of the greatest benefit, especially in conjunction with warmth, a residence in a warm dry situation, and sufficient nourishment. Care also ought to be taken to preclude any access to the substances for which the morbid propensity is entertained.

Bibliog. and Refer. — *Davidson*, New York Med. Repos. 1799, vol. ii. No. iii. art. 6.—*Chisholme*, in Ibid., and Med. and Phys. Journ. 1800, p. 614. — *Hunter*, On the Diseases of the Army in Jamaica; and in Edinburgh Medical Commentaries, vol. xiii. p. 194.

CÆCUM. — Its Diseases. 1. This viscus is not infrequently the seat of dangerous and fatal diseases, without any other part of the digestive tube being affected; and it is evidently concerned in the production of other disorders, in which it has usually been considered as merely accidentally to participate. If we consider its anatomical relations and functions in man and the lower animals, we shall be justified in viewing it as a distinct organ, performing offices modified in their nature from those of the rest of the alimentary tube. Notwithstanding this individuality, both its functions and its diseases have not generally attracted that degree of attention, nor received the investigation, they evidently deserve; and, hitherto, the latter have not even obtained a place in practical or systematic works. Some years ago, I took occasion to notice the importance of the offices and pathological states of this viscus, and detailed some cases in which it was remarkably diseased. Several facts illustrating the practical part of this subject have been recently accumulated, and some have since been observed by myself. From these sources, I shall arrange all that is known respecting the *diseases* of this organ, after having premised a few remarks on its functions.

2. The resemblance of the cæcum to the stomach in most of the graminivorous, and particularly the ruminating, animals, as well as its form and situation throughout all the higher classes of the animal kingdom, are circumstances showing that it is an important viscus, and one in which the last act of digestion is performed. M. Viridet appears to have been the first who entertained correct ideas of the actions of this viscus. "Sed de intestino cæco," he states, "quidquam dicere præstat, cum in quibusdam animalibus sit summè necessarium, nempè quibus et amplissimum, forsanque vicem alterius ventriculi gerit; nam glandulis crassioribus donatur, quorum succus solutione heliotropii rubescit, et solutione sublimati albescit, suisque salibus acidis et volatilibus præditum est." (*De Prima Coctione*, p. 270.) This view has been recently confirmed by the able researches of Tiedemann and Gmelin, professors at Heidelberg. The situation of this organ, its capacity, its attachment to the parietes of the abdomen, and the circumstance of its contents being propelled in opposition to their gravity, are proofs of their longer retention than those of any other part of the digestive tube; and confirm the view that has been taken as to its being, in some respects, a reservoir, wherein is poured that portion of the materials remaining in the ileum, in order to undergo the latter stages of digestion, and the first of fæcation. Besides other proofs of these functions, it may be stated, that it is very abundantly supplied with large follicular glands, which, according to the experiments of Tiedemann and Gmelin, secrete an acid, albuminous, and solvent fluid, which mixes with, and promotes the digestion of, those portions of aliments which have withstood the actions of the stomach and small intestines, or been insufficiently changed by them. In order that this office may be the more completely performed, the anatomical relations of the cæcum admit of the remora, for a longer or shorter time, of the matters which pass into it; so that a last effort is here made to obtain the remaining nourishment from the ingesta: and thus it performs, if not the very last act of digestion, at least the last important part of it. But it also seems to fill an additional office, namely, that of secreting, chiefly from its numerous follicles, an unctuous or oily fluid for the protection of the surface of the large bowels from the irritating effect of the fæcal matters passing along them; and it is probable that the constituents both of this fluid, and of the other secretions poured out from its surface, consist of elements that require to be eliminated from the blood; so that, in addition to its other functions, it is also a depurating organ.

3. The usual contents of the cæcum are of the consistence of a soft *bouillie*, or gruel, of a brownish yellow colour, and here first acquire their fæculent odour; which, according to Tiedemann and Gmelin, proceeds from the volatile oily substance secreted by its follicles. During the changes that are effected by the cæcum on its contents, an acid and hydrosulphuretted hydrogen gas is disengaged. This gas seems to be generated only in small quantities during the healthy functions of the organ; but when its vital energies are diminished, and when, consequently, a greater remora than usual of its contents takes place, air is disengaged in much greater quantities, and sometimes to the extent of injuring its healthy tone. Whilst the cæcum reacts energetically on the distending power, this flatus, along with a portion of its contents, are thereby propelled along the colon: but on many occasions, and under particular circumstances, considerable opposition about

the right flexure of this bowel is offered to their transit; and hence, pain and uneasiness in this part of the colon, as well as in the cæcum, are complained of; giving rise to the idea of the existence of either hepatic or nephritic disease.

4. Under other circumstances of protracted disorder of the digestive organs, as when acidity is generated in the stomach and small intestines, and the food imperfectly digested; or when the ingesta are of a stimulating, irritating, or otherwise unwholesome kind; or when the secretions of the liver, pancreas, and mucous surface of the small intestines, are of a morbid or excoriating nature, — then the accumulation and remora of these matters in the cæcum are productive of disorder of its functions, of inflammation, and even of change of its structure.

I. DISORDERED FUNCTIONS OF THE CÆCUM. CLASSIF. I. CLASS, I. ORDER (*Author*).

5. When the vital energies are weakened, and the alimentary canal debilitated, the cæcum often betrays greater disorder than any other part of the digestive system. Its situation and functions will, from what has already been stated, account for the frequency and importance of its diseases. In some cases, the irritation produced by morbid or accumulated matters in it is slight, and readily productive of sufficient reaction of its muscular coats to propel them along the colon. In other instances, the efforts made to accomplish this end, owing to the obstructions occasioned by the lodgment of flatus about the right flexure of the colon, or by irregular spasmodic contractions of this bowel, are ineffectual, and give rise to colicky pains. If the interruption is removed, disorder soon subsides; but if it continue for any considerable time, the more violent forms of colic or ileus supervene. When the internal surface of the cæcum is in an irritable state, disorders of this description are readily produced by the accumulation, even to a small extent, of the intestinal matters poured into it from the ileum, especially when they are of a more than usually stimulating kind, or if the secretions be morbid. In young, irritable, or nervous persons, and in those who partake of much acid or unripe fruit, or who neglect their bowels, particularly females who wear very close cinctures around the upper part of the abdomen, diseases affecting the alimentary canal, and, sympathetically, some other parts of the frame, not infrequently thus originate in this viscus. Accumulations, however, of alimentary and fæcal matters sometimes take place in it to a great extent, without producing much disorder, until the distension and irritation thereby occasioned give rise to disease of its internal surface, of its follicles, or its parietes generally. Persons advanced in life, of a phlegmatic temperament, or lax and torpid habit of body; those who take little exercise, or whose occupations are sedentary; and especially aged females; are very liable to be thus affected. During this state of infarction, the retained matters are more or less changed, partially decomposed, become acrid, excoriating, and a source of irritation both to the mucous surface itself, and to its follicles; which are thereby obstructed, and ultimately inflamed and ulcerated. In this way, most of the morbid states about to be described originate.

6. Several instances have been recorded by the older writers, where the stones of fruits, biliary and intestinal concretions, and hardened fæcal matters lodged in the cæcum, have occasioned severe colic, and even fatal ileus. Some cases of this kind are referred to in Dr. MONRO's instructive work on Morbid Anatomy, as having occurred in his and his father's practice. In one of these, a concretion upwards of seven inches in circumference filled up this viscus. FONTANUS found an earthy concretion in it, as the only morbid appearance after death from ileus; and HELM, nearly three hundred cherry stones in the same situation, and in the ileum before it opens into the cæcum, in a fatal case of this disease. In some instances, accumulations of fæcal matters with great distension occur, without much suffering referrible immediately to the cæcum being experienced; the organs affected secondarily evincing the most marked disorder. This was shown by the case detailed by M. ODIER, of Geneva, of the celebrated M. DE SAUSSURE, in whom this viscus was very greatly dilated. When very much distended, it is generally diseased in other respects; its coats are more or less thickened, inflamed, and ulcerated, or its follicles enlarged. MONRO, NACQUART, and others, have adduced instances in which its engorgement and enlargement were accompanied with chronic inflammation and thickening. Mr. WILMOT relates a case in which it was dilated to the extent of containing a gallon, filled with fæcal matters, and perforated by a circular ulceration. When the distension by accumulated matter is great, it may, from rising high in the abdomen, and pressing upon the nerves, vessels, and ducts in its vicinity, occasion numbness, and œdema of the right lower extremity, retraction of the testicle, and derangement of the urinary secretion; and thus be mistaken for disease of the kidney. M. DUCOS has detailed an instructive case of this kind; and two similar instances have been observed by me. In general, the seat of the tumour arising from collections of morbid matters in the cæcum, and the disorders connected with it, readily lead to the recognition of its nature, as in the case recorded by Dr. BARLOW. When, however, there is little or no tumour formed, and the symptoms are of a chronic and less violent kind, the cause of disorder may long exist in this situation, and escape detection. In a case of a young lady whom I attended with Mr. ANNESLEY, this part was considered as the seat of disorder, from its fulness and hardness upon an examination made when the patient was semi-recumbent, and the thigh slightly bent, and a treatment in accordance with this view strenuously insisted upon. She had been attended by several eminent physicians during the preceding three or four years, and very different opinions entertained of the nature of her ailments. After persistence in the treatment about to be recommended, an evacuation of hardened balls, containing indigestible substances which she had chewed many months previously, were evacuated, the fulness and hardness in the right iliac region disappeared, and the patient perfectly recovered. Two nearly similar cases to this were detailed by me in a work referred to below.

7. Substances incapable of digestion, either taken accidentally or from a depraved appetite, also frequently lodge in the cæcum, and remain in it for a very long period, sometime without

producing much disorder, at other times occasioning the most violent effects. In other cases, in addition to various morbid matters, large balls of worms, both lumbrici and ascarides, collect in this viscus, and occasion much local irritation, or even inflammation of its inner surface, and constitutional disturbance. Mr. BLACKADDER has detailed some interesting instances of this occurrence. He found, in a patient who had complained of disorder of various organs, and of a gnawing soreness in the right iliac region, ragged ulceration of the inner surface of the cæcum, which contained an immense number of worms. The rest of the alimentary canal was sound.

8. When the cæcum is much enlarged, or otherwise diseased, it may also be *displaced*. Cases are recorded by SALZMANN and ANNESLEY, in which its attachment to the internal iliac muscle had yielded so far that it had passed over to the left side; and others, in which it had descended very low into the middle of the pelvis, and pressed upon the urinary bladder.

9. Not only may indigestible substances and morbid concretions sometimes lodge in the cæcum, producing much local irritation and general disturbance, but they may, when small, sometimes pass into the vermiform appendage, where they occasion, as will be shown in the sequel, the most dangerous effects. It does not, however, appear that the simple presence of any of these substances in this process is always followed by such results. Mr. BLACKADDER relates a case in which he found a small concretion in this part, and yet the patient had not complained of any symptom referrible to the right iliac region. I have treated, or been consulted respecting, four cases, in which foreign bodies and concretions were found in the appendix after death; and in all, the symptoms were those of the most violent peritonitis complicated with ileus, and terminating in sphacelation of this process itself. Two of these I attended with Mr. PAINTER, of Crawford-street, by whom the inspections were made; and who ascertained that the substance found in the appendix, in one case, consisted chiefly of cholesterine.

10. The *phenomena* usually occasioned by fæcal matters collected in the cæcum, and by distension, enlargement, or irritation of this viscus, will necessarily vary with the nature of the offending substances, the extent to which they may have accumulated, and the age, temperament, and habit of body of the patient. The disorders which result are, 1st, Local; 2d, Symptomatic, and 3d, Constitutional. *a.* The *local signs* are more or less fulness, hardness, or distension in the right iliac region: sometimes, on examination carefully with the points of the fingers, the abdominal muscles being relaxed, a doughy hardness is felt. In other cases little or no pain, even upon a minute examination, is complained of; but occasionally, especially if the disorder be about inducing inflammation, both tenderness and pain either exist more or less constantly, or come on in paroxysms; and the patient generally reposes on the right side. When the bowels are constipated, and interruption of the passage of matters through the cæcum occurs, the paroxysms of pain are very acute, and sometimes attended by vomtiing, and all the symptoms of the most severe colic, or even those of ileus. In such cases, upon examination, signs of obstruction either in the cæcum or in its vicinity are detected, unless general peritonitis may have come on; and then the origin of disease is very generally referred to the cæcal region, or the tenderness and pain are most acute in that situation.

11. *b.* The *symptomatic disorders*, when this viscus is much distended, either by fæcal or other matters, or by flatus, or by both, as is most commonly the case, are, numbness of the right thigh, œdema of the right foot and ankle; sometimes retraction of the testicle, or frequent calls to empty the bladder, and sometimes hæmorrhoids; uneasiness or pain in the right iliac region, often extending to the hypochondrium; various dyspeptic symptoms, costive or irregular state of the bowels; occasionally diarrhœa, with scanty, offensive, and mucous stools; and, if irritation be excited in the mucous surface and follicles of the organ, the efforts made to evacuate the bowels are attended by severe tormina, and even by retching. I have seen several cases of varicose veins of the leg, or indolent ulcers, and a case of disease of the bones of the foot, the occurrence of which was evidently connected with great distension and accumulations in the cæcum; the symptoms of this disorder, with more or less tumefaction and hardness in the iliac region, having been found on examination. The justness of this view was fully shown by the success of the treatment, which was based upon it.

12. *c.* As long as the states of disorder have not advanced to inflammation or ulceration, the effects are often not very manifest upon the *constitution*. The countenance and skin, however, are pale and lax; the complexion is deficient of clearness, and, with the surface generally, often covered with an oily or dirty moisture; the perspiration is fœtid, and the breath offensive; the soft solids lose their elasticity, and are slightly emaciated; the lips are usually pale, the tongue white or loaded at its centre and base, sometimes red at its point and edges; the pulse is weak, soft, or small, frequently slow, but easily accelerated; and, at an advanced stage, the symptoms more clearly manifest that the blood is imperfectly depurated, or that it is affected by the absorption of a portion of the excrementitious matters retained in the cæcum. In addition to these symptoms, general debility, and disinclination to any physical or mental exertion, are often complained of. The above states of disorder continue for a longer or shorter period; when at last the local irritation either produces increased action of the muscular coat of the cæcum, and ultimately the dislodgment of the offending matters, or gives rise to acute or chronic states of inflammation, and various consecutive organic changes. In some instances, the accumulation in this viscus, and the spasm of the adjoining parts, amount to complete obstruction of the passage through the alimentary canal, even without inflammation or any disorganisation of the cæcum itself having taken place; causing violent colic and ileus, as in the cases already noticed (§ 10.); the most marked symptoms during life being referrible to the superior portions of the tube, and the lesions after death being most remarkable in those parts, particularly about the

termination of the ileum, and the ileo-cæcal valve.

13. *Treatment.* — The intentions in this state of disorder are very obvious; namely, 1st, to evacuate morbid collections; and, 2d, to prevent their re-accumulation, by preserving a regular tonic action of the viscus, and by strengthening the digestive organs generally. *a.* The evacuation of the accumulated or retained matters is to be attempted by means appropriate to the circumstances of the cases. If there exist irritability of stomach, or even any tendency to it, or to febrile action; or if there be any pain or soreness in the iliac region; full doses of calomel should be first exhibited, the enemata about to be suggested administered, and the liniments prescribed in the Appendix (F.296. 311.) assiduously rubbed over the cæcal region, with the view of exciting the healthy action of the viscus. If, on the other hand, the stomach and bowels be torpid, and the former can retain purgative or cathartic medicines, they may be given, selecting those which are the least irritating in their effects. I have seen inattention to this caution, the most stimulating cathartics having been exhibited, productive of the worst consequences; a state of disorder simply functional, or colic from distension and obstruction of the cæcum, being converted into either inflammation of the bowels or dangerous ileus. When, therefore, an irritable state of the stomach supervenes in our attempts to remove obstructions of this viscus, we should desist from the exhibition of purgatives, or even of aperients by the mouth, excepting full doses of calomel, or calomel combined with hyoscyamus or opium, and moderate doses of nitrate of potash, or sub-carbonate of soda, or of both, which will generally be retained, and will allay the sickness and retchings. But we ought strenuously to persist in the administration of enemata — preferring those which are oleaginous, saponaceous, and solvent — and in the use of the liniments. The enemata should be always large, and injected by means of the valve-syringe now in use, so that they may reach the seat of obstruction. In obstinate cases, this object will be facilitated by placing the patient upon his knees and elbows during their administration, and elevating the pelvis as much as possible above the rest of the trunk. The practitioner should not be discouraged by the ineffectual administration of several injections, but repeat them according to circumstances, employing at the same time frictions over the abdomen with the liniments already advised. If flatulent distension of the abdomen be present, they will assist in removing it; but in such cases the terebinthinate enemata ought to be preferred. When we suspect the presence of worms, in addition to other morbid matters, aloes and the alkaline solutions, assafœtida, camphor, lime-water, &c. may be used in the injections. In the slighter and more usual cases, the aperients in common use, particularly castor oil, the compound decoction of aloes, the combination of the compound infusions of senna and of gentian, or the infusion of senna with decoction of cinchona, or the several formulæ of this description contained in the Appendix (F.215. 266. 562. 575.), may be prescribed, as they may appear appropriate to the circumstances of the case.

14. *b.* Having apparently removed whatever obstruction may have existed, — the cæcal region being soft and natural, and the actions of the bowels free, — the object is next to prevent the recurrence of disorder, and to strengthen the digestive organs, by vegetable tonics and bitters combined with aperients; by sulphate of quinine with aloes; by small doses of blue pill with the alkaline carbonates and other deobstruents, and given occasionally with the view of promoting and correcting the secretions; by the occasional use of the liniments above referred to, or by wearing a warm stimulating plaster (see F. 109. 115. 117.) over the right inferior regions of the abdomen. In every case, attention should be paid to the state of the digestive, assimilating, and secreting functions; regular evacuations of the bowels promoted, by the occasional use of enemata; and the diet strictly attended to.

II. INFLAMMATION OF THE CÆCUM. CLASSIF. III. CLASS, I. ORDER (*Author*).

15. Although inflammations of this viscus have been generally overlooked or confounded with those affecting either the colon, the small intestines, or the peritoneum, there are few diseases more defined in their character, or more distinctly limited in the great proportion of the instances of their occurrence, than they are. In respect of its *seat*, inflammation may affect chiefly the mucous surface, or the follicles, or all the coats of the organ more or less: or it may attack the vermiform appendix only, or the cellular tissue connecting the cæcum to the internal iliac muscle. As to the *character* of the inflammatory action, it may be sthenic and acute; or acute, asthenic, and spreading, as in dysentery and fever: it may also be more or less chronic. Cases of all these states of disease are to be found scattered through the works of modern medical authors, and most of them have come before me. The first case which attracted my attention to the importance of attending to the state of this viscus in various abdominal diseases, occurred in 1816, in a hot climate. The patient had the usual symptoms of inflammatory dysentery, with violent pain, and subsequently tumefaction in the cæcal region. The disease had been neglected in its early stages; and it was only shortly before the sudden subsidence of this tumour that I observed it. Upon straining at stool, a sensation of something having burst internally was felt; and very soon afterwards above a pint of purulent matter, mixed with a little blood, was discharged. Upon examination six hours after death, the cæcum was found ulcerated, discoloured, and nearly sphacelated, with an opening through the part attached to the abdominal parietes leading to the nearly empty sac of an abscess which had formed in the cellular tissue connecting this viscus to the side; the mucous membrane of the colon was inflamed in parts, and excoriated.

16. i. The CAUSES of inflammations of the cæcum are chiefly the functional disorders already described. A morbid state of the abdominal secretions, and particularly an increased secretion of vitiated acrid bile; the irritation of foreign bodies, indigestible substances, and of worms; a strangulated hernia, or the pressure of an ill-constructed truss; the suppression of the hæmorrhoidal and menstrual discharges; and the presence of biliary or intestinal concretions, hardened fæces, or the stones of fruits, or their escape into the vermiform

appendage. Inflammatory irritation of the mucous membrane and follicles of the viscus is not infrequent after child-birth, and as an attendant upon some of the diseases which affect chiefly the bowels of females at this period. In connection with the accumulation and retention of morbid matters, it very often constitutes the earliest pathological state in dysentery and diarrhœa, and consequently then arises from the same causes that produce those diseases.

17. ii. SYMPTOMS. — *A. Of inflammation of the mucous surface of the cæcum.* These chiefly consist of an irregular, mucous, offensive, and sometimes slightly bloody appearance of the stools, with tenderness upon pressure or examination of the cæcal region. The evacuations are generally preceded by tormina or griping pain, extending from this part upwards to the right side, and down towards the pelvis. The tongue is slightly loaded or furred; and more or less symptomatic fever is present. This state of disorder is liable to lapse into a chronic form, and to continue for a long period; or it occurs primarily, from the functional disorders already described, and sometimes fluctuates as to the degree of severity. In the more slight or chronic states of inflammation of this surface, the patient often complains of little beyond irregularity of the bowels and colicky pains in the abdomen, with slight emaciation, and loss of the healthy complexion; till, at last, an acute attack of the disease supervenes, from the extension of the inflammatory action to the more exterior coats; or the chronic organic change has proceeded so far as to implicate adjoining parts, and to occasion a train of severe symptoms. In this manner, the more dangerous forms of dysentery not infrequently take place. During the earlier states of inflammation of the internal surface of the cæcum, ulceration may have commenced, or the follicles become diseased, and the coats successively perforated, until the peritoneal covering is attacked; when the inflammation assumes more serious features, owing both to its extension, and to the nature of the tissues which are now invaded by it. The perforation may, however, take place in that part of the parietes of the viscus where it is attached to the iliac muscle; and thus inflammation be extended to, and abscess form in, the cellular tissue exterior to it, and break either externally, or into the cæcum, or both; a sinuous communication being thus formed between the cavity of the organ and the surface of the body. In the manner now described, the more acute states of inflammation of the cæcum, and its connecting tissue, may arise; or these states may primarily affect the different structures composing its parietes, or may originate in its vermiform appendage.

18. *B. Acute inflammation of the coats of the cæcum* generally commences with violent pain in the right iliac region, frequently attended with a burning sensation, and most exquisite tenderness, particularly when the serous coat of the viscus is affected. It is accompanied with the most severe tormina, extending from the above region upwards to the right hypochondrium, across the abdomen, down into the pelvis, and along the thigh of that side. If the disease be attended by distension of, or fæcal collections in, the cæcum, the testicle is retracted, and the thigh either very painful or numb. While the pain occurs in paroxysms, and shoots in various directions throughout the abdominal cavity, it is constant and fixed in the situation of the cæcum. The regions of the abdomen, although sometimes distended and tense, bear examination, excepting in the cæcal region and its immediate vicinity, where the least pressure cannot be tolerated. The pain is usually increased when the body is erect; and the patient reclines on the right side, with the trunk slightly bent, and the thighs drawn upwards, so as to relax the parts in the vicinity of the disease. The bowels are generally torpid; but vomiting is not complained of, unless obstinate constipation exists, or drastic purgatives have been given early in the disease. The pulse is usually quicker than natural; but it is occasionally not much affected; and the temperature of the surface is increased. In some cases, the above constitute the chief symptoms; but in others much more disturbance ensues, particularly if the disease advances, or is neglected in its early stages, and the peritoneal surface of the cæcum is affected. When such is the case, the local symptoms increase in severity; the abdomen becomes more generally tense and painful, owing to the extension of the inflammation over the peritoneal covering of the viscus and the adjoining parts; and the symptoms of peritonitis, often attended by obstinate vomiting, supervene, with great frequency of pulse, and general fever. If the appendix participate in the disease, the symptoms are still more acute; general peritonitis is very quickly produced; adhesions are formed between it and the adjoining peritoneal surface; and the appendix soon sphacelates; a fatal result taking place, usually in a very short time. In other cases the disease assumes a somewhat less violent character, and terminates in suppuration, owing to the cellular tissue connecting the coats of the intestine to one another and to the abdominal parietes being chiefly affected. When this occurs, the issue is not so rapid as in the former instances, but is sometimes prolonged for a considerable period; and, in some cases, recovery is at last brought about. The foregoing history applies more strictly to inflammation originating in the cæcum; but when it commences in the appendix, or in the external connecting cellular tissue, the symptoms are often much modified.

19. *C. Inflammation of the appendix cæci* appears to be attended from its commencement with more acute symptoms than that of the cæcum itself. In four cases of this description which I have seen, this part was primarily and chiefly inflamed, owing to hard substances having escaped into it, and had occasioned general peritonitis, and gangrene of the appendix itself. In all of these, obstructions of the bowels, with obstinate retchings, was present at the time when I first saw them; and in the latter stages of the disease, vomiting was attended by violent tormina, and the discharge of matters evidently from the small intestines. Thus the symptoms of ileus were superadded to those of peritonitis. *Upon dissection*, the cæcum was found inflamed only in its peritoneal surface, in three of the cases; in the fourth, inflammation was observed also in its inner surface. In one, where the appendix contained a small biliary concretion, its extremity adhered to the surface of the cæcum after passing

around a convolution of the ileum, which it had evidently strangulated; but at the time of the inspection it was quite gangrenous on each side of the concretion. In another case, appearances of strangulation were manifested in a less satisfactory manner; the surrounding parts being so agglutinated by albuminous exudations, that their respective relations were not obvious. It does not appear, however, that inflammation originating in the appendix always arises from substances having escaped into it. M. Louyer Villermay has detailed two cases of a similar state and termination of disease to the above; one occurring without any apparent cause, the other seemingly from the pressure of a bandage in hernia. In one, published by Mr. Parkinson, ulceration and perforation of the appendix had taken place from the lodgment of a small portion of indurated fæces in it. A very interesting case, where violent abdominal symptoms were occasioned by a large lumbricus, which had passed into the cæcal appendage of a person otherwise diseased, is recorded by Mr. Blackadder. M. Thiery found this part engorged with fæcal matters, and inflamed, in a fatal case of ileus; the cæcum being narrowed, but not otherwise diseased. Heister met with the appendix inflamed and ulcerated after death, with similar symptoms. Amyand detected a small nail in this part after fatal ileus. Moreau and Kloeckhoff record instances of this disease produced by strangulation of the ileum by the cæcal appendage. Mr. Waldron discovered a small concretion in it after fatal peritonitis; and Morgaoni, Van Doeveren, Sandifort, and several others, have detailed cases of both peritonitis and ileus, in which this part had adhered to adjoining parts; and, in some instances, a loop of intestine had been enclosed by it, and strictured. From the history of these and other cases, which have occurred to several of my medical friends, it may be inferred, that inflammation affecting primarily the cæcal appendage is most frequently brought on by hard substances having escaped into it; and that the inflammation rapidly extends to the peritoneum; giving rise to the exudation of albuminous lymph, to adhesion of its opposite surfaces, and of the appendix to adjoining parts, and to gangrene of this process.

20. Very acute pain, tumefaction, and tenderness, are complained of upon the invasion of this form of the disease, first in the right iliac region, and subsequently more or less over the abdomen; with excruciating tormina, obstinate constipation of the bowels, a very frequent, small, or contracted pulse, heat of skin, dry tongue, great thirst, sometimes with numbness of the right leg, or pain shooting down the thigh, and retraction of the testicle. Vomiting comes on sooner or later, and is often, at one period or another, attended by the discharge of matters from the small intestines — at least, in the cases which I have seen. The patient at last becomes restless, his countenance sunk, and a fatal termination takes place, generally from the third to the sixth day, preceded by the symptoms ushering in dissolution from intestinal peritonitis.

21. D. *Inflammation of the pericæcal tissue* is occasionally met with. Several interesting cases of it have been published by French writers, especially by MM. Dupuytren and Menière. Mr. Copeland has detailed a case where a urinary calculus was extracted from an abscess which opened externally, and communicated internally with the cavity of the cæcum. It is probable that the calculus, in passing along the ureter, had produced inflammation, extending to the cellular tissue exterior to the cæcum, and terminating in abscess, which had opened in both directions. In a case contained in Dr. Johnson's Journal, abscess had formed in the cellular tissue, external to the cæcum, had also burst into this viscus, and pointed externally: and a similar instance is recorded by M. Duplay. In all these a sinuous communication between the cavity of the intestine and external surface was formed. Several of the cases of inflammation of the cæcum and connecting tissue, detailed or referred to by M. Menière, terminated in suppuration, and opened either internally or in the right iliac fossa. In some of those published by M. Dupuytren, the purulent matter had infiltrated itself as high as the kidney, and as low in the pelvis as to collect between the rectum and bladder.

22. The *precursory symptoms* of this state of disease belong to pathological changes in the functions or coats of the cæcum itself, and are often similar to those already described as indicating acute or chronic inflammation of its mucous surface and follicles; the disease in such cases most probably arising from ulcerative perforation of the coats of the organ, or the extension of inflammation from its mucous surface. The patient frequently is first affected with either diarrhœa or constipation, or by both alternately, with colicky pains shooting in various directions, but generally radiating from the right iliac region; and he complains of pain or tenderness on pressure. To the above symptoms, others sooner or later are added, especially tumefaction, and constant pain in this part, and in the right iliac fossa, with anorexia, nausea, fever, and an irregular state of the bowels. As soon as suppuration commences, the disease presents the local and constitutional characters usually accompanying the formation of matter, with more or less tumour, which is generally situated deep in the iliac fossa.

23. Inflammation in this situation will, if recognised early and treated judiciously, terminate by resolution, in perhaps the majority of cases. But suppuration is almost as common a termination as resolution; and when it takes place, the abscess formed most frequently opens internally. In several instances, peritonitis has supervened, either previously or subsequently to suppuration, but more usually the latter. The abscess may also open externally, as in the cases already referred to; but seldom without it having also previously established a communication with the cavity of the cæcum.

24. iii. Chronic Inflammation of the Cæcum generally comes on primarily, slowly, and insidiously, and may be long limited to the internal surface and follicles of the intestine, as noticed above (§ 17.). It more rarely remains after acute attacks. In the former mode of appearance, it often advances imperceptibly, until serious organic changes have taken place in the coats of the organ; the general health, although more or less affected, not being so far injured as to alarm the patient. In its progress, it sometimes presents occasional accessions of severity, and even assumes

a sub-acute form. In other cases, an acute attack is superinduced, which may terminate in peritonitis, or in suppuration, or even in gangrene. Chronic inflammation is the most common organic state of disease by which the cæcum is affected.

25. *A. Causes.*—This form of inflammation of the cæcum is, I believe, most frequent in females, probably owing to contingencies connected with the uterine functions and child-bearing, and to their modes of dress. It often occurs among them previously to menstruation, or soon after the climacteric epoch. The use of unripe or acerb fruits; sedentary occupations, or want of exercise; the depressing passions; previous disorder of the digestive organs, particularly costiveness, and habitually, or occasionally, deferring the earlier intimations to evacuate the bowels; suppression of accustomed discharges, especially the hæmorrhoidal, the menstrual, and lochial; the pressure of an ill-constructed bandage for hernia; blows or contusions on the cæcal region; and occasionally too violent exercise on foot or on horseback; are its most usual exciting causes.

26. *B. Symptoms.*—At first the general health and strength are not much injured; but the patient loses his healthy appearance, and activity. He complains of colicky pains occurring occasionally, or even periodically, in the right iliac region, shooting through the abdomen, and recurring soon after a meal. The appetite is not materially affected, and flatulence is the most constant gastric symptom. The tongue is generally red at its point and edges, and loaded at its root; sickness and vomiting are not present; the pulse is often little affected, or it is quick and small; the patient lies on the right side, with the body bent and the thighs drawn up, and feels pain or uneasiness in the iliac region on turning to the left side, which is increased by continuing the position. The alvine evacuations are irregular and offensive, being at one time frequent, at another retained, generally muco-feculent, fluid, preceded by colic or slight tormina, and affording little relief. The abdomen, on examination, presents little remarkable, until we reach the cæcal region, where pressure occasions uneasiness, and a deeply seated fulness and hardness are usually detected. If much fulness or distension be present, the urine is generally voided frequently, and slight pain or numbness of the right thigh, with œdema of the right ankle, is often felt. If the disease go on to ulceration, blood will appear in the stools, which will also be of a more or less dark colour. Such are the usual symptoms, until some one of the acute states of the disease supervenes, when their attendant phenomena will indicate the change.

27. *C.* The *chronic state* of the disease may give rise to very great thickening of the parietes of the cæcum, either with or without dilatation of its cavity, and ulcerations in its internal surface. FABRICIUS HILDANUS describes a case of this kind as one of cancerous ulceration; but it seems rather to have been chronic inflammation, with thickening and ulceration. Dr. BEEZELEY has detailed an interesting case very nearly of this description, wherein these changes were very remarkable. The patient complained of colic, constipation, flatulence, mucous bloody stools, and of a large tumour in the iliac region, which was mistaken for aneurism of the iliac artery. On inspection, *post mortem*, the coats of the cæcum were found above an inch in thickness, scirrhous, inflamed, ulcerated, perforated, and its cavity enlarged. When the disease has gone on to thickening, as indicated by the obscure hardness, and tumour, uneasiness, &c. in the iliac region, particularly if it be attended with ulceration, as may be inferred from the presence of small quantities of blood or pus mixed in fluid, or but little consistent, muco-feculent and offensive stools, amendment is procured with great difficulty, under the most favourable circumstances; but it should not be despaired of, although it may be long in appearing. I have met with severe cases, obviously of this description, where medical treatment was persisted in for many months, and one or two for some years, yet ultimately the health was re-established. In a case recorded by M. EMERY, the cæcum was remarkably constricted, and the appendix filled with fæces. The patient died of ileus.

28. iv. COMPLICATIONS. — Inflammations of the cæcum, particularly of its internal surface, and in their sub-acute and chronic forms, with morbid enlargement and fungous ulceration of its follicles, are very frequently associated with dysentery and fever, in both temperate and warm climates. Inflammation of its external connecting tissue is much less common in these complications. I ascertained the fact of the intimate connection of inflammations of the cæcum with *dysentery*, in 1816, my attention having been first directed to it by the case already alluded to (§ 15.). Indeed, they generally constitute the original disease in dysentery; the irritative state of inflammation of the mucous surface and follicles of this viscus, together with the acrid secretions and other matters retained in it, producing an excoriating state of the discharges, whereby the cæcum itself is first affected, and subsequently those parts of the colon and rectum where they are the longest retained; an opposite morbid relation, however, obtains in respect of its complications with fevers, particularly those of a typhoid nature; for, while in dysentery it is frequently the primary affection, in fevers it is commonly a consecutive lesion arising from the morbid states of the secretions and matters, either retained in or passing through it, and from the disposition to change possessed by the mucous tissues and follicles during these diseases, particularly those of an asthenic character. It should not, however, be overlooked, that lesions of the cæcum may also arise in the course of dysentery, owing to similar states of the secretions and mucous surface of the intestines as are present in fevers; and that the cæcal disease will very generally escape detection during life, particularly in fevers, unless the attention of the practitioner is alive to its occurrence. In every case, therefore, should the region of this viscus be attentively examined; and, if symptoms indicating an affection of it be present, the means of cure should be directed accordingly.

29. v. LACERATION, or *rupture* of the cæcum occurs in rare cases, either in consequence of previous disease and infarction of its cavity, or of external injury. Some instances of this occurrence are to be found in early volumes of the Philosophical Transactions, and in the Transactions of foreign medical societies. SOEMMERING, in his notes to the translation of Dr. BAILLIE'S

Morbid Anatomy, mentions a case wherein it was produced by vomiting, which may have arisen from accumulation of morbid matters in the cæcum, with obstruction of its canal, and ulceration of its internal surface. Mr. SPEER and Mr. SHEWARD record instances of its rupture from contusion, — an event which is very likely to occur when an injury is sustained over it during distension of its cavity, from whatever cause. The consequence of its laceration generally is rapidly developed, and speedily fatal, peritonitis. *Introsusceptions* of this part, itself having passed into the colon, or portions of bowel having passed into it, are not infrequent, particularly in young subjects; but they require no particular notice, farther than as a cause of *ileus*, inflammation of *intestines*, &c.

30. vi. The PROGNOSIS in disease of the cæcum is very different in each of its forms. — *a.* When the *internal surface* is chiefly affected, recovery will take place in most of the cases, unless ulceration has commenced; and even then a favourable issue will sometimes follow judicious medical treatment and regimen. *b.* In the *acute states* of inflammation affecting the more external coats of the viscus, the prognosis is upon the whole unfavourable, at least it should be stated as such to the friends of the patient; and in every case it should be given with caution. *c.* If we suspect, from the severity of the symptoms, or from the rapid extension of inflammation from the cæcal region over the abdomen, that the *appendix is inflamed*, it is still more unfavourable; if, in addition to this circumstance, the retching be frequent, and more particularly if the matters ejected appear as having come from the small intestines, we may infer, not only that the cæcum or its appendage is most acutely inflamed, but also that either its canal is obstructed, or some adjoining part of the tube is strangulated; — in either case the prognosis is most unfavourable. The subsequent appearance of the symptoms usually indicating gangrene of the intestines leaves no hope, and is soon followed by dissolution. *d.* When considerable tumour, seated in the iliac fossa, and the signs of inflammation of the *pericæcal tissues*, are present (§ 22.), a favourable opinion of the issue may be entertained, if active treatment have been employed early in the disease, and the patient's constitution be not in fault. But in very many such cases, the general health has been much impaired previously to this disease, and has even predisposed to the attack. In such cases, as well as when evidence of the formation of *abscess* is observed, a very unfavourable, or at least a very cautious, prognosis ought to be given. *e.* In the *chronic states* of the disease any opinion should be offered with much reservation. If the disease have come on slowly, continued long, and the stools present the appearances indicating ulceration (§ 26.), an unfavourable state of disease exists; thickening of the coats of the viscus merely (§ 27.) is more favourable, but is not readily removed. *f.* The *complications* of this disease (§ 28.), particularly with typhoid fever, are attended by considerable danger. The association of it with dysentery is productive of the worst forms of that disease, as well as its complication with fever, of its most dangerous states; and causes the former to assume a chronic and obstinate form. *g. Laceration*, or rupture of the coats of the cæcum, is generally fatal in its results.

31. vii. TREATMENT. — *A.* Inflammation of the *internal surface* of the cæcum, and the *chronic states* of the disease (§ 17. 24.), require the application of a number of leeches either near the iliac region, or on the inside of the right thigh, and a repetition of them according to the circumstances of the case. In robust or plethoric persons, general depletion may precede the local. After the leeches are removed, fomentations and a succession of poultices will be found serviceable; after which, a full dose of calomel with James's powder, and, a few hours subsequently, a mild aperient medicine, should be exhibited, and an aperient action promoted by the administration, and frequent repetition, of demulcent, oleaginous, or saponaceous enemata (§ 13.). Drastic purgatives are seldom more efficacious than those of a milder kind, but are often attended with risk. I have generally found the infusion of rhubarb, with tartrate of potash, and the electuaries prescribed in the *Appendix* (F. 82. 89. 98.), most serviceable. In the majority of cases, the above means will remove all ailment. The treatment in other respects should be the same as is recommended in chronic *Diarrhœa* and in *Dysentery*. If functional disorder remain after the more inflammatory symptoms have subsided, a blister may be applied, or a deobstruent liniment (§ 13.) rubbed over the cæcal region night and morning; or a rubefacient and deobstruent plaster (§ 14.), worn for some months in this situation.

32. *B.* In the *more acute states* of the disease, general *blood-letting*, repeated according to the circumstances of the case, or followed by local depletions, and the same treatment subsequently as described above, must be early and decidedly employed. If there be vomiting, or retchings upon taking substances into the stomach, a large dose of calomel, — generally from 10 to 20 grains given either alone or with one or two grains of opium, — will allay this disorder. If the symptoms still continue, or if they be but slightly mitigated, blood-letting, general and local, followed by fomentations, poultices, and oleaginous enemata, having been carried as far as may be deemed prudent, the turpentine embrocation, (flannel cloths wrung dry out of very hot water, and immediately soaked with spirits of turpentine,) should be applied over the abdomen and retained there as long as it can be borne by the patient. If the tormina be severe, or if peritonitis have supervened, this is, after depletions have been practised with decision, the most efficacious means we possess. In a case of this disease, which had become complicated with peritonitis, in a member of the family of a medical friend, this means gave almost instant relief, after other measures had been carried to the utmost limits, and the patient soon afterwards recovered. In another instance of extreme danger similarly complicated, which very recently occurred, the repetition of this treatment removed all complaint, although resorted to in despair of success from it.

33. *C.* I have stated that *inflammation* of the *appendix cæci*, particularly when occasioned by hard bodies having passed into it, often does not extend to the cæcum itself, or, at most, only to its peritoneal coat, in common with the ad
portions of this surface; but that the sup

the extension, and fatal termination of peritonitis in such cases are most rapid and dangerous, the appendix itself generally soon becoming gangrenous. It therefore behoves the practitioner to have recourse to the most decided measures, when he finds the symptoms of peritonitis originate in the cæcal region, and when retchings come on. Vascular depletion, and all the remedies already noticed, must be energetically and early employed; but premature attempts should not be made to evacuate the bowels, otherwise their action will be inverted, and decided symptoms of ileus will be produced. Fomentations should follow the leeches; and afterwards hot poultices should follow; which in their turn ought to give place to the terebinthinate embrocation, if requisite. A large dose of calomel and opium should, however, be given after the first full blood-letting; this will generally be retained, even in the worst cases; and it ought to be repeated according to circumstances, without fear of affecting the system by it, — an effect which it is even very desirable to produce. Little other medicine need be exhibited by the mouth, excepting draughts with nitrate of potash, or sub-carbonate of soda, or both, with agreeable demulcents and emollients, if the stomach will retain them. But the assiduous administration of *enemata* must not be neglected. It is entirely by their agency in this state of disease, that the bowels are to be evacuated, when it is judged prudent to fulfil this intention, which should seldom be omitted as far as they are calculated to accomplish it; more especially after depletions have been practised. The enemata prescribed in the *Appendix* (F. 130—151.), as they may appear suited to particular cases, may be employed. Pain, tormina, nausea, or vomiting, having been relieved, gentle cooling aperients, and in the interval diaphoretic medicines, may be exhibited by the mouth. Warm baths are seldom of much use in this malady: but when they will not interfere with the treatment prescribed, they may be tried, particularly in the more advanced periods. After the disease has been removed, and merely functional disorder remains, the measures already advised may be put in practice.

34. *D.* The treatment now described is also applicable to the early stages of inflammation affecting the *pericæcal tissues*. If suppuration takes place, the treatment recommended for *Abscess* must be resorted to; taking care to support the energies of life under it, particularly when the constitution or general health is in fault. If we suspect either the existence of *ulceration* or of *thickening* of the coats of the viscus (§ 27.), the assiduous employment of the liniments noticed above; of gentle aperients and deobstruents, particularly the infusion of rhubarb with soda or potash; of electuaries, with sulphur, cream of tartar and soda, or the sub-borate of soda; small doses of blue pill or hydr. cum creta, with ipecacuanha, hyoscyamus, and camphor; repeated blistering, and subsequently the deobstruent plasters; the frequent use of large oleaginous, saponaceous, and demulcent enemata, with the treatment recommended in chronic *dysentery*; are the measures most to be depended upon; with strict attention to diet, which should be chiefly farinaceous, to the state of the digestive organs generally, and to the secretions and excretions.

35. *E.* The *complication* of the disease with *dysentery* requires, in addition to the measures used for that disease, the application of leeches near the right iliac region, and the other external measures already noticed, with rhubarb aperients, combined with camphor, narcotics, and ipecacuanha; laxatives, with demulcents and anodynes; the frequent administration of oleaginous and emollient enemata; and the usual means of correcting the secretions, and diluting and carrying off the acrid and excoriating fluids, and fæcal matters in the intestinal canal. (See Dysentery — *its Treatment.*) A similar treatment to the above is necessary when the disease occurs in the progress of *fever*. Depletions, however, are generally not so well borne in this complication as in the former, and should therefore be carried to a less extent; but all the external remedies, and the use of laxatives, particularly those imparting a tonic effect to the intestinal mucous surface, should be often employed. Camphor, with hydrarg. cum creta and opium, or with ipecacuanha and rhubarb, terebinthinate injections, or even a terebinthinate draught in the worst cases, have proved most serviceable in this state of complication, in my practice. During recovery, the occasional use of the liniments and plasters above referred to, attention to the secreting and digestive functions, particularly to the state of the bowels, which should be occasionally assisted by emollient and laxative injections; and a regulated diet, easy travelling, change of air and of scene; are the chief measures requiring attention. (See the treatment of Fever.)

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CALCULI. See Concretions, *Biliary and Intestinal*; also Urinary Calculi, and Urine.)

CANCER. Syn. *Scirrhus, Carcinus, Schirro-Cancer, Carcinoma,* Auct. Var. *Cancer*, Fr. *Das Krebsgeschwür*, Ger. *Scirro, Canchero, Cancro*, Ital.

Classif. 4. *Class*, Local Diseases; 6. *Order*, Tumours (*Cullen*). 3. *Class*, Sanguineous Diseases; 4. *Order*, Cachexies (*Good*). IV. Class, IV. Order (*Author*, see *Preface*).

1. Defin. *A disease often arising from hereditary predisposition, in the middle or advanced periods of life; commencing with a local hardness,*

which subsequently softens in its centre, infects the adjoining parts, and ultimately contaminates the frame.

2. Cancer consists of two states or stages: the *first*, in which it presents the appearances usually denominated *scirrhus;* the *second*, in which it softens, ulcerates, &c., and degenerates into true *cancer*, or *carcinoma*. I shall describe each of these successively.

3. I. SCIRRHOUS STAGE. — *Occult cancer.* It commences with a tumour, a limited local hardness; is usually single; is very rarely, at its commencement, detected in different parts at once; and is not surrounded by a cyst. Several authors have stated the occurrence of a cyst; but OTTO more accurately excludes it from this structure. It is of importance to attend to the appearances of the disease at its commencement, as serving to indicate its nature. It is distinguished, at this period, by hardness, coldness, whiteness or paleness, insensibility, and deficiency of red blood vessels; — a state indicating the low grade of vital endowment of the part.

4. The scirrhous structure, when fully developed, consists of a firm, hard, rugged, incompressible, and unequal mass, the limits of which are not distinctly defined. Its colour is generally of a light grey, and, when cut into thin slices, it is semi-transparent. Upon close inspection, it is found to consist of two distinct substances; — the one hard, fibrous, and organised; the other soft, and apparently inorganic. The former composes the chief part of the diseased mass, and consists of septa, which are opaque, of a paler colour than the soft part, unequal in their length, breadth, and thickness, disposed in various directions; sometimes forming a nearly solid mass; in other instances, a number of cells or irregular cavities, which contain the soft part. This latter is sometimes semi-transparent of a bluish colour, and of the consistence of softened glue; at other times more opaque, softer, somewhat oleaginous, and like cream in colour and consistence.

5. The fibrous structure seems to be the cellular, or proper tissue of the part, in a state of induration and hypertrophy; assuming, in consequence of its increased density and bulk, an appearance similar to the fibrous or fibro-cartilaginous structure; whilst the softer portion, contained in the meshes and cells of the former, appears to be merely a morbid secretion poured out by the vessels nourishing the organised fibrous tissue, and is probably the exhalation of the part, either secreted in a modified state, or accumulated and changed by the disease of its containing structure. If this view be correct, the former, or organised part, may be considered as chiefly resulting from an altered state of nutrition in the seat of disease; whilst the latter, or inorganised portion, may be viewed as proceeding from a morbid secretion, — the diseased structure thus being a product of a disordered state of both the nutritive and secreting functions, most probably in consequence of alteration of the vital influence exerted by the ganglial nerves on the capillaries of the part.

6. The proportion of each of those two substances, and the modes of their distribution, vary very considerably in different scirrhous masses. This diversity seems to be owing to the different tissues in which they are developed, and to the modifications arising from temperament, local irritation, and various concurrent circumstances to which the patient may have been exposed. It has been attempted by Mr. ABERNETHY to arrange these varieties of scirrhus into species, and to designate them according to the natural structures which they most resemble. Thus he divides them into Mammary, Pancreatic, Tuberculous, &c.; but these different states of structure glide so insensibly into each other, and are so perfectly similar as respects their origin and consequences, that little practical advantage is derived from thus distinguishing them.

7. In some scirrhous tumours, the fibrous part of their structure is both most conspicuous and abundant, and is condensed into a solid mass, having the appearance of a centre or nucleus, whence radiate numerous septa in every direction. This is the most common appearance of the disease. In other instances, the tumour forms an uniformly hard mass, of an irregular shape, and of no very defined structure. In some cases, the organised part approaches more nearly to the cellular structure, its cells being filled with a soft matter which may be pressed out. Occasionally, cysts are formed within the tumour, of various sizes, containing a reddish, reddish brown, or a chocolate-coloured fluid. These cysts are lined by a smooth membrane, from which a fungous tumour sometimes sprouts out. In some instances, portions of the scirrhous mass are converted into a hard substance resembling cartilage, in which bony or calcareous depositions are occasionally found. When the scirrhous structure is formed in the substance of a gland, its limits cannot generally be accurately determined, the two structures apparently being inseparably connected. In some cases, the scirrhous tumour condenses the cellular tissue surrounding it, and hence it acquires a somewhat sacculated appearance. (WARDROP.)

8. At the commencement of scirrhous disease, the structure of the tissue or organ in which it is seated preserves for some time its aspect and colour, being changed merely in volume and density: sometimes, however, its volume is but little augmented, whilst its density is very much increased. As the disease advances, the proper tissue of the organ becomes more obscure, and verges nearer to that already described.

9. M. HECHT, of Strasbourg, analysed a portion of fully developed scirrhus of the mamma, and found 72 grains composed of 2 grains of albumen, 20 of gelatine, 20 of fibrine, 10 of a fluid fatty matter, and 20 of water and loss. He likewise analysed, by a similar process, 72 grains of scirrhous uterus, and found it to consist of 15 grains of gelatine, 10 of fibrine, 10 of oily or fatty matter, and 35 of water and loss. (LOBSTEIN, *Anat. Path.* t. i. p. 403.)

10. Scirrhous tumours do not always remain in the state now described; and the period during which they thus continue is not determinate. When once they commence, they seldom retrograde, and the part affected never is restored to its healthy state. It is chiefly in this respect that the early stages of scirrhus differ from simple induration proceeding from chronic inflammation. Scirrhus may remain nearly stationary for several years, occasioning but little constitutional disturbance; but generally an important

change takes place in its structure, and the disease afterwards makes rapid progress.

11. II. CARCINOMATOUS, or CANCEROUS STAGE. — *Open or ulcerated cancer.* After a time, portions of the scirrhous mass begin to soften, and pass into a state of unhealthy suppuration and ulceration, — unhealthy as respects the characters and progress of these processes, and their contaminating influence upon the whole frame. The soft or inorganic substance resolves itself into a thin ichorous matter, very different from pus; and disorganisation commences, generally about the centre of the mass, and extending towards that part of it which is nearest either the surface of the body or any of the natural openings. When this process commences, it is in that state which has been denominated CARCINOMA, or CANCER. When this change takes place, the diseased mass seldom increases much in bulk, but is destroyed by an ulcerative process. The disease now makes rapid progress, owing to the contamination of the adjoining structures by the morbid matter secreted by the ulcerating part, a portion of which matter is evidently absorbed, irritating the lymphatic glands, and vitiating the whole frame. In consequence of this infection, the powers of life sink, the soft solids become cachexied, and the progress of the local affection accelerated. At last the patient sinks from the contamination of the circulating fluids, and the different textures of the body; the blood being diminished in quantity, as well as otherwise altered.

12. When the skin covering a scirrhous tumour ulcerates, a fungus of a cauliflower appearance, and hard gristly structure, sometimes proceeds from the surface of the mass. In some cases, ulceration destroys both the fungus and the primary tumour. It has been observed by Sir E. HOME, that some cancerous sores have suddenly changed from a painful and malignant character, to a more healthy aspect at some part, and even have begun to cicatrize. This apparent amendment is never permanent, for, sooner or later, the ulcerative process is renewed, and the disease pursues its usual course. Dr. PARR (*Dict.* vol. i.) states, that he has seen several cases thus terminate spontaneously; but the patients were all soon afterwards cut off by internal disease; probably consisting of the internal developement, or metastasis of the malady, cases of which occurrence are not infrequent. (See *Journ. Hebdom.* t. i. p. 323. for a case wherein internal cancer appeared after the removal of the external disease by compression.)

13. Cancerous tumours generally contaminate the glands in the vicinity, particularly after ulceration has commenced. But these glands are seldom primarily affected. Mr. WARDROP states, in his excellent description of this disease, that he has only met with two cases of primary affection of the lymphatic glands. Besides these glands, various other organs and parts, sometimes far removed from the seat of the primary disease, become secondarily affected. This is most probably occasioned by contamination of the frame, from absorption of the morbid matter of the disease. Sometimes the existence of cancer in distant organs is not successive or secondary, but seemingly coeval. In this case the cause must be looked for in the originally morbid state of the system. Indeed, this state always obtains, to a certain extent; the disease being strictly constitutional even in its origin; the consecutive contamination, arising from the absorption of morbid matter from the primary tumour, merely augmenting the original vice, and accelerating its noxious effects.

14. Scirrho-cancer most commonly *originates* in glands whose functions have been interrupted, or that have never performed the offices intended for them; or it affects parts which have been previously diseased, or have received at some period an external injury. Thus it attacks the mammæ, the uterus, the ovaria, the testes, the thyroid glands. It also very frequently commences in the tegumental, and the digestive, and urino-genital mucous surfaces; more particularly in the skin of the face; in the mucous membrane of the nose, lips, mouth, pharynx, and œsophagus; in the stomach, especially the pylorus and cardia; in the intestinal canal, the ileo-cæcal valve, rectum, and anus, and in the urinary bladder. The viscera which are *secondarily* affected, are commonly the lungs, bronchial glands, the liver, the omentum, the mesentery, the spleen, the pancreas, the brain, the medulla of the bones, and the skin. Several of these, particularly the liver, pancreas, mesentery, brain, &c. may also be primarily or coevally affected with other parts. Scirrhus affects the skin in two forms; — the one is that of wart, the other that of tubercle — the former being primary, the latter secondary.

15. III. DIAGNOSIS. — It is of great importance to be able to distinguish between this disease and various others, for which it is liable to be mistaken. For instance, the simple induration proceeding from chronic inflammation has, in several instances which have come to my knowledge, been mistaken for scirrhus. This mistake not infrequently occurs in respect of induration of the neck of the uterus.

16. *A.* In *simple induration,* the part affected is redder, more injected, retains more of its original structure, is less indurated, and less lobulated, than scirrhus. The parts also surrounding the indurated portion are frequently slightly infiltrated with serum. Induration, the result of inflammatory action, admits of resolution, and entirely disappears, sometimes in consequence of a natural flux or evacuation, of active exercise, the return of accustomed discharges, or pregnancy. Thus the menstrual flux sometimes dissipates inflammatory induration of the mammæ, or of the neck of the uterus.

17. *B.* The *fibrous production* generally appears in the form of a rounded body, implanted, but isolated, in the proper structure of the organ, and adhering to it merely by means of laminated tissue. Upon dividing this structure, it grates under the scalpel; and it sometimes presents dilated vessels, which are never observed in scirrhous masses: moreover, it occasions little or no pain, and never passes into the cancerous state.

18. *C.* Compared with *tubercular* or *lardaceous* productions, scirrho-cancer offers remarkable differences: — 1st, This latter is never found isolated in the cellular tissue, or in the parenchyma of organs, in the form of granulations, or of small rounded tumours, as the tubercular formations are; nor in largely diffused masses, as the lardaceous substance: 2d, It is never enclosed in a cyst: 3d, It does not greatly increase the volume of the part it affects; sometimes the part is even

diminished, but much more dense: 4th, It is not susceptible of the same kind of softening as the tubercular and lardaceous productions; but rather of a peculiar rarefaction, passing into a peculiar form of fungus, followed by the developement of blood-vessels: 5th, Its vital properties are excited, and its sensibility becomes exalted, as the disease advances, — circumstances which are never observed in connection with these productions.

19. *D. Cancerous ulceration* is characterised by a jagged, thick, soft edge, which is turned outwards. The surface of the ulcer is greyish, or greyish brown, sometimes livid brown, elevated into loose, fungous vegetations, discharging a fœtid, corroding *sanies* or *ichor*, and bleeding slightly upon irritation. *a. Chronic inflammatory ulcers* differ from the former in the absence of a fœtid corroding ichor; in the hardness of their margin, which turns inwards; and in the reddish and more healthy appearance of their bottoms, which in cancer is colourless, or a livid brown, hard, irregular, fungous, sometimes with cauliform excrescences, and extremely offensive. *b. Local tumours* sometimes appear, particularly on the tongue, originating in irritation, and exasperated by the continuance of this cause. These usually commence with a small pimple or wart, becoming more and more hard and irritable as they increase, until they assume a scirrhus-like induration. They seldom endanger the constitution, yet appear sometimes to assume a malignant character. (Mr. EARLE, *in Trans. of Med. Chir. Soc.* vol. xii. art. 22.)

20. E. As soon as the *carcinomatous change* takes place in the scirrhous mass, the disease involves adjoining parts, and the system generally. The local suffering is more fully developed, and the vital actions of the part are changed greatly from the healthy course. The sensibility is morbidly augmented in short paroxysms; the pain being violent, and what is usually called *lancinating* or stinging during the exacerbations, but often slight, or almost altogether absent in the intervals. If the surface be exposed, the pain is burning, and the part is always sore. As the disease advances, and particularly as the ulceration proceeds, the paroxysms of lancinating and burning pains increase in violence, and the remissions become more imperfect, and of shorter duration. The *cancerous sanies* is generally very fluid; but its appearance varies with the treatment, the situation of the disease, and with the diet of the patient. It is generally of a greyish white, or reddish grey; it slightly effervesces with sulphuric acid, and turns syrop of violets to green.

21. *F.* The *extension* and *contamination* of the system characterising cancerous ulceration appear to be owing, 1st, to the corroding influence of the secretion on the parts with which it is in contact: 2d, to the absorption of a portion of the morbid secretion by the lymphatic vessels: this is evinced by the swelling and affection of the glands in the vicinity of the primary disease. But the affection of the glands may not be altogether owing to the absorption of the morbid matter, but partly to the irritation of the lymphatic vessels occasioned by the disease of the part in which they originate: and, 3d, to the absorbing function of the veins, according to the researches of MAYER, MAGENDIE, TIEDEMANN, GMELIN, &c. These different sources of contamination seem more than sufficient to account for the general cancerous cachexia characterising the advanced stages of the disease.

22. G. The characters of this *cancerous cachexia* are, emaciation; softness and flaccidity of the soft solids; œdema of the extremities; hectic fever; a peculiar change of the complexion and colour of the whole surface of the body, which become of a pale leaden, or pale straw colour, or waxy hue; and general depravation of the functions. This state of cachexia increases with the progress of the disease, and augments at the same time the primary local change. It is rapidly developed and increased when the scirrhous mass ulcerates, when also carcinomatous tumours frequently manifest themselves in various parts of the body. Ultimately the circulating fluid is deficient in quantity, and is poor and morbid; and the vital cohesion of the soft solids, and even of the bones, is diminished.

23. IV. CAUSES. — Scirrhus, like scrofula, is undoubtedly an hereditary malady. Instances are numerous of several individuals in the same family having been affected by it. It is almost altogether confined to persons advanced in life. Cases of the disease are very rare before the age of thirty. Sir A. COOPER met with it only twice previously to this age. Mr. WARDROP has seen one instance of it in the skin of a girl of twelve years. Females, owing to the liability of their appropriate organs to be attacked, are more subject to it than males; especially those who have not borne children, the disease generally appearing in them upon the cessation of the catamenia. The disease seems commonly to result from an original or acquired diathesis, existing previously to the developement of morbid structure, and very often connected with the lymphatic temperament. MM. BRESCHET and FERRUS found 23 instances of this temperament prominently marked, out of 44 cases of the disease. Anxiety and distress of mind, and all the depressing passions, are most disposing causes, particularly to cancer of the breast. An inactive state of the part for a considerable time previously; a poor, unwholesome diet; laborious and exhausting occupations, and an unhealthy locality; also dispose to it.

24. It is generally *excited* by blows and external injuries; by repeated or continued irritation; the abuse of spirituous liquors; and by low and poor diet. It is not liable to be propagated by contagion; the experiments of MM. ALIBERT, BIETT, and DUPUYTREN, having shown that the matter discharged from a cancerous ulcer cannot produce the disease in another person. Although irritating agents of any description may give occasion to its appearance, yet there must have previously existed cancerous diathesis, or constitutional disposition, in which it almost always originates.

25. The *proximate cause* of this dreadful disease is extremely obscure; and opinions respecting it have consequently been numerous. SCHAEFFER and GAMET consider it to be caused by a singular depravation of the nervous fluid. Dr. ADAMS and Dr. BARON impute it to the existence of an hydatiform body, which they call the *hydatis carcinomatosa;* and Mr. CARMICHAEL, to a body enjoying an independent state of existence developed in those parts of the frame, the vitality of which is enfeebled, and the organised matter of which begins to be decomposed. He supposes that, at first, this constituent of cancer occupies but a minute spot

consists of a substance nearly similar to cartilage; and that it afterwards extends itself in the form of radiations, resembling ligaments formed by thickened cellular tissue. These opinions, which are not essentially different from each other, have been completely refuted by Burns, Cleri, and Himly. According to M. Broussais, scirrho-cancer is the result of an inflammatory or sub-inflammatory state of the vessels (*Examen des Doctrines Méd.* t. i. prop. 93—95.); and the opinions of M.M. Begin, Breschet, and Ferrus (*Dict. de Méd.* t. iv. p. 133.), differ but little from that of M. Broussais. They impute the disease to irritation of an inflammatory nature, occasioning the secretion of a coagulable lymph that becomes condensed into a scirrhous substance, which may remain stationary for a longer or shorter period, but which sooner or later undergoes a secondary inflammatory process, and experiences softening and disorganisation, with various other changes, as these processes proceed. To this doctrine of the modern French pathologists it may be objected, that scirrhus furnishes no sign, local or general, of inflammation, and yet it goes on increasing; and if it can increase rapidly without inflammation, may it not also originate independently of this cause? Where, therefore, neither the local appearances, nor the usual consequences, nor the constitutional symptoms, of inflammation can be perceived, ought we to impute disease to this state of vascular action? The inference is obvious; but it is only one of many arguments, which, if they were not superfluous, might be adduced against the doctrine.

26. According to M. Andral, cancer is not a specific alteration, but a state of disease arising from lesions of nutrition and secretion, which have reached the period of their termination in ulceration; the ulcer thus arising, constantly increasing either in depth or extent of surface, without any disposition to cicatrisation. Thus, M. Andral considers cancer in a generic acceptation, and comprises under it the ulcerative process in various species of disease of a constitutional origin and malignant nature, which, although always considered as closely allied, in their origin, nature, and tendency, to scirrhus, have usually been viewed as distinct maladies. This opinion is more in accordance with the wide signification of the term *cancer*, in the writings of French pathologists, but is very deficient in precision and applicability; inasmuch as it embraces the advanced states only of several organic changes, which, in their earlier periods especially, are very distinct from one another — distinct in causes, origin, the structures they principally attack, and in their appearances and properties. I have, therefore, adopted the more accurate views of British pathologists respecting this disease, which I consider in relation to its predisposing and exciting causes, to the states of the system in which it occurs, to its local appearances, and constitutional effects, to the results of treatment, and to the ultimate changes produced in the blood, and in the various structures, *as essentially depending upon a weakened and otherwise morbid state of the system generally; and arising from depravation of the vital conditions of the part affected, whereby its nutrition, nervous sensibility, and secreting function, become specifically changed, and all the fluids and solids ultimately contaminated.*

27. V. Treatment. — The conclusion now drawn respecting the nature and morbid relations of *scirrho-cancer* must render very apparent the futility of various measures which have been employed to remove it. Some writers have too exclusively viewed the disease as local; and thus, even in its advanced stages, resorted to most dangerous and painful operations to extirpate an evil, which, instead of being local, proceeds from the morbid state of the system generally, and which all depressing causes (the surgical operation itself being one) rapidly increase, disposing not only to its extension in its primary seat, but also to its appearance in new situations and more vital organs. The means of cure, therefore, should have especial reference to the state of the constitution favouring its developement and progress; for, when the malady is advanced, local measures can, at the best, only be palliative, and are therefore subsidiary to judiciously devised means employed internally, and assisted by suitable diet and regimen.

28. Before I proceed to state the indications which should guide the treatment of this disease, and the medicines which seem best calculated to fulfil them, as far as this is possible, I will take a brief view of the means which have been recommended or tried by preceding writers. The real importance of this subject to the physician will be the more obvious, when he reflects, that cancerous diseases are often — indeed most legitimately on all occasions — within his province, more particularly when they invade, as they frequently do, internal organs; and that the life of the patient may be greatly prolonged, and his sufferings much alleviated, by judicious medical treatment.

29. *A.* At the *commencement of the scirrhous stage*, various means have been employed, and sometimes with some advantage, according to the showing of those who employed them. *Conium* has, upon the whole, found the greatest number of supporters; and I think that, when it has been combined with the alkaline tonic and stomachic preparations, it has been often of considerable benefit. This seems to be nearly the opinion of several writers, and amongst others, of Gesner (*Beobacht.* b. i. p. 213., iii. p. 242.), Girard, Hufeland, (*Journ. der Pract. Heilk.* b. ix. 3 st. p. 86.), Hahnemann (in *Ibid.* b. ii. p. 473.), and Thilenius (*Med. und Chir. Bemerk.* p. 100.). Electricity and Galvanism have been employed by Brisbane (*Select Cases, &c.* p. 36.) and Walther (*Ueber die Ther. Ind. der Galv. Oper. &c.* c. 12.); the muriate of baryta, by Hufeland; antimonials, by Rowley and Dowmann; aconitum, by Gredino; digitalis, by Mayer (*Richter's Chirur. Bibl.* b. v. p. 531.); laurel-water, by Thilenius; mercury, particularly the corrosive sublimate, by Ruysch, Thilenius, and Harris; sal-ammoniacum, by Justamond; belladonna by Gataker; and the mezereon, by Home (*Clin. Exper. and Hist.* p. 428.), with more or less benefit, chiefly of a temporary kind in those cases which were obviously scirrhous, and with permanent service in those which were only supposed to be of this description.

30. *B.* In the *more fully developed* and *less doubtful states* of the disease, as well as in its earliest stage, a number of medicines have been recommended, and for a while have obtained some credit, which few of them have long retained. The great majority, however, of them have been

brought forward rather as palliatives, and with the view of keeping the disease in check, than as possessing the power of curing it; yet some have been exhibited with more sanguine expectations, particularly arsenic, conium, hyoscyamus, and belladonna. *a*. That *conium* is productive of benefit, when judiciously combined with other remedies, is manifest, notwithstanding the contradictory evidence respecting it. While we find Stoerck (*Lib. de Cicut. Vind.* 1761. 8vo.), Fothergill (*Works*, vol. ii. p. 47.), Hamilton, Francke (*De Cancro. Ien.* 1778.), Nicolson (*Med. Obs. and Enquir.* vol. iv. n. 31.), Quarin (*De Cicuta*, ch. 4. 5.), Fearon, Bell (*On Ulcers*, pt. ii. sect. 8.), Gruelmann (*De Usu Cicutæ, &c.* Goet. 1785.), Renard (*Journ. de Med.* t. xxiii. p. 411.), Schaeffer, and several other writers, in favour of it, we observe, Siebold (*Chir. Tageb.* n. 74.), Lange, Hill (*Ed. Med. Comment.* vol. i. p. 146.), Akenside (*Trans. of Col. of Phys.* vol. i. n. 6.) Oberteuffer, (*Hufeland's Journ.* b. ix. st. 3. p. 81.), Schneider (*Chirurg. Gesch.* b. iv. n. 19.), and Burns, expressing opinions as to either its little efficacy, or its entire want of effect. This discrepancy may be accounted for upon the supposition of want of virtue in the preparations prescribed; the extract generally losing the virtues of the plant during the modes of preparing it formerly in use: and I find, upon referring to most of the authors now quoted, and to others not referred to, that the extract and decoction were usually employed by those who found it productive of no benefit; whilst the powdered leaves, the expressed juice of the plant, or an infusion of it, had been preferred by those who have expressed themselves in favour of it. I have prescribed the inspissated juice and powdered leaves of this plant, in several cases of internal scirrho-cancer, in combination with the alkalies and tonics, and have always found them much more beneficial when associated with it.

31. *b. Belladonna* was first exhibited by Alberti (*De Bellad. tanquam Specif. in Cancro, &c.* Halæ, 1739.), who highly praised it in the occult stage of the disease. It was afterwards recommended by Lambergen (*Haller's Disp. Pract.* ii. n. 41.), Bellot, Lentin (*Beobacht. &c.* n. 2. and 3.), Amoureux (*Journ. de Méd.* t. xiii. p. 47.), Camperdon (*Ibid.* t. lv. p. 342. 423—502.), Sulzer (in *Ibid.* t. xxiv. p. 68.), and by Grandvilliers (*Ibid.* t. xvi. p. 449.); and declared of little use by Zimmermann and De Haen (*Rat. Med.* pt. ii. p. 37.). I believe, however, that some advantage will be procured from its internal and external use, particularly as a palliative, and when combined with medicines which are calculated to support the energies of life, and improve the secreting and digestive functions. A similar opinion may be offered respecting *hyoscyamus*.

32. *c*. There is, perhaps, no medicine which has been so commonly prescribed in this malady as *arsenic*. It forms the base of the several secret remedies, internal as well as external, employed by empirics; and has been very generally used by them as an escharotic, sometimes with very injurious effects, from being absorbed largely into the system. There can be no doubt, however, of its beneficial influence, in many cases, when cautiously prescribed, and judiciously combined with other medicines; but chiefly as a most energetic tonic and excitant of the capillary vessels, and powerful detergent in the ulcerative stage of the disease. Justamond prescribed it both internally and externally, with opium and various other medicines; Stark (*Archiv. f. d. Geburtsh.* b. ii. p. 673.), Rush (*Edin. Med. Comment.* vol. xi. p. 312.), and Odhelius, state that they have found it cure incipient cancer, when applied in solution to the part; Collenbusch (in *Hufeland's Journ. d. Pract. Arzn. &c.* b. iii. p. 103.) found it beneficial when employed externally, tonic extracts having been given internally at the same time; Fischer (in *Richter's Chir. Bibliog.* b. viii. p. 76.), Michaelis (in *Ibid.* b. v. p. 132.), and Reusner, prescribed it in the form of the *powder of Guy* * (composed of arsenic, sulphur, ranunculus sylvest., &c.), with marked benefit; Salmade (*Mém. de la Soc. d'Emulat.* t. i. p. 152.) cured a case with the *powder of Rousselot*, the twenty-fifth part of which, he says, consists of arsenic; Balascon de Tarare gave it with the expressed juice of the solanum, and Hornuno with serpentary and soot. This evidence, however, in its favour, is not without powerful opposition. Fabricius Hildanus (*Cent.* vi. obs. 81.) says, that arsenic was introduced into practice by a monk named Theodoric, in the tenth or eleventh century (having probably been made acquainted with in the West), and details cases in which he considered it detrimental. A similar opinion has been entertained of it by Schneider, Thilenius (*Med. und Chir. Bemerk.* p. 101.), Acrel, Murray (*Med. Pr. Bibl.* b. iii. p. 485.), Adams, Oberteuffer (*Stark's N. Archiv*, b. iv. p. 673.), and Delius. Mr. Hill, however, expresses a very favourable opinion as to the effects of this mineral, and states that it will retard the progress of the true scirrhous tumour, in the great majority of cases, and often prevent it from becoming cancer (*Ed. Med. and Surg. Journ.* vol. vi. p. 58.). I believe that, when this medicine is cautiously employed, both internally and externally, in conjunction with narcotics and alkalies, or otherwise judiciously combined, Mr. Hill's opinion in its favour is not much too highly coloured.

33. *d*. The preparations of *mercury* are always injurious in this disease, when exhibited in any other manner than as an alterative, and, externally, as an astringent and stimulating wash. The oxymuriate, in minute doses internally, with the muriate of ammonia, or the compound sarsaparilla decoction, the tinctures of cinchona, with guiacum, &c., is often of service, at least in retarding the progress of its early stage; and when the disease has advanced to ulceration, the external use of the oxymuriate, with the muriate of ammonia, lime water, &c. may occasionally be of some service. Reidlin (*Cur. Med. Millen.* n. 408.), states, that the preparations of this mineral are always injurious when productive of salivation. Of the accuracy of this opinion, there can be no doubt. Prescribed, however, as now recommended, it has received the approbation of Moseley, Gooch, Gmelin (*Method. Cancrum Sanandi*, Tub. 1756.), Hagen, Gataker, Chapuis, Büchner (*De Med. Mercur. Usu in Cancro.* Hal. 1755.),

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* A secret remedy, recommended by Richard Guy, in a production, entitled *Essays on Scirrhous Tumours and Cancers*, 8vo. Lond. 1759.

Champelle (*Sur le Traitem. du Cancer*. Par. an viii.), and by Sir A. Cooper (*Lectures*, in *Lancet*, vol. iii. p. 190.)

34. *e*. The preparations of *iron* have been recommended by Justamond and De Mare (*Tract. Med. Chirurg. de Cancro, &c.* Vien. 8vo. 1767.), who gave them variously combined, particularly with muriate of ammonia, and in the state of neutral salts. Mr. Carmichael strenuously advises the sub-phosphate, combined with a little pure fixed alkali. He prefers this preparation, but occasionally also employs the carbonate, the tartrate of iron and potash, the phosphate and oxyphosphate of the metal. If it occasion costiveness, he combines with it a little aloes; and, if it produce headach, fever, or full pulse, he leaves it off, and gives four grains of camphor every five hours. He prescribes it as follows; directing *externally* to ulcerated cancers, the carbonates, phosphates, or arseniate of iron, made into a thin paste with water; and to occult cancer a lotion constantly applied, consisting of a strong solution of some one of the salts of this metal.

No. 85. ℞ Sub-phosph. Ferri gr. xxx.—℈ ij.; Potassæ vel Sodæ Puræ gr. iij.—v.; Extr. Aloës gr. iv.; Pulv. Glycyrrh. ℈ j.; Albumenis Ovi q. s. ut fiant Pilulæ xij. Capiat binas tertiis vel quartis horis.

Besides these preparations, the *ferrum ammoniatum* is entitled to notice. It was considered the best medicine that could be directed against this disease by Dr. Denman (*Observ. on the Cure of Cancer*, p. 77.).

35. *f*. The preparations of *lead* have also been used, chiefly externally, when the disease has advanced to ulceration. Gesner (*Beobach*. b. v. p. 141.) recommends the acetate in the form of liniment with turpentine, and Schoenheyder (*Soc. Med. Hann. Coll*. vol. i. n. 4.), advises the continued application of lotions of this salt in a decoction of conium. It has also been used in thin sheets constantly pressed upon the scirrhous tumour. Of the various other remedies brought forwards by authors at different periods, and stated by them to have proved serviceable, I may briefly notice the following: — Horstius (*Observ*. l. ix. ob. 3.) prescribed internally, and externally, *sulphur*, with spirit of turpentine; Ruland (*Cur. Ampir*. i. n. 92.), the *balsamum sulphuris;* and various other writers, the oleum sulphuris (F. 21.). The *sulphurets* have also been employed, both internally and externally, either alone, or with narcotics, and sometimes with benefit. Gataker (*Obser. on the Intern. Use of the Solanum*. Lond. 1757.) used the *solanum nigrum;* and Paulus Æginæ (l. iv. c. 25.), Oribasius (*Synop*. l. vii. c. 13.), and Carere, the expressed juice of the solanum *dulcamara*, externally; the last-named author exhibiting it internally at the same time. *Opium*, as well as other narcotics, is often necessary in order to alleviate the patient's sufferings, and with this view has chiefly been employed. I believe, however, that, when combined with suitable remedies, it is otherwise productive of benefit. The *volatile* and *fixed alkalies* have been exhibited by Barker (*New York Med. Repos*. vol. iv. n. 4.), Martinet and Barbette (*Journ. de Méd*. t. lvi. p. 559.); *antimonials*, by Rowley and Theden (*Bemerk*. b. ii. p. 86.); *barytes*, by Crawford (*Duncan's Med. Comment*. vol. xiv. p. 433.); *cinchona*, by Homburg, Vieussens, and Plenk (*Samml. von Beobacht*. i. n. 6.); the expressed juice of the *chelidonium* and the *sulphate of zinc*, by Berchelmann; *lime-water* by Vogel (*De Curat. Cancir. per Aquam Calcis Vivæ potam, &c.* Goet. 1769.); the *orobanche Virginiana*, by Barton and Bensell (*Philad. Med. Journ.*); an ointment with the juice of the *bardana* and *acetate of lead*, by Percy (*Hufeland N. Annalen*, i. p. 331.); *camphor*, by several authors; the *sedum acre*, by Buchoz and Quesnai; the *onopordum acanthium*, by Goelicke (*De Onopordo Carcin. Aver. &c.* Fr. 1739.), Handel, Juncker, and Ross; *myrrh*, by Nicolas (*Hufeland N. Annalen*, i. p. 362.); *fixed airs*, by Beddoes, Percival (*Essays*, ii. p. 73.), Ingenhousz, and Peyrilhé (*De Cancro*, p. 75.); *digitalis*, by Richter (*Chirurg. Bibl*. b. iv. p. 591.); the *hydro-sulphuret of ammonia*, by Burns; *petroleum*, by Rammazzini and Pierce; the *rhododendron chrysanthemum*, by Pallas; and *aconitum*, *sarsaparilla*, *guaiacum*, the *beccabunga*, the *phellandrium aquaticum*, &c. by various writers. All these have been prescribed both internally and externally, with little or no advantage, or with very temporary benefit only.

36. *g*. Of the numerous *external remedies* recommended at various periods, the preparations of arsenic and quicksilver; charcoal and carrot poultices; the mineral acids, particularly the oxymuriatic and chloric acids; the chlorurets, and many of the metallic salts; camphor, the balsams, and the terebinthinate substances; ammoniacum, galbanum, and myrrh; and the greater part of the astringent, antiseptic, detergent, and stimulating vegetable medicines, have obtained a greater degree of reputation; and, when some of them are judiciously combined with one another, and with narcotics, they are deserving of notice as discutients in the early stage of the disease, and as palliatives in its ulcerating state.

37. Frictions of the part were advised by Ponteau, and Young entertained sanguine expectations of the result of pressure, — a practice which, very recently, has received the support of Recamier, and several French physicians. M. Joubert states, that he has found small local blood-lettings, and the following pills, most serviceable in the different stages of cancer. (*Archives Gén*. vol. xvi. p. 282.)

No. 86. ℞ Saponis Medic. ʒ iv.; Gum. Ammoniaci ʒ ij.; Ext. Conii et Ext. Aconiti Nap. ʒ jss.; Massæ Pilul. Rufi ʒ j. M. Contunde benè simul, et divide in Pilulas gr. v.

He directs two of these to be taken night and morning, increasing the dose by an additional one daily, until twelve, fifteen, or even twenty, are taken, morning and night. The rest of the treatment consists in applying poultices of the recent conium; using deobstruent and solvent beverages, a mild diet and regimen, and wearing an issue or seton in the arm or thigh. This plan has likewise been advised by Dr. Lowassy, by whom it was first practised.

38. *h*. Sir A. Cooper expresses himself very strongly against low diet in this disease, — a practice which had been much insisted on by Mr. Pearson, Dr. Lambe, and Hufeland (*Journ. der Pract. Arzneik*. b. i. p. 289.) The opinion of Sir Astley is certainly in accordance with accurate observation, and rational induction. This very eminent surgeon states, that he has seen most benefit derived from Plummer's pill given at bed-time,

and stomachic tonics in the day, consisting chiefly of the bitter infusions, with ammonia, and the sub-carbonates of the alkalies. Some advantage was also derived from a pill, consisting of half a grain of stramonium, with two grains of camphor, given twice or thrice a day.

39. Since the introduction of *iodine* into practice, the preparations of it have been tried in the different stages of cancer by several physicians. The results of the trials which have been made of this substance are certainly such as ought to warrant the use of it in the early states of the disease. The cases recorded by Dr. Wagner (*Rév. Méd.* Juin, 1823.), and by Mr. Hill, of Chester, are much in favour of it. I have been consulted in two cases occurring in females between thirty and forty, for what was considered, by the attending practitioners, *scirrhus mammæ*, owing to the lancinating and remitting pains, and the diseased state of the nipple and axillary glands. They were both put upon a course of iodine (F. 328, 329.); and conium, with the sub-carbonates of potash, was given internally; a light nutritious diet, and strict attention to the state of the uterine functions, were also observed. Perfect recovery has taken place in both: but it appears doubtful whether or not they were genuine cases of scirrhus, notwithstanding the signs now alluded to were present. They had, however, withstood other means of cure for a long time. The treatment, in one of the cases, was chiefly conducted by Mr. Faxon, according to the above suggestions.

40. *C.* Conformably with the opinion stated above (§ 26.), I conceive that the treatment of this disease should be directed to the fulfilment of the following *intentions*: — 1st, To support the energies of life, by exciting the digestive functions, and the abdominal secretions and excretions; 2d, to soothe the morbid sensibility of the part, and promote the absorption of morbid depositions in its tissues, by means of anodynes combined with deobstruents and discutients; and, 3d, to impart vigour to the frame by suitable medicine, diet, and regimen. The remedies which are calculated to fulfil the first indication, may be often conjoined with those intended to accomplish the second and third; and both internal and external means may be simultaneously used, with those views. The medicines already enumerated comprise nearly all that have been found of any service in this distressing malady. But the advantage to be derived from them will mainly depend upon their combination and exhibition appropriately to the circumstances of individual cases.

41. The preparations of *iodine* given in very small and frequently repeated doses, with potass, and conium, or opium, will be found amongst the best remedies that can be used; inasmuch as, when exhibited in this manner, they are both tonic and deobstruent. They may also be used externally in the form of ointment; but one third of the proportion of hydriodate to the ointment usually employed should be prescribed, and friction with it ought to be of much longer continuance than commonly directed. Either stramonium, conium, opium, belladonna, hyoscyamus, or aconitum, may be given in various forms in the intervals between the exhibition of the iodine; and be combined with tonic infusions or decoctions, with the fixed or volatile alkalies, or with camphor in doses of from two to six grains. They may also be tried in conjunction with the preparations of arsenic, or of iron, or the chlorates of potash, soda, or lime, and as external applications also, when the disease has gone on to ulceration. In females, scirrho-cancer is generally connected, at its commencement, with disorder or the cessation of the menstrual discharge. In such cases, the preparations of iron with ammonia, or the fixed alkalies, and aloes, are sometimes of service. I have observed most advantage in these cases from frequent and full doses of conium, in the form of powder, given with the sub-borate of soda.

42. Tonic infusions, or decoctions, with liquor ammoniæ acetatis, or with the carbonates of the alkalies, and extract of conium, or the tincture of hyoscyamus; the oxymur. hydrarg. in the compound tincture of cinchona, or compound decoction of sarsaparilla; or small doses of blue pill, or hydrarg. cum creta, with camphor, and either of the narcotic extracts; the preparations of sulphur, and the sulphurets; the phosphates of iron, or this metal combined with ammonia, and conium; the sulphates of quinine and zinc; and the balsams and terebinthinates; may severally be employed.

No. 87. ℞ Decocti Cinchonæ ℥j.; Liq. Ammon. Acet. ʒ ij.; Liq. Ammon. ♏ xx.; Extr. Conii gr. vj.; Tinct. Capsici Annui ♏ viij. M. Fiat Haustus, ter die sumendus.

No. 88. ℞ Potassæ Sulphureti ʒ jss.; Pulv. Fol. Belladonnæ ℈ jss.; Saponis Castil. ʒj.; Gum. Ammoniaci ʒj. Syrup. Simp. q. s. Simul contunde, et divide massam in Pilulas lx. quarum capiat tres ad quatuor ter quotidiè.

No. 89. ℞ Infus. Anthemidis ℥ jss.; Liq. Potassæ ♏ x.; Tinct. Hyoscyami ʒ ss. M. Fiat Haustus, ter die capiendus.

No. 90. ℞ Hydrarg. cum Creta gr. j.; Camphoræ rasæ gr. iij.; Extr. Aconiti (vel Belladonnæ, vel Stramonii) gr. ss. ad gr. j.; Sodæ Sub-carbon. exsic. gr. viij.; Bals. Peruvian. q. s. ut fiant Pilulæ iij. mane nocteque sumendæ.

No. 91. ℞ Arsenici Albi gr. vj.—x.; Opii Puri gr. xij.—xx.; Oxydi Zinci ʒ ss.; Butyr. Recent. ℥ j.; Ceræ Flavæ Liquef. ʒ jss.; Longe triturat. misceantur exactiss. et f. Unguentum parti affectæ applic. (Harless, *De Arsen. Usu in Med. Norim.* 1811.)

No. 92. ℞ Extr. Conii mac., Balsam. Peruv., āā ʒ j.; Plumbi Acet. ℈ j.; Tinct. Belladonnæ ♏ xij.; Tinct. Opii Comp. (F. 729.) ℈ j.; Unguent. Ceræ ℥ j. M. Fiat Unguentum.

No. 93. ℞ Ferri Ammoniati ʒ jss.; Extr. Conii, ʒ j.; Pulv. Capsici Annui ʒ ss.; Extr. Aconiti gr. iv. Camphoræ rasæ gr. xv.; Extr. Aloës purif. ℈ j.; Syrup. Simp. q. s. M. Contunde benè simul, et divide in Pilulas xlviij. quarum capiat tres, ter, quaterve quotidiè.

No. 94. ℞ Herbæ Beccabungæ contus. ℥ ij.; Pulv. Capsici Annui ʒ jss.; Aquæ Ferventis O j. Macera benè et cola. Dein adde Liq. colat. Solut. Arsenici ʒ ij. (vel Chlor. Calcis ʒ jss.); Extr. Opii Aquos. ʒ j. M. Fiat Lotio, pro parte affecta.

No. 95. ℞ Balsam. Canad. ʒ jss.; Oxyd. Zinci ℈ ij.; (vel Sub-carb. Potassæ exsic. ʒ j.); Pulv. Folii Conii ℈ ij.; Pulv. Capsici ℈ jss.; Pulv. Tragacanth. Comp. q. s. ut fiat Massa Pilularis, quam divide in Pilulas xlviij. Capiat tres ter die; et augeatur dosis ad quatuor quater quotidiè.

43. *D.* Although the malady obviously has a constitutional origin, yet the propriety of *extirpating the affected part*, as soon as the true scirrhous character becomes manifest, may be conceded. After this is accomplished, the constitutional vice may be more successfully combated, and the reappearance of the local disease more probably prevented than at a later period. When, however, the system exhibits any of the symptoms of the cancerous cachexia, whether the adjoining glands be enlarged or not, nothing will be gained by an operation; but some advantage may still accrue from judicious and energetic medical treatment, particularly from tonics combined with anodynes, alteratives, and deobstruents. Whilst medical

measures have often obtained the credit they by no means deserved, from the circumstance of local diseases mistaken for scirrhus having been removed by them; so I believe that surgical operations have sometimes acquired reputation from the same cause.

44. During the treatment of this malady, attention must be especially directed to the secretions and evacuations. The bowels ought to be kept freely open, with deobstruent laxatives, combined with tonics and vegetable bitters. The diet should be nutritious, and easy of digestion. Pork, in every state, ought to be avoided, as well as other indigestible kinds of meat. Change of air, and of scene, with agreeable amusements, serve essentially in assisting the influence of a judiciously devised method of cure, and should, therefore, not be overlooked by the practitioner; and several of the tonic and deobstruent mineral waters are of use, particularly those of Bath, Tunbridge, Buxton, Spa, &c.

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CARCINOMA. See Cancer.

CARDIALGIA. See Indigestion.

CARDITIS. See Heart, *Inflammation of*, &c.

CATALEPSY AND CATALEPTIC ECSTASY.

Classif. 2. *Class*, Nervous Diseases; 1. *Order*, Comatose Affections (*Cullen*). 4. *Class*, Diseases of the Nervous Function; 4. *Order*, Affecting the Sensorial Powers (*Good*). II. Class, III. Order (*Author*, see *Preface*).

1. *Catalepsy* and *Ecstasy*, although treated of by some writers as distinct affections, generally present very nearly the same pathological conditions, as respects the presumed states of circulation in the brain, of vital energy, and of nervous influence; manifest similar morbid relations and complications, in their origin and progress; are so far modified in their symptoms, as frequently to pass insensibly into each other; and therefore require, according to such manifestations, a treatment in all respects the same. For these reasons I shall consider them, in this article, as varieties of the same species of disease; and, if nothing more be gained by thus connecting them, repetition will be, at least, avoided.

I. Catalepsy — Trance (from *καταληψις*, the action of seizing, and that from *καταλαμβάνω*, I seize). Syn. Καταληψις, Greek. *Catalepsia*, *Catalepsis*, *Catochus*, *Prehensio*, *Congelatio*, Auct. Lat. *Carus Ecstasis*, *Carus Catalepsia*, Good. *Entonia Catalepsis*, Young. *Catalepsie*, Fr. *Die Starrsucht*, *Katalepsis*, Ger. *Catalepia*, Ital. *Trance*.

2. Defin. *A sudden deprivation of sense, intelligence, and voluntary motion, the patient retaining the same position, during the paroxysm, in which he was at the moment of attack, or in which he may be placed during its continuance; the pulse and respiration being but little affected.*

3. This disease is very rare; so much so, that its existence has been doubted by many writers, who consider it to have been feigned. Its occasional occurrence is, however, well ascertained. I have seen one case of it in my own practice, and been consulted by letter respecting a second. I recollect, also, an undoubted example of it in an hospital, the practice of which I attended when a student. It presents no precise or undeviating train of symptoms, but varies in many particulars; the phenomena noticed in the definition being those most uniformly present. This varying character of the disease, according to the description given of it by authors, is owing to two circumstances; — 1st, to the modified state which it actually assumes, from the circumstances connected with its origin; and, 2dly, to certain of its phenomena having been more particularly noticed by some authors than by others, who have either mentioned them incidentally, or entirely overlooked them.

4. Symptoms. — This is an intermittent and apyrexial disease, occurring in paroxysms of variable duration; and generally after very irregular intervals. The seizure is occasionally announced by premonitory symptoms, — by headach, mutability of temper, yawning, tinnitus aurium, vertigo, palpitations, lassitude, pain or slight spasm of the limbs or neck, confusion of mind, &c.; but it is commonly sudden, — the patient retaining the same expression of the countenance, and posture of the body, as at the moment of attack. The eyes are fixed, are open or shut, the pupils usually dilated, but contractile from a strong light; and, from their unvarying expression, and the unchanged attitude, the body has the appearance of a statue. Any position, in which the head, trunk, or limbs are placed, is retained without deviation; the passive contractility of both the flexor and extensor muscles being such as to adadmit of a change as well as retention of the position during the paroxysm. The evacuations are either suspended during the fit, or passed involuntarily.

5. After a very indefinite duration — sometimes of only a few minutes, at others of several or even many hours, but rarely of days — the patient is restored to consciousness. In a remarkable case, however, detailed by Dr. Burrows, the fit lasted many days. Restoration is usually instantaneous, accompanied with sighing, and followed by pain or confusion in the head, and a sense of fatigue and lassitude. The patient has no recollection of what has passed during the fit: and the same ideas, and, according to some, even the same sentences, which had been suspended by the seizure, have been pursued, the moment of recovery.

6. The countenance, during the paroxysm, is sometimes little changed; at other times, it is paler than usual; but it is more commonly slightly suffused, and the pulsations of the carotids more forcible than natural. The respiration is variable, sometimes it is embarrassed: the temperature of the surface is also unequal; being generally depressed in the extremities and increased in the head, evincing an irregular distribution of the circulation. The pulse is occasionally very slow: Sauvages found it only 50; but it is more commonly quick and small. The senses are so entirely abolished, that the patient may be pinched, without feeling it; and he cannot hear the loudest noises. The state of the muscles during the attack varies somewhat in different cases. They are often slightly rigid, but not to the extent of preventing the easy change of position of the limbs; and sometimes the position so permanently retained is one, which no person in health could so long preserve. M. Georget states, that the muscles often present a degree of tetanic rigidity; but this is only sometimes the case, particularly when the disease is more nearly allied to *Ecstasy*. In some cases, it would seem as if a partial state of volition existed, of which the patient either had no consciousness, or a very imperfect consciousness at the time, and consequently, no recollection of the act subsequently, as in some states of sleep.

7. In the more complete seizures, sense, intelligence, voluntary motion, and consciousness, are entirely abolished; but, in some instances, the abolition is only partial; the patient being conscious, but incapable of moving or speaking. This imperfect form of the disease has very generally received the appellation of *catochus* from nosologists; and numerous instances of it are on record. A very marked case, and nearly approaching to fully formed catalepsy, is recorded in the *Edinburgh Medical Commentaries*, by Dr. Fitzpatrick; and slighter grades of it have been met with as a subordinate symptom of chronic nervous diseases, particularly of the severe and obstinate forms of hysteria. In a case, however, of well-marked *catochus*, in a female, detailed by Dr. Lubbock, no hysterical symptoms existed; and, instead of unusual susceptibility of the system having been observed, in this and other cases which he had met with, more than common torpor was apparent. M. Petetin and others, who believe in animal magnetism, conceive that sensation, instead of being lost for the time, is concentrated towards the epigastric region; and that the intelligence, so far from being altogether abolished, is exalted to a degree to amount almost to prophecy. But these opinions can only be applicable to ecstasy.

II. Cataleptic Ecstasy. *Ecstasis*, *Ecstasy* (from εκστασις, from εξίστημι). Syn. *Extase*, Fr. *Entzückung*, *Begeisterung*, Ger. *Estasi*, Ital. *Ecstatic Trance*.

8. Defin. *Suspension of consciousness of external objects, and of voluntary motion, arising from, and attended by, a high degree of mental excitement and abstracted contemplation, the muscles continuing more or less rigidly contracted, or only partially relaxed.*

9. Under the term ecstacy, Dr. Good has described a variety of catalepsy, but little different from the usual appearance of that form of seizure, instead of the particular modification of disease to which the name ecstasy has usually been applied. This variety of cataleptic disorder is generally induced by mental excitement and sustained contemplation of some particular subject, most generally of religious topics, and of those exciting the affections and passions. The patient suddenly seems mentally struck, or carried away from all external objects; either standing or sitting in a most excited and impassioned position, with the eyes fixed and open; and sometimes uttering either the most enthusiastic and fervid expressions, or the most earnest denunciations and warnings, or the most absurd exclamations, with the feeling or belief of their reality; and total abstraction from, or unconsciousness of, all surrounding objects or persons.

10. This affection is variously modified. In some cases it very nearly approaches to pure catalepsy; in others, to a sort of maniacal excitement. Dr. Chisholm records an instance of this latter state in a young female, in whom it alternated with mania; and I was consulted by a practitioner in the country, respecting a most marked case occurring in a religious young lady, where it was evidently connected with, if not consisting of, an exalted form of hysteria. During the attack, she sung and composed long doggerel strains. Many of the cases which have lately made so much noise in this metropolis, under the idea of inspiration with "unknown tongues," evidently belong to this affection; at least, such of them as have not been feigned. The effects produced by the practisers of animal magnetism, upon nervous persons, sometimes appear allied to this affection. Many of the Italian improvvisatori are possessed of this faculty only whilst they are in a state of ecstatic trance, similar to this disease. And few of them enjoy good health, or consider their faculty otherwise than a morbid one.

11. The Terminations of Cataleptic and Ecstatic Seizures are generally either in health, or in disease of the cerebral functions. They may pass into mania, epilepsy, or confirmed insanity. Dr. Burrows's case, already alluded to, was complicated with mania, following excited and ungratified passions, and interruption of the menses. Recovery, however, took place, and the patient afterwards bore children. Dr. Gooch met with a case which supervened on, and was followed by, melancholia. J. Frank treated a case of catalepsy, that terminated in mania, of which the patient at last recovered; and Behrends details the history of a case complicated with mania. Pinel records a case of catalepsy which terminated in apoplexy. Rostan states, that he has observed a case in which inflammation of the lungs was associated with it. In many instances, these affections terminate, as they commence, in most severe hysteria; with which a very large proportion of them are more or less intimately allied.

12. But little is known of their relation to morbid states of the brain or viscera. Holier, however, informs us, that he found the vessels of the brain and cerebellum distended with black blood, and slight extravasation in a case which terminated fatally. Lieutaud and Ab Heers make mention of fibrinous concretions formed in the longitudinal sinus, with disease of the lungs and liver. According to the state of the counte-

nance, temperature of the head, and action of the carotid arteries, during the fit, it may be inferred that active congestion, or an efflux of blood, far beyond what obtains in health, takes place to the brain, and is instrumental in the production of the disease.

13. Prognosis. — These affections do not appear to be attended with much danger. The fully formed cataleptic seizure is, however, a serious disease. The cases already adduced in illustration of its termination are sufficient to indicate this. Fatal cases are, however, noticed by Holier, Dodonæus, and the authors just quoted. Aetius, De la Tour, Fahr, and Sauvages, state that they have seen it disappear after copious epistaxis, and return of the menses.

14. Causes of Cataleptic Seizures. — *A*. The *predisposing causes* are, whatever diminishes vital power, and increases the susceptibility of the nervous system, particularly the depressing passions, violent and continued sorrow, great anxiety, unrequited affection, intense and sustained mental applications, religious contemplations, exhaustion from repeated miscarriages or severe confinements, and excessive venereal indulgences and manustupration. The hysterical, hypochondriacal, and melancholic temperaments, are evidently most disposed to these attacks. They occur at all ages, from six or seven years till old age; but they are very rare before puberty; and are much more frequent in females than in males.

15. *B*. These affections are most commonly *excited* by some violent mental impression; by certain of the above predisposing causes, when acting intensely, particularly religious enthusiasm; great mental application, and the passion of love; frights, terror, or uncommon dread; the irritation of worms in the prima via; suppression of the menses, of eruptions and accustomed discharges; injuries of the head (Stark); concealed mental emotions, and ungratified passions; and disturbance of the uterine functions. Renard (*Hufeland's Journ. die Pr. Heilk.* June, 1815.) relates a case which was occasioned by disease of the ovaria. Sprengel states, that these seizures are induced by onanism. J. Frank remarks, "nunquam catalepsin in Judæis observavi, ac onaniæ vitium rarius inter eos, quam alias apud gentes inveni." (*Prax. Med. Univ. Præcip.* v. ii. p. 487.) I believe that many cases in females are chiefly exalted or more severe states of hysterical affection; and more or less connected with disorder of the nerves and circulation in the uterus and ovaria.

16. Diagnosis and Prognosis. — The practitioner must not overlook the fact of all those affections being frequently feigned, particularly by females, even by those in good circumstances, and when there can be no end to serve by the imposture further than to create interest in their behalf. Although cataleptic and ecstatic seizures pass insensibly into each other, and are in their nature obviously very intimately related, yet their more extreme and distinct forms are very different. In the *former* affection, the patient resembles a statue, is entirely deprived of voluntary motion, and is perfectly mute: in the *latter*, the countenance is animated and earnest; the muscles are more or less rigid; the patient talks, exclaims, or even sings with the utmost ardour; and the character of the whole frame is that of the most abstracted and intense contemplative excitement; consciousness of all other objects and ideas, excepting of the particular subject by which the mind is excited, being abolished: but the conscisciousness is often of a morbid or imaginative kind; the patient conceiving, as in the instances adduced by Tissot, that he has seen wonderful visions, and heard singular revelations. *Ecstacy* may be confounded with *somnambutism* and *reverie*. The excited, and, as it were, inspired appearance of the patient, in the former affection, is sufficient to distinguish it from the more passive character of the latter, in both of which he resembles a person half asleep, or sleep-walking. The statue-like appearance and muteness of the *cataleptic* are alone sufficient to distinguish this disease from these latter affections. (See § 4—6.).

17. Catalepsy may also be mistaken for asphyxia, syncope, apoplexy, and even for death itself. The total suspension, however, of respiration and circulation, the deep colour of the lips and countenance, in *asphyxia*; the flexibility of the limbs, great paleness of the face, and the scarcely perceptible performance of the respiratory and circulating functions, in *syncope*; and the congestion of the head and face, the stertorous breathing, relaxed and flexible limbs, and the attendant paralysis, in *apoplexy*; are sufficient of themselves to distinguish it from any of the modifications of the affection now under consideration. It is possible, also, that a cataleptic patient may be considered as being dead. There are many instances on record, where persons in a state of trance have narrowly escaped being buried alive; and there is even reason to suppose that, in countries where burial usually takes place much sooner after dissolution than in this, such a circumstance has actually occurred. But this could never have occurred, unless the respiration and pulse had been suppressed, and the countenance pale. The stethoscope may now possibly prevent such an occurrence from taking place, by detecting the feeble action of the heart, which can never be altogether extinct in catalepsy. The states of the sphincters, and of the cornea, and the temperature of the trunk of the body, will further serve to prevent so distressing a mistake from ever occurring, even independently of due reservation of the body from inhumation, till indubitable proofs of death show themselves. As to discovery of feigned seizures of these affections, the general characters of the case, and the practitioner's own acumen, must be the chief guides.

18. Treatment. — When we consider that evidence of determination, or of active congestion, of blood in the head, has generally been furnished in these affections, the propriety of *vascular depletion* will not be disputed. If the signs of general or local plethora be very manifest, and if the disease have any relation to suppression of the menses, cupping between the shoulders, the application of a number of leeches to the nape of the neck and behind the ears, stimulating pediluvia, and bleeding from the feet, should be employed. If the temperature of the head, and the action of the carotids be increased, the *affusion of cold water* on the head, or the use of cold or evaporating lotions in this quarter, whilst the lower extremities are plunged in warm water, will be of service. In addition to these, *purgatives* should be given by the mouth, and repeated; a constant, but moderate action, being thereby exerted upon

the bowels; and antispasmodic or turpentine enemata should be administered from time to time. (See F. 130. 135. 150. 152.). The aloetic purgatives (F. 450—455. 470. 518.), are particularly eligible, when the affection is connected with irregularity of the menstrual evacuation. **Diedier** advises active hydragogue cathartics.

19. The above means are equally applicable to the paroxysm, and the interval, or suppression of accustomed evacuations, in cases characterised by plethora, or local determination of blood. If resorted to in the fit, they may be conjoined with various *antispasmodics*, as valerian, musk, ether, assafœtida, camphor, ammonia, &c., and volatile stimuli may be occasionally held to the nostrils, when the face is pale, and signs of determination of blood to the head are wanting.

20. The utmost attention should be directed, during the intervals, to the state of the uterine organs. If signs of congestion or of irritation are detected in this quarter, *cupping* on the loins, the application of *leeches* to the groins and tops of the thighs, and the internal use of the boracic acid, or of the sub-borate of soda, combined with refrigerants and anodynes, should be resorted to. The frequent association of these complaints with hysteria indicates the propriety of having recourse to a nearly similar treatment to that recommended in it, and to the same appropriation of medicinal means. **Behrends** attaches considerable importance to the state of the stomach and prima via in cataleptic seizures. There can be no doubt of the functions of these organs being often impeded or disordered, and of the propriety of restoring them to a healthy state. This can be done only by a judicious combination of *tonic* and *aperient*, or of *deobstruent* medicines.

21. When these affections have arisen, as they not infrequently do, from depressing or exhausting causes, the judicious combination of *tonics* with gentle aperients and *antispasmodics*, will be of much service. The shower-bath, salt water bathing, change of air, tonic and deobstruent mineral waters, regular exercise, early rising, and mental amusement, will be most advantageous in such cases. Several of the causes of the disease are both of an exhausting nature, as respects the constitutional energies, and of an exciting kind, in regard of the cerebral organs, particularly some of those which induce the ecstatic form of seizure (§ 8—10.). In these, it will be necessary to diminish the local determination to the brain, which is generally present, by the means indicated above (§ 18.), whilst we soothe the nervous system, and restore the digestive functions and the energies of the frame. To accomplish these ends, we must resort to a combination or alternation of tonics with anodynes, antispasmodics, and aperients (F. 453. 572.), keeping at the same time the head cool, the secretions and evacuations free, the mind amused and disengaged, the feet warm, and the blood as regularly distributed throughout the body as possible.

22. When the disease is complicated with mania, melancholia, or epilepsy, similar means to those already stated may be employed, appropriately to the state of vascular excitement and vital powers, and to the symptoms more immediately connected with the brain and the uterine organs. In several cases of these complications, full and frequent doses of calomel will be of service, and, under careful supervision, it may be judicious to exhibit, in conjunction with anodyne, nervine, or antispasmodic remedies, the milder preparations of mercury, until the mouth is slightly affected. In all cases where the above means fail of producing the expected effect, and particularly in these complications, issues, or setons, perpetual blisters, or the tartarised antimonial ointment, or moxas, should be directed to the nape of the neck, the occiput, or behind the ears, and perseveringly continued. In most instances, whether simple or complicated, after the affection of the mouth by mercurials, or the long continued use of setons, &c., the more tonic and restorative means advised above should be prescribed. Amongst the various antispasmodic medicines recommended by authors on these affections, I may notice the different antispasmodic gums, by **Stark** (*Klin. Instit.* p. 172.); the ammoniated copper, by **Theussink** (*Samml. Auserl. Abh. für Pract. Aerzte*, b. xvii. p. 279.); electricity, by **Ledra** and **Sigaud la Fond** (*De l'Elect. Méd.* p. 396.); the cautery to the occiput, by **Blankard** (*Collect. Med. Phys.* cent. v. No. 18.); and cinchona combined with valerian. The different preparations of iron, and various antispasmodics, have been recommended by Dr. **Lubbock**, and exhibited by him in a case where, however, they appeared of little service, most advantage having been derived from travelling, pure air, and agreeable mental occupations. (*Edinb. Med. and Surg. Journ.* vol. i. p. 61.). During the whole course of treatment, the strictest reference ought to be had to the nature of the predisposing and exciting causes, the habits and practices of the patient, and to his diet, and physical and moral regimen.

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CATARRH. — **Simple Catarrh.** **Syn.** *Catarrhus* (from καταῤῥέω, defluo). *Gravedo, Coryza, Bronchos, Catarrheuma, Fluxio, Rheuma, Capiplenium*, Auct. Var. *Catarrhus simplex*, Richter. *Phlegmhymenitis* (from φλεγμα, mucus, and ὑμεν, a membrane), Hildenbrand. *Catarrhe, Rhume, Fluxion,* Fr. *Ein Fluss, Schnupfen, Katarrh,* Ger. *Catarro, Reuma,* Ital. *A Defluxion, a Cold.*

Classif. 1. *Class,* Fevers; *Order,* Fluxes (*Cullen*). 3. *Class,* Sanguineous Function; 2. *Order,* Inflammations (*Good*). II. Class, I. Order (*Author,* see *Preface*).

1. Defin. *Sneezing, watery discharge from the nostrils; lachrymose state of the eyes; slight gravative headach, chillness, evening fever, sometimes accompanied with sore throat, hoarseness, and cough.*

Path. Defin. *Specific irritation of the mucous surface of the nostrils, extending to the frontal sinuses and eyes, in one direction; to the posterior nares, fauces, and throat, in another; and occasionally also to the pharynx, œsophagus, glottis, and trachea, thus terminating in catarrhal bronchitis.*

2. Although the most common of all diseases, there are few which are less understood, or have called forth a greater diversity of opinion, than catarrh. This uncertainty is chiefly owing to its varying characters, arising from the limitation or extension of its seat, the temperament and habit of body of the patient, the causes which occasion it, and the severity of the attack. If the affection be not extended much beyond the Schneiderian membrane, it very generally receives the name of *coryza,* or catarrhal coryza; if it be seated in the frontal sinuses it is called *gravedo,* or catarrhal cephalalgia; if in both these situations, a cold in the head; if the fauces be its principal seat, catarrhal cynanche, or catarrhal sore throat; if the glottis and pharynx, catarrhal cough and hoarseness; if it advance to the trachea and bronchi, catarrhal bronchitis; and if the eyes be primarily affected, catarrhal ophthalmia. It may thus be limited to any one of those situations, or be extended to two, or more, or even all of them, according to the predisposition of the parts and of the person affected. It may even proceed further, as to the air-passages on the one hand, or to the œsophagus and digestive organs on the other, after having subsided in, or disappeared from, its primary seat; and it may even be coexistent in several, or even all of these situations.

3. If we consider the origin and phenomena of catarrhal affections, we shall observe many characters warranting an analogy between them and rheumatism on the one side, and erysipelas on the other. Catarrh is a disorder proper to mucous membranes, and is not limited to the parts of this tissue above specified. The same causes which occasion it in them, will sometimes, although much less frequently, excite it in other parts of this system, according to morbid predisposition of the organs. Rheumatism is an affection of the fibrous, sero-fibrous, and aponeurotic structures, and generally proceeds from the same or very similar causes to those which produce catarrh; they are both also often present at the same time, and in the same person, and the epidemic prevalence of both is not uncommon. Erysipelas is an affection of the skin, also often depending upon similar causes to those which produce catarrh and rheumatism, particularly those connected with the states of the atmosphere; and all of them are benefited more or less by a nearly similar treatment. Neither of these diseases is the same as true inflammation, although presenting more or less of the inflammatory characters, but also some which are proper to each. On this account, therefore, should they be viewed, even when approaching the nearest to inflammation, as essentially specific diseases; possessing, however, certain symptoms in common with one another, and with inflammation; the same causes acting on a certain number of individuals, producing catarrh in many, rheumatism in some, erysipelas in a few, and true inflammation in others, according to the diathesis, habit of body, state of the abdominal functions, previous disorder, &c. of the affected.

4. I. Causes. — *A.* The *predisposing causes* of catarrh are referrible chiefly to original conformation and diathesis, and to previous disorder, particularly as respects the state of the digestive and assimilating organs. It most frequently affects persons of a phlegmatic temperament, relaxed habit of body, and delicate constitution, or who are weakened by any cause, particularly by morbidly increased secretions and discharges; also those with long necks and narrow chests, or who indulge in warm apartments and beds, who rise late, and take little exercise in the open air. It is very common among the inhabitants of cold, moist, and changeable climates, more particularly during spring and autumn, and in variable or wet seasons; and in persons whose digestive organs are deranged, the functions of the liver torpid, and whose biliary organs and alimentary canal are loaded by morbid or accumulated secretions.

5. *B.* The *exciting causes* of catarrh are most commonly cold and moisture, or other states of the air, which either are or are not perceptible to the senses, but which impede or check the insensible cutaneous perspiration, and change the functions of those parts of the mucous surfaces most obnoxious to their first impression. That there is something in the air, often producing catarrh, beyond what is perceived by our senses, is shown by the very general or even epidemic prevalence of the affection during states of the weather and of the air, in which nothing peculiar can be observed. Its great frequency, particularly in certain localities and seasons, has induced some authors, amongst whom Dr. Macculloch is pre-eminent, to impute it to a diluted or generally diffused malaria proceeding from the usual sources of this active agent of disease.

6. Change of locality, whilst it will often remove a cold, will also frequently occasion it, especially in some constitutions; and a current of air, particularly if it come directly on the face, is a very common cause. The occurrence of catarrh on travelling and visiting places at a distance has been attributed to malaria; and this may very possibly be the case in many instances. Whenever I have gone any distance into Essex, I have returned with catarrh. It is very commonly believed by unprofessional persons, that the disease is infectious; from the circumstance of its commencing in one member of a family, and attacking others successively. This spread of the ailment, however, may be in a great measure owing to the diffusion of the same cause in the atmosphere, whether it be a much diluted or weak local malaria, or a more widely

spreading epidemic influence. Still I believe that there are some grounds for the popular belief. Although these causes will explain much of what is imputed to infection; still, it may, either of itself occasion the disease, or, when superadded to them, induce an attack in those whom the states of the air, without such aid, might have spared. When catarrh is occasioned by local or generally diffused influences, it may not only thereby assume an infectious character, but really possess it; thus countenancing the opinion of Dr. Cullen, that the epidemic prevalence of the disease only is infectious; yet, still, I question if this limitation be just. There can be no doubt, however, that when it arises from epidemic, malarial, or infectious sources, it is usually febrile and severe, and very prone to extend along the air-passages on the one hand, and to the digestive mucous surface on the other, particularly the former; while catarrh, arising from the more common causes of cold and moisture merely, in any one of the many ways in which these causes are applied to, and affect either the whole or parts only of the frame, is more commonly seated in the cephalic mucous surfaces, assuming the form of cold in the head, coryza, or sore throat, and quickly subsiding. It should not be overlooked, also, that sudden change from a low to a high temperature, or from a very dry to a very moist air; and even the being more than commonly overheated, without any very apparent chill, or exposure to cold in any form subsequently; will often produce catarrh. This is especially the case, if the exposure to warmth be sudden, after an impression of cold of some continuance, as the coming into an overheated apartment out of a cold and moist atmosphere,— the instantaneous transition from a raw air of about 32° to a dry air of upwards of 70°.

7. II. Symptoms.—Owing to the circumstances already alluded to (§ 2.), catarrh manifests itself in various forms; but most commonly in the following manner: — *A. Its slighter states.* At a period generally varying from a day or two, to six or seven, but occasionally after even a shorter or longer time, from exposure to the cause, this affection commences with a sense of chilliness or coldness, lassitude, and heaviness of the head, followed by dryness, fulness or stuffing of the nasal passages, frequent sneezing, a dull pain and sense of weight in the forehead, and stiffness, or rather uneasiness, in the eyes. To these is more or less quickly added a distillation of a watery fluid from the nose and eyes, with slight redness and tumefaction of the mucous surfaces of these parts. Occasionally the above symptoms appear nearly simultaneously. The defluxion is generally somewhat acrid and saline, producing slight excoriation of the parts over which it passes. These phenomena constitute the *gravedo* of Celsus, and the coryza or *defluxion* of various authors. They may be the only ailment, and not proceed further, or they may have others rapidly superadded to them, depending upon greater constitutional disturbance, and the extension of the affection to a larger surface. In the former case, the general lassitude and chilliness ushering in the complaint are often so slight as to be overlooked; but, in the latter case, and in the severer states of the disease about to be noticed, they are commonly more marked from the commencement and amount even to slight shiverings, followed by white tongue, acceleration of pulse, and increase of heat in the evening. The posterior nares and fauces, as well as the nose and eyes, are affected; and the patient complains of a sense of roughness, or soreness of the throat; loss of the sense of smell; sometimes of dulness of hearing, with soreness or pain extending along the Eustachian tube to the ear, with slight redness of the fauces and mouth, hoarseness, frequent tickling cough and efforts to excrete a mucous fluid abundantly secreted from the posterior nares, fauces, pharynx, and trachea; and sometimes with a loss or suppression of voice, from slight œdematous fulness about the glottis. To the foregoing are very commonly added, pains resembling those of rheumatism in various parts of the body, particularly about the neck, head, and limbs, loss of appetite, costive bowels, and slight thirst.

8. *B. Its severe forms.*—The above symptoms constitute the usual form of simple catarrh, which frequently subsides in from three, to seven or eight days; the fluid secreted becoming gradually less copious, more opaque and coloured, and, at last, thick, small in quantity, and yellowish white, or yellowish green; all disorder quickly disappearing. But in very many other instances, as the coryza and watering of the eyes subside, straitness, oppression, and uneasiness in the chest, supervene; with fits of coughing, and all the symptoms described under the *catarrhal* form of Bronchitis. In other cases, the symptoms indicate, from the beginning, a more severe affection, and a more evident constitutional disturbance, approaching more nearly to a state of inflammatory irritation of the mucous membrane of the cephalic passages, than the preceding form. In this case, the coryza and watering of the eyes are attended by much soreness and heat of the eyes, nostrils, fauces, and throat; by frequent sneezing; and by the secretion of a very copious, watery, and colourless fluid, excoriating the parts over which it passes. The fauces are red; the tonsils somewhat inflamed and enlarged; and there is a short, dry, tickling cough. The fever, which, in the slighter state of disease, was scarcely noticed, is much more evident in this, particularly towards evening; and is ushered in by chills, or shiverings, the chills often continuing throughout, and preceding the evening febrile exacerbations; catarrhal fever usually thus assuming a remittent type. The pains felt in different parts of the body, and the general lassitude, cough, anorexia, sluggishness of the bowels, and thirst, are also greater in this, than in the preceding state of the affection.

9. Throughout the disorder, the patient is unusually susceptible of the impression of cold, even although the skin be warmer than natural. He is also inordinately disposed to experience an accession of, or to contract a fresh cold, upon the slightest exposure to its causes, or even to the least depression of temperature. Owing to this circumstance, catarrhs are often very much prolonged, and either assume a chronic form, or induce chronic bronchitis, and other serious affections of the air-passages and lungs.

10. *C. Progress and terminations.*— This form of catarrh either disappears, as in the slighter states of the disorder, with a diminished and

thickened secretion, less frequent and less severe fits of coughing, and subsidence of fever, in from four, to seven or nine days; or it affects, in a much shorter period,—sometimes almost from its commencement,—the pharynx, trachea, and large bronchi, producing slight or severe bronchitis; or it terminates in this disease, or in pneumonia, or even in pleuritis. But most commonly, under proper management, it is attended merely by a moderate catarrhal affection of the trachea and bronchi; with fits of coughing, increased mucous expectoration, &c., constituting catarrhal bronchitis. It also sometimes extends down the œsophagus, and affects slightly the stomach, inducing numerous dyspeptic symptoms; and, in persons with an irritable state of the digestive tube, occasionally passing off at last with mucous or serous diarrhœa.

11. III. PROGNOSIS.—In general, catarrh is a very slight ailment, and attended with no danger as respects itself. But, in aged persons, in those disposed to pectoral diseases, particularly those who may have tubercles already formed in the lungs, who have had hæmoptysis, or who are asthmatic, or have experienced attacks of bronchitis, pneumonia, or pleuritis, catarrhal affections require strict attention, as they very often quickly produce, or terminate in, these maladies. In many persons, also, they are very prone to become chronic, either in the form of a chronic *coryza*, with continued irritation, and slight redness of the posterior nares and fauces, and an abundant muco-puriform discharge; or in some one of the states of chronic bronchitis. In the aged, and in those of a phlegmatic temperament, or lax habit of body, catarrh often passes into a chronic bronchial flux, when it has been neglected, or renewed by incautious exposures during the treatment. Children of a lymphatic and flaccid habit of body are very liable to catarrh in the form of *coryza*; and in them it very frequently assumes a chronic form; the thick muco-purulent secretion filling up the nares, and, in infants, preventing them from taking the breast, and rendering them irritable, each attempt at sucking disordering the pulmonary and cerebral circulation in such a manner as even to occasion convulsions. In children also, the *coryza*, when allowed to become chronic, sometimes degenerates into *ozæna*, with ulceration.

12. IV. COMPLICATIONS.—Catarrh very commonly ushers in the febrile exanthemata, particularly measles; and even accompanies them through their course, especially in the form of bronchitis. It is also very liable to appear during convalescence from them. Its connection with rheumatism has already been noticed (§ 3.), both disorders evidently springing from the same causes. Continued fevers, as well as some epidemic visitations of fever, are not infrequently complicated with catarrhal affections. The association of catarrh with biliary and gastric derangements is very common, sometimes in consequence of the disposition to be affected by its causes during biliary disturbance, and occasionally owing to the circumstance of simultaneous disorder of the digestive, cephalic, and respiratory mucous surfaces, having arisen from the impression of the same exciting causes. These complications have especially characterised the various occurrences of *epidemic catarrh*, which have been observed. (See art. INFLUENZA.)

13. V. The NATURE OF CATARRH is deserving of some notice. Many pathologists, particularly those of the modern Parisian school,—the followers of LAENNEC and BROUSSAIS,—consider it as ordinary inflammation of the cephalic mucous membranes, or parts of this tissue which it usually affects. Other pathologists, more especially RICHTER and HILDENBRAND, view it, with stricter propriety, as an inflammation of a specific kind. I believe, although it very often terminates in true inflammation when it extends to the bronchial tubes, that it chiefly consists of a specific irritation of that portion of the mucous surface primarily affected by it, nearly allied to inflammation, and soon followed by, or accompanied with, great increase of the secreting functions of the part; or, in other words, that it is not pure inflammation, but an irritation of a specific or peculiar kind, attended by slightly increased vascularity, afflux of the circulating fluids, and augmented secretion. Since the time that VAN HELMONT ridiculed, in his *Catarrhi Deliramenta*, the opinions then entertained respecting catarrh, enquiries into its nature have been more rational, although, up to the present time, ideas have still continued very vague as to the extent of surface affected by it, many even of modern writers comprising under catarrh, not only bronchitis, but even all affection of mucous surfaces, attended with a copious serous or sero-mucous discharge.

14. One of the most interesting questions connected with this subject, and one which has been agitated by J. P. FRANK and others, is, whether the defluxion is a consequence of the suppression of the cutaneous perspiration, arising out of the irritation which the secretion retained in the circulation produces upon the cephalic and pulmonic mucous surfaces; or of the specific irritation and morbid impression of those parts by the exciting causes of the disease. The former opinion was very generally received by the followers of the humoral pathology; and the latter by HOFFMANN, and subsequently by CULLEN, PINEL, and other disciples of his school. PINEL considered the febrile phenomena merely as symptomatic of the inflamed mucous membrane, discarding the plausible opinion advanced by BOTAL, that whatever of inflammation exists is caused by the acrimony of the catarrhal discharge, and that the local ailment is consecutive of the constitutional disturbance,—a doctrine which is in strict accordance with the description of the disease given by RICHTER, and with the more usual succession of its phenomena. In some cases, however, it is very difficult to determine the priority of the general disturbance, the local ailment being equally early. Upon the whole, I believe it is not proved that the constitutional affection is the consequence of the local, although the former is generally increased in proportion to the severity of the latter; nor does it appear that the defluxion is caused by the suppression of the cutaneous perspiration, even granting that suppression is actually produced,—a position by no means established. I would thence infer that the causes of catarrh affect primarily the organic nerves supplying the surface principally disordered, and, through them, the system generally; and that,

owing to this change, the secreting functions and circulating actions of the part primarily or specifically impressed, are altered, and the disease fully developed; its chief modifications arising out of the degree to which the constitutional actions are disturbed, of the extent of surface affected, and of the grade of irritation produced in the capillaries of the part.

15. VI. Treatment. — The treatment varies much according to the symptoms and periods of the disease. Immediately upon the approach of catarrh, before febrile exacerbation has appeared, and whilst ailment is limited to the cephalic mucous surfaces, very opposite means to those required when fever is present, or when the affection has extended to the trachea, and threatens to produce bronchitis, are generally most serviceable. Under the former circumstances, a judicious exhibition of stimulants of any kind, but especially stimulating diaphoretics, will either cut short the disorder, or render it much shorter and more mild; whilst, in the latter state, particularly when any pectoral symptoms have appeared, considerable risk will be incurred in some constitutions, although either little or none in others, of inducing inflammatory action by the same measures.

16. Early in the disease, therefore, and while a copious defluxion has not come on, the patient may inhale through the nostrils the vapour of warm water, or of any emollient and anodyne decoction or infusion: if the ailment is no more than a coryza, or cold in the head, febrile action not having appeared, he may take, upon going to bed, an active stimulating draught, consisting chiefly of ammonia, camphor, spirit. æther. nitrici, &c., with or without a narcotic. Either of the following will be used with advantage as long as febrile action, or any acute affection of the bronchi, has not appeared: —

No. 96. ℞ Spirit. Æther. Nit. ʒj.—ʒiij.; Tinct. Camphoræ Comp. ʒj.—ʒij.; Mucilag. Acaciæ ʒij.; Spirit. Anisi ʒj.—ʒij.; Liq. Ammon. Acet. ʒij.; Mist. Camphoræ ℥j.; Syrup. Tolutan. ʒj. M. Fiat Haustus, horâ somni sumendus.

No. 97. ℞ Camphoræ rasæ, gr. iij.—vj.; Ammon. Subcarbon. gr. vj.—x.; Pulv. Ipecac. gr. j.; Extr. Hyoscyami gr. vj.; Conserv. Ros. q. s. ut fiat Bolus, h. s. s.

17. The above draught will often arrest the disease, when given sufficiently early. In some cases I have directed the bolus to be taken with it, either the hyoscyamus or the tinct. camph. co. being omitted. On the following morning, a stomachic aperient may be taken; but nothing more is necessary, not even diluents, as, at this period, they will have little further effect than to increase the defluxion. When the pulse becomes accelerated, and somewhat fuller or harder than natural, with other signs of febrile action; or when the throat is more or less affected, and particularly if there be irritation about the glottis and trachea; a different practice is required. Diluents will now be of service, particularly in conjunction with emollients, diaphoretics, &c. Any of the medicines of this description in the *Appendix* (F. 238. 244.), or those denominated pectoral (F. 389. 426.), will be of service; or the following may be used. Richter states, that the first of these has generally been employed by him early in catarrh.

No. 98. ℞ Calomel gr. j.; Extr. Hyoscyami gr. ij.; Gum Acaciæ Pulv., Sacchari Albi, āā gr. xv. Misce et fiat Pulvis. Dispens. tales quatuor. Sumat æger tertia quaque hora unum.

No. 99. ℞ Mucilag. Acaciæ ʒj.; Mist. Camphoræ et Mist. Amygdal. Dulc. āā ℥ss.; Liquor. Ammon. Acet. ʒiij.; Tinct. Camphoræ Co., Spir. Æther. Nit., āā ʒss.; Syrup. Tolutan. ʒss. M. Fiat Haustus, quartâ vel quintâ quâque horâ capiendus.

18. Whenever we deem it requisite to act moderately on the bowels, either in the course or at the decline of the complaint, a full dose of the flour of sulphur, either with, or without cream of tartar, will be found to act most beneficially, both on the catarrh and on the abdominal functions. When febrile action becomes more fully developed, or if the disease assumes an inflammatory character, with headach, flushed countenance, or hard cough, a suitable quantity, either of the liquor antimon. tartariz., or, of the vinum ipecacuanhæ, may be added to the above draught; and either of the following given at bed-time: —

No. 100. ℞ Pulv. Ipecacuanhæ gr. ij.; Hydrarg. Submur. gr. iij.; Pulv. Opii Puri gr. j.; Mucilag. Acaciæ q. s. ut fiant Pilulæ ij.

No. 101. ℞ Pulv. Jacobi Veri gr. iij.—v.; Hydrarg. Submur. gr. iij.; Opii Puri gr. j. (vel Extr. Hyoscyami gr. v.); Syrup q. s. M. Fiant Pilulæ ij.

19. When ailment begins to subside, or when it seems likely to degenerate into a chronic state, with more or less affection of the bronchi, the treatment recommended in *Catarrhal bronchitis*, or in the slighter chronic states of the disease, should be prescribed. (See Bronchitis, § 69.) Hufeland recommends a decoction of the untoasted coffee-berries, or the *carduus benedictus*, in those cases. Joerdens advises the oleum camphoratum (F. 449.) on sugar; Lentin, the oleum terebinthinæ rubbed on the loins; and Kortum, camphor, with sal ammoniac. The decoction of Iceland moss, with ipecacuanha, or spiritus æther. nit. and syrup of poppies, may also be used, or either of the following: —

No. 102. Zinci Oxydi gr. j. (vel Sulphatis gr. ss.); Pulv. Ipecacuan. gr. ss.; Extract Hyoscyami (vel Conii) gr. iij.; Extr. Glycyrrh. gr. ij. Fiant Pilulæ ij. ter quaterve in die sumendæ.

No. 103. ℞ Extr. Papaveris Albi gr. iij.; Mucilag. Acaciæ ʒj.; Tinct. Camphoræ Comp. ʒss.; Spirit. Anisi ʒj.; Decocti Althææ et Aq. Sambuci āā ℥ss.; Spirit. Æther. Nit. ♏xx.; Syrup. Tolutan. ʒj. M. Fiat Haustus, ter quaterve quotidiè capiendus.

20. When catarrh is connected with *biliary disorder*, or with accumulated sordes in the prima via, an ipecacuanha or antimonial emetic at the commencement of the treatment will often be of much service; especially when followed by a dose of calomel and an aperient draught, or stomachic purgative, in order to evacuate whatever morbid secretions or fæcal matters may have been collected. If it be complicated with *rheumatism*, calomel, combined with antimony and opium, and subsequently with camphor, ipecacuanha, and opium, will be found of service; biliary collections, &c. being carried off by the exhibition, every day or alternate days, of a stomachic purgative. If catarrh be accompanied with symptoms of debility, or with those of a nervous character, forming what some German pathologists have termed *nervous catarrh*, the liquor ammoniæ acetatis, with larger doses of camphor than under the preceding circumstances, or with the spirit. ammon. arom. or succinati, or the spirit. ætheris sulphur. comp., and any of the anodynes in common use, are appropriate medicines. When the disease becomes chronic, change of air is most beneficial. During the treatment, the patient should avoid exposures to atmospheric vicissitudes, and partake only of light bland diet, observing the injunctions laid down for the management of convalescence from *bronchitis*. (See Bronchitis and Influenza.)

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CELLULAR TISSUE. Syn. *Tela cellulosa*, *Corpus cribrosum*, *Tela mucosa*, Auct. Var. *Tissu Cellulaire*, Fr. *Tissu Muqueux*, Bordeu. *Corps Cribleux*, Fouquet. *Reticular Membrane*, W. Hunter. *Filamentous Tissue*. *Cellulo-filamentous Substance*. Its Diseases.

Alterations of the. Classif. Special Pathology.—*Morbid Structures.*

1. *A.* The *quantity* of the cellular tissue varies greatly in different constitutions, a large proportion of the soft solids consisting of this structure, particularly in persons of a lax fibre and rounded fleshy form. It is relatively more abundant in the female than in the male; in the young than in the aged; in the sanguine, phlegmatic, or lymphatic temperaments, than in the melancholic; and in those who are fair, than in the dark complexed and swarthy. It may be *diminished*, in parts, from pressure; or throughout the body, from disease, or inanition. Long continued and laborious exertions will also apparently lessen it; or at least diminish its bulk, by causing the absorption of the serous and fatty matters deposited in its areolæ or interstices. It is remarkably *increased* by full and rich living, and by indolence; but its bulk is then evidently, in a great measure, owing to the general fulness of its minute vessels, and to the greater proportion of fluid contained in its interstices. *Partial* increase of this tissue is also observed, but chiefly in consequence of disease. It forms, in such cases, the basis of vavarious morbid growths, particularly encysted, scrofulous, sarcomatous, and scirrhous tumours.

2. *B.* The *consistence* of the cellular tissue also varies greatly. In some persons it is unusually *lax* and *extensible*; in others, it is uncommonly *dense* and *tenacious*. The slighter changes of consistence are the result of original conformation, and of age. It is usually more lax in females than males, in the phlegmatic and lymphatic temperaments, than in the melancholic and bilious; and in very young persons, than in those of mature or advanced age. The state of vital energy also influences its consistence; for as the powers of life are reduced by disease, &c. its cohesion is proportionately lessened, and it becomes more lax and inelastic. Changes of consistence occurring in parts are chiefly the consequences of inflammatory action. Continued pressure has the effect of condensing it, and changing it from a nearly semifluid state, into a fibrous, lamellated, and firm structure.

3. *C. Inflammation* of this tissue gives rise to the most varied and important changes, according to the vital energies of the frame, the state of constitution, and habit of body, the nature of the exciting causes, and the intensity of the disease. In a previously healthy state of the system, and when the exciting cause is not of a septic or poisonous nature, the inflammation is usually of the phlogistic or phlegmonous character, and its extension is limited by the formation of coagulable lymph around the centre of the part inflamed; and which, becoming condensed with the cellular tissue exterior to it, forms a cyst for the enclosure of the purulent matter which is usually formed within the part, when the inflammation has proceeded to a certain height. (See Abscess, § 5.)

4. When the inflammation arises from septic or poisonous animal secretions, or from the more common causes of irritation, or of local injury acting on an unhealthy habit of body, or during unwholesome or epidemic states of the air, it assumes a *spreading* or *diffusive* character. The disease, however, may be spreading, without being primarily diffusive; for it sometimes commences in a point or circumscribed spot, as in phlegmonous inflammation; and from the influence of certain causes, hereafter to be noticed, coagulable lymph is not formed so as to limit its extent, as in that form of the disease, and it consequently spreads more or less rapidly; the part soon losing its vitality, and the secretion from the affected vessels infiltrating and contaminating the portions adjoining it, until extensive destruction and sphacelation of this tissue takes place. The inflammation may, on the other hand, owing to nearly the same causes, attack, almost coetaneously, a considerable extent of structure, and terminate either in the same way, or in a manner nearly resembling it. *Spreading* inflammation of the cellular tissue is generally the consequence of external exciting causes, particularly punctures, abrasions, wounds, fractures, &c. acting upon a predisposed system, and more commonly gives rise to a foul serous or sanious secretion, and terminates in sphacelation or gangrene; whilst *diffusive* inflammation is more usually produced by internal causes, or such as affect the nervous or constitutional powers previously to the developement of the disease in the cellular tissue; the secretion which is formed in the part approaching more nearly than that of the foregoing to a puriform matter, and extending in various directions in the course of this structure, under the integuments, &c. which it but little affects. The *former* is often connected with hospital gangrene, or is nearly allied to it, as well as to various forms of foul spreading ulceration; the *latter* is frequently an attendant upon *erysipelas*, without, however, constituting any of the states of that disease; and upon the inoculation of animal poisons, as in the dissection of bodies recently dead of diseases in which the blood and soft solids are more or less vitiated. (See Cellular Tissue —*Diffusive Inflammation of*.)

5. Cellular tissue is also often the seat of *chronic inflammation*, generally in circumscribed parts, giving rise to cold or chronic abscess (see Abscess, § 19.); or to certain manifestations of scrofulous disease. In this state of inflammatory action, gelatinous or albuminous fluids are commonly effused into the interstices of a greater or less extent of this tissue; imparting to it a *swollen* or *hardened* appearance; as in rheumatism, gout, imperfectly cured erysipelas, pelagra, elephanti-

asis, and probably that peculiar affection denominated the induration of the cellular tissue of new-born infants. Otto comprises also phlegmasia dolens under the class of lesions of this tissue, which arises from chronic inflammation; but we have not sufficient evidence of this origin. Indeed, facts, as far as they have been ascertained regarding it, very conclusively show, that other structures besides this are affected at a very early period of the progress of this disease.

6. *D. Infiltrations,* or effusions of fluids from the circulating vessels, frequently take place in this tissue, and constitute the prominent phenomena of various diseases. *Hæmorrhage* sometimes occurs in it, either from external injuries, or from internal causes affecting the vitality of the system and the states of the capillaries and circulating fluids. When it originates in the latter source, the effused blood is usually infiltrated into the interstices of the structure in circumscribed spots, forming ecchymoses, and sugillations, as in scurvy and purpura hæmorrhagica, &c. When the hæmorrhage is extensive, it is commonly owing to the rupture of an aneurismal vessel or varix. The infiltration of serous fluids is very common, either in circumscribed parts (*œdema*), or more or less generally, although in different degrees, in the greater part or the whole of the body (*anasarca*). This preternatural increase of the serosity usually moistening the cellular tissue is owing to various causes, explained in the article Dropsy; and chiefly to increased exhalation, either from augmented determination of the circulation, or deficient tone of the exhalants, or both, — to impeded absorption, either from obstructed circulation in the veins or inactivity of the absorbents, — and to oppletion of the vascular system by the serous or watery parts of the blood, from obstructed elimination by the kidneys or by the respiratory and digestive mucous surfaces, and by the skin. A general state of very slight œdema, or an unusual fulness, softness, and flaccidity of the cellular tissue, — a condition obviously depending upon its laxity or deficient cohesion, conjoined with the presence of a greater proportion of watery fluid than in the healthy state, — not infrequently also is observed, particularly in phlegmatic and lymphatic constitutions. This has usually been termed *leucophlegmasia;* and although it may not amount to actual disease, yet it undoubtedly forms the first stage of several slowly formed maladies, and is usually attended with that state of the frame described in the article Cachexy. It is of importance to attend to the chief pathological relations of this state of the cellular tissue, as they furnish useful indications respecting the nature and treatment of various diseases with which it is often connected. It commonly proceeds from an originally weak conformation, subsequently heightened by diminished vital power of the system in general, and defective cohesion of this tissue in particular.

7. The *urinary* secretion sometimes escapes into the cellular structure, which it violently inflames; the part thus infiltrated being usually affected by the spreading form of the disease, and the constitution thereby suffering most severely, as in other cases of this state of inflammation. This tissue is sometimes also infiltrated by *aëriform fluids,* constituting the *emphysema* or *pneumatosis* of authors. This species of infiltration arises either from the escape of air into the cellular substance, owing to laceration of some part of the respiratory mucous membrane; or from a morbid secretion by the vessels in certain advanced stages of disease, as in the last period of some forms of inflammation. (See art. Emphysema.)

8. *E.* The cellular tissue is also very frequently the seat of a great variety of *morbid growths,* and formations of a specific and malignant kind. Amongst these, the most important are simple serous cysts, hydatids, tubercles, melanosis, earthy and bony concretions, the vascular sarcoma of Abernethy, &c. These adventitious productions very often commence in some part or other of this tissue, even when they are found in other structures; the matrix, or medium of connection furnished by it to other textures and organs, being most frequently their point of origin. Certain *parasitic* animals, especially the larvæ of the *œstrus, filariæ,* and *cysticerci,* are also occasionally met with in the cellular membrane. Changes of *colour* are not unusual, most commonly in consequence of biliary obstruction, giving rise to jaundice; and of certain malignant fevers, when it is either yellowish or yellowish green, and deficient in its vital cohesion.

Cellular Tissue—Diffusive Inflammation of the. Classif. III. Class, I. Order (*Author*).

9. Defin.—*Severe constitutional disturbance, either preceding or following intense pain and diffuse swelling of some part of the cellular tissue, with rapid pulse and depressed vital power.*

10. The parts of the cellular tissue chiefly affected, according to Mr. Hunter and Dr. Craigie, are those in which the adipose substance is most abundant. In respect, however, of its seat and nature, this important malady has been much misunderstood, owing to the circumstance of its most commonly occurring as a complication with diseases of those structures, whose anatomical connection with this tissue is extremely intimate. Dr. Duncan, to whom we are indebted for the most comprehensive account of it which has hitherto appeared, has erred in considering other maladies, thus contingently related to it, as forming varieties of it, rather than as being occasional complications with it. It is true, that, while diffusive inflammation of the cellular structure arises primarily, constituting the only or principal complaint, it is also associated (generally in a secondary form, or in consequence of the extension of inflammation from immediately adjoining tissues) with inflammations of absorbing vessels and glands, with phlebitis, with inflammation of the fasciæ, and most commonly with erysipelas; these generally proceeding from the same causes, and from similar states of constitution and vital energy of the patient, as occasion it; and one or other of these diseases often appearing simultaneously with it. But, when thus associated, it may constitute either the least, or the most remarkable part of the malady; and, therefore, in such cases at least, can only be viewed as a more or less important part of a complicated disease.

11. I. Causes.—*A.* The *predisposing causes,* as far as they are ascertained, are epidemic states of the atmosphere; impure conditions of the air originating in local sources, particularly the foul air of crowded or imperfectly ventilated hospitals and apartments; morbid accumulations of bile

in the gall bladder and ducts, and of sordes, &c. in the prima via; lowered vital power, from whatever cause; the use of unwholesome food, a cachectic habit of body, and deranged state of the digestive functions, or of the secretions.

B. The *exciting causes* are chiefly local injuries and sprains, especially punctures and abrasions; venæsection and the ligature of veins; the inoculation of various animal poisons, generally of a septic tendency; acrid substances, or vegetable or animal matters in a state of disease or *decomposition*, applied to the cellular tissue; and even the simple contact of morbid secretions and fluids with any part of the body. The numerous instances which occurred a few years since in Plymouth Dock, and described by Dr. BUTTER and Mr. TRIPE, were chiefly referrible to epidemic or endemic states of the air; were generally excited by local injury; and were complicated with erysipelas.

12. II. SYMPTOMS.— *A.* The *local symptoms* are variously modified, according to the causes by which the disease is produced. *a.* In some cases it proceeds with very severe lesion of the part to which the cause is applied, as when the fluids and secretions of a diseased animal come in contact with the skin, and give rise to the disease called "*pustule maligne*" by the French, or malignant anthrax. In this case the morbid matter produces a vesicle, from its effects on the rete mucosum, followed by a tubercle, arising from the extension of the inflammation to the true skin, whence it penetrates to the subjacent cellular tissue. Its progress then is very rapid and alarming. A considerable swelling now extends to some distance, presenting a peculiar character. The surface of the skin is shining, and the swelling is elastic, diffused, and resisting, with a throbbing pain and sense of heat, followed by a feeling of torpor, tightness, and weight of the part. This morbid state extends in all directions; and, upon examination, excites a sensation between the softness of œdema and the elasticity of emphysema, to which the terms *boggy*, or *doughy*, have been applied. The central parts generally soon become entirely deprived of life, and the mortification glides below the skin, and destroys the cellular tissue all around; the constitution being most seriously affected. A nearly similar state of the part primarily injured not infrequently follows the application of various acrid matters, animal or vegetable, directly to the cellular tissue itself. Punctures, also, which penetrate as far as this tissue, or mere abrasions of the cuticle, may also occasion it; the chief difference being in respect of the extent to which the skin is affected. In some of such cases, particularly when punctures are the cause, either with or without the application of morbid matter, the skin is very slightly diseased, although the cellular tissue is very extensively destroyed; whereas, in other instances, especially when the cuticle is abraded, or when acrid matter is applied externally to the skin, this structure is very manifestly inflamed at the same time, and the malady presents the characters of erysipelas, complicated with this affection of the cellular membrane.

13. *b.* When the disease arises from punctures, mechanical injuries, chemical irritants, and sometimes from wounds received in dissection, the constitutional disease is, as in the foregoing instances (§ 12.), preceded by the local affection. The mischief commences in the seat of injury, and extends from thence to the trunk of the body, and sometimes also in an opposite direction, without leaving any interval apparently sound. The progress of this variety differs greatly in different cases; being in some confined to the limb, or part of the limb, to which the cause is applied, and in others proceeding rapidly to the trunk, and terminating fatally. In a few of the instances following venæsection, the puncture heals as usual, and either remains permanently united, or opens again, and gives vent to some purulent matter; but more commonly union does not take place; the lips of the incision remaining slightly swollen, red, and everted. Some ichorous or puriform discharge appears, and disease extends continuously from the wound to the shoulder or breast.

14. *c.* In the most dangerous form of the malady, as that consequent upon the inoculation of a virus or morbid matter, a vesicle or pustule forms in the part to which the poison is applied, with very remarkable constitutional disturbance, followed by severe diffusive inflammation of some part of the cellular texture, generally on the same side with that on which inoculation of the disease took place, but at a distance from it, and not continuously with the primary pustule. In such cases, the manner in which the malady is propagated from the local injury, — which is most commonly in the fingers, — to the seat of the diffusive inflammation, which is usually in some part of the trunk, has not been satisfactorily shown. It has been supposed to pass along the absorbents, and, arriving at the axillary glands, to excite inflammation in them, extending to the surrounding cellular tissue; others have thought that the process takes place along the veins; but the accuracy of either of those views has not been demonstrated by dissection, both these sets of vessels having been found free from disease in cases of this description. The history of this most dangerous malady, and the nature of the cause which excites it, render it more probable that the morbid impression is made upon the organic nerves of the part, and that the frame is soon generally affected, owing to the anatomical and functional relations of this system of nerves; the intimate connection of which with the blood-vessels disposing the consecutive diffusive inflammation to appear on the same side with that on which the morbid impression was first made. The primary pustule is usually of very little extent or severity, often heals before the consecutive inflammation takes place, and is evidently the local effect of the virus upon the capillaries of the part to which it was applied. But it is quite insufficient to account for the rapid and violent constitutional disturbance which follows, and which can only be explained by referring it to the change produced by the morbid matter in the organic system of nerves primarily, and consecutively in the vascular system, and in the blood itself.

15. The chief and not infrequent illustration of this form of the disease is furnished us in the cases which follow punctures received on opening recent subjects. In the course of ten or twelve hours from the time of sustaining the injury in the finger, or not until after five or seven

days, the patient complains of rigors, remarkable debility, and frequency of pulse, with sickness at stomach, retchings, &c. A pustule appears in the part, but not always; and generally no connection can be traced between it, even when it is formed, and the diffusive inflammation which takes place during the progress of the constitutional affection. In some cases, a few red lines may be traced, or swelling of the surrounding part is observed; but neither advances any distance, the parts above being perfectly sound. In the course of the violent fever induced by the inoculation in the hand, the consecutive inflammation usually appears in the axilla, and extends towards the sternum, along the neck, down to the loins or haunch, or even to the thigh of the same side. In some instances, it terminates at the mesial line; in others, it passes continuously to the other side. It occasionally is translated from one side or part to the other, by a kind of metastasis, as in gout or erysipelas.

16. The inflammation of the cellular tissue of the trunk, whether arising from a continuous extension of the disease from the arm, or part originally affected, as in certain states of the disease (§ 12, 13.), or in the course of the constitutional commotion (§ 14.) excited by the inoculation of a morbid virus, always possesses peculiar characteristics: it is diffuse or extensive, without the smallest tendency to point; being flatly elevated above the sound parts, usually by a raised or defined margin. It is smooth and equal, without central hardness, and with all the characters already noticed (§ 12.). In general, no chords, which can be supposed to be diseased lymphatics, veins, or arteries, can be traced under the surface, and the glands are either very slightly or not at all enlarged. The diffused swelling commonly furnishes an obscure sense of fluctuation; but, frequently, when punctures have been made into it, little or no discharge has been procured.

17. The *pain* of the swollen part is most acute in every instance, whether the swelling be in an extremity, or extend along it to the trunk, or commence in the trunk itself; and it is quite independent of whatever affection of the skin may accompany the malady. In some cases, the integuments present not the least redness, although the cellular tissue has extensively suppurated, or even sphacelated; but the skin is commonly more or less affected, although in a secondary manner, in consequence of the extension of disease from the cellular tissue to it, and generally subsequently to the manifestation of acute pain. In the advanced stages, the skin has often a reddish or pink coloured blush, and occasionally a mottled or livid hue. In some cases, at a still further advanced period, solitary vesicles form over the diseased cellular tissue, and contain a serous, or sero-sanguineous, or ichorous fluid. The temperature of the part is sometimes much below natural.

18. *B.* The *febrile commotion*, whether appearing consecutively of the diffuse inflammation, directly produced in the part primarily injured, or previously to the affection of the trunk, is of a typhoid or adynamic type, and is accompanied with the most marked disorder of the nervous system, with anxious collapsed countenance, and frequency of pulse; more particularly when excited by the inoculation of a morbid matter, as by wounds from dissecting recent subjects, and when preceding the disease of the cellular tissue of the trunk. The fever sometimes commences insidiously, but more frequently in a very evident or tumultuous manner. The pulse soon becomes very quick, sharp, broad, soft, or compressible. The patient lies in the supine posture, with depressed shoulders, and without turning to either side. Delirium is common, but it is generally intermittent; and profound coma is rare. The respiration always is quick, laborious, and painful, partly owing to the inflammation of the cellular tissue of the side of the thorax, and its extension to the costal pleura. As the disease advances, the peculiar cadaverous fœtor emitted by the patient, the yellowish or lurid hue of the surface, the offensive and sometimes coloured sweat, which, in rare instances, proves critical, and the tendency to ulceration in the parts pressed by the weight of the body, show that the blood, the secretions, and the soft solids, are more or less contaminated. Towards a fatal close, the raving delirium is often accompanied with muttering, and starting of the tendons; and alternated with stupor; the breathing becoming panting, laborious, or interrupted.

19. The TERMINATIONS of the disease vary with the exciting cause, the state of the patient's constitution, and the part primarily affected. When it arises from mechanical causes, as after venæsection, simple puncture, &c., it may terminate with spreading *suppuration*, which may or may not be attended by *sloughing* of the cellular structure: and this result may occur both in cases which end fatally and in those that recover; a partial regeneration of this tissue taking place in some of the latter. In the milder cases, the inflammatory action changes its character, and shows a tendency to stop; the disease terminating in phlegmonic suppuration and granulation. If the cellular substance adjoining a serous membrane become affected, this latter participates, and the inflammation spreads rapidly over it, generally producing an effusion of sanguineous serum; but sometimes, also, adhesion of the opposite surfaces. Occasionally the adjoining periosteum becomes diseased, and even the cartilages and bones denuded. A fatal termination occurs either rapidly from the intensity of the disease, or more slowly from some one of its sequelæ: and usually takes place, in the first instance, in from four to fourteen days; in the second, not till after two or more weeks, or even longer; but the common period is from the sixth to the tenth day.

20. III. APPEARANCES ON DISSECTION.—Dr. DUNCAN has given a very minute and accurate account of the successive changes that take place in the diseased structure. As the malady often attacks progressively various parts, it is sometimes found after death, in all its stages, in the same subject. In the part last affected, which is frequently the space between the last ribs and the os ilium, the cellular substance is merely œdematous, with increased vascularity; the infiltrated fluid being either limpid or tinged with red, and readily flowing from the divided tissue. In a more advanced stage, the effused matter is less fluid, often higher coloured, but not yet puriform. The diseased structure is next found gorged with a white semifluid matter, which greatl

ments its thickness, separating the particles of fat at a distance from each other, but does not flow from the incision. In a subsequent stage, this matter is opaque, whitish, or reddish, or greenish, but is now so fluid that it flows from the incision. It is still, however, contained in the cells of the tissue; and it is only in the last stage, and after the texture of the part is entirely broken down, that this puriform matter is met with in collections, mixed with portions of the sloughy tissue. At this last stage the matter is not circumscribed by any cyst, or defined cavity, but is gradually lost in the adjoining cellular substance, without any line of demarcation. (See art. Abscess, § 15.)

21. The *cellular tissue* itself is usually gray or ash coloured. It is detached extensively from the textures it connects, or adheres to them and the skin in sloughy shreds; and long sinuous cavities are found between the tendons or muscles. The *muscular structures* adjoining are generally more or less diseased, the inflammation extending to their interfibrous cellular tissue; which, however, does not appear to be alone affected, the muscular fibres having their colour altered, and being more easily torn than in health. As respects the *blood-vessels*, the number of visible red arteries is increased, and the veins are enlarged, and turgid with black blood. Mr. J. Hunter states that he found, "in all violent inflammations of the cellular membrane, whether spontaneous or the consequence of accident, that the coats of the larger veins passing through the inflamed parts became also considerably inflamed; and that their inner surfaces take on the adhesive, suppurative, and ulcerative inflammations; for in such inflammations, I have found in many places of the veins adhesion, in others matter, and in others ulceration." (*Trans. of Soc. for Improvement of Med. Knowledge*, 8vo. Lond. 1793, p. 18.)

22. The *lymphatic vessels* have not been sufficiently examined. The axillary glands have, however, been observed somewhat enlarged, and embedded in the diseased cellular tissue. Dr. Duncan states, that, although a tender and swelled axillary gland has been frequently mentioned as one of the first symptoms observed, he has never found them so much changed as at all to support the idea that their affection was the primary cause of the alteration of the surrounding parts. The state of the *fasciæ* has been very generally overlooked in dissections of fatal cases of this malady, as well, indeed, as that of the blood-vessels and lymphatics; but the fasciæ, tendinous expansions, sheaths of tendons, &c. are not always unchanged, although they appear not to have suffered in some instances. The *skin* is often severely affected, but not essentially or primarily, in the idiopathic form of diffuse inflammation of the cellular texture.

23. IV. Diagnosis and Complications.—*a.* Diffuse inflammation is readily distinguished from phlegmonous inflammation of the cellular tissue, by the circumscribed hardness of the latter, by the elevation of the tumour, and its pointing and becoming soft in the centre; and especially by the phlogistic character of the attendant fever, which will also indicate the nature of the disease, when phlegmonous inflammation is seated beneath fasciæ. In the less severe cases of the diffuse disease, particularly when it is principally seated in those parts to which the exciting cause has been directly applied, and when it has been judiciously treated in the early stages, a disposition to pass into the phlegmonous state, by the formation of coagulable lymph, and the limitation thereby put to its extension, are very generally observed. Indeed, this change of character constitutes the favourable termination of the disease; although it may also occur as a complication in unfavourable or even fatal cases, especially when veins or fasciæ are also affected.

24. *b.* Diffuse inflammation of the cellular tissue is often consequent upon erysipelas, or complicated with it, particularly the *erysipelas phlegmonodes*; the difference between them consisting in the circumstance of this tissue being primarily and mainly affected in the former; and consecutively of the inflammation of the skin, in the latter.

25. *c. Inflamed veins* may be distinguished from this disease, when they can be felt stretching like chords in the direction of the swelling, and when the pain and tenderness on pressure are chiefly limited to the same line. There is usually, also, little or no affection of the skin, even secondarily, and the disease is generally more confined to a limb; fulness of the pectoral, cervical, and lateral muscles and surface being commonly wanting. (See Veins—*Inflammation of*.) When the tumefaction is very great, it is extremely difficult to determine respecting the affection or non-affection of the veins: the consecutive inflammation of these vessels, however, and its complication with this disease, is very common, as Mr. Hunter has so accurately stated, and more recent researches have confirmed.

26. *d.* The diagnosis between this malady and *inflamed lymphatics* is also extremely difficult, owing chiefly to the same cause, namely, to the œdema and congestion of the surrounding and distal cellular tissue consequent upon the obstruction of these vessels in the inflamed state. The existence of superficial red streaks, not connected with veins, running along an extremity from the part where the exciting cause is supposed to have been applied, and swelling of the lymphatic glands to which they lead, are the only proofs we usually possess of the lymphatics being diseased; and the absence of their appearance is the chief evidence of their being unaffected. But, as in cases of inflamed veins, diffuse inflammation of the cellular substance very generally follows inflammation of the absorbents, as satisfactorily shown by Abernethy, James, Duncan, and Breschet. The difficulty of diagnosis, however, in a great proportion of cases, excepting at their commencement, must be evidently owing to the very sufficient reason of their co-existence.

27. *e.* The same circumstance also explains the difficulty sometimes found of distinguishing the disease from *inflammation of the fascia*; for in the majority of instances, the affection commences in the cellular tissue, and extends to the fascia, this latter structure being very rarely inflamed primarily, unless after it has experienced some external injury. Even when the fascia is primarily inflamed, it will not be possible, on some occasions, to form an accurate diagnosis, as disease commonly extends thence to the cellular tissue on each side of it. When the fascia is affected,

either primarily or consecutively, contraction of the limb is generally occasioned: but this is insufficient evidence of inflammation of the fascia, as inflammation and distension of the parts inclosed by it will produce this effect. When the disease commences in the cellular tissue, and extends to that portion enclosed by fascia, or to this structure itself, the skin is often unaltered even in colour. In a most severe case, attended by Mr. PARKER and myself, the whole leg and thigh, to far above the hip, were affected, and the limb contracted, and yet the skin was natural. The inflammation may, however, originate in the skin, extend to the subjacent cellular tissue, thence to the fascia, and, ultimately, to the cellular tissue beneath it; forming an important variety of erysipelas, well described by Mr. COPLAND HUTCHISON, and constituting the triple complication of diffuse inflammation of the cellular substance with that of the skin on the one side, and with that of the fascia on the other, the first being most extensively and destructively diseased. The local and constitutional suffering in such cases chiefly arise from the pressure made by the fascia upon the inflamed and tumid cellular tissue underneath it.

28. *f*. Whilst it is important to distinguish between *injury or inflammation of a nerve*, and this malady, it must not be overlooked that the one is often associated with the other; priority of affection in respect of either being the chief object of diagnosis. When, after a puncture or other local cause, very acute pain is complained of, particularly in the situation and the course of a nerve, with severe or obstinate symptoms of great nervous irritation, convulsions, &c. accompanying it, we may conclude that the disorder has originated in a nerve; and, if to those symptoms are added the diffuse, boggy swelling, &c. already described (§ 12.), we may likewise infer that diffuse inflammation has subsequently attacked the cellular tissue.

29. *g*. I have met with some instances of diffuse inflammation of the cellular tissue as a complication and termination of several severe or fatal states of disease in the *puerperal state*, both with and without affection of the skin; but only in the wards of a lying-in hospital. They have appeared in two forms: 1st, In the advanced progress of asthenic inflammation of the uterus, attended with an excoriating and fœtid discharge, which has first irritated the skin about the nates, — the cellular tissue underneath becoming diffusely inflamed to a great extent, and destroyed; and, 2d, After cases of inflammation of the uterine veins, evidently in consequence of the vitiation of the circulating fluid. Dr. OTTO, Dr. DUNCAN, and Dr. CRAIGIE, refer phlegmasia dolens to diffuse inflammation of the cellular substance. But, I think, on insufficient evidence. If this tissue be really inflamed in that disease, other structures participate; and it certainly is not the part first affected. In the cases which I have seen examined after death, — only three in all, — the nerves and veins were the parts to which the symptoms of disorder were first referred; the veins being obstructed in all the cases. (See PHLEGMASIA DOLENS.)

30. *h*. The cellular tissue of the side of the neck and throat is sometimes diffusely inflamed, apparently from an extension of disease, in angina maligna, and worst form of scarlet fever, the patient sinking from it rapidly. I have, however, met with one case of this description, where recovery ultimately took place. This disease also rarely occurs near the anus, or about the buttock and perinæum, in the course of fevers, dysentery, &c. But it is more disposed, on these occasions, to limit itself, and to terminate in suppurating abscesses. When it occurs in aged persons, from the escape of urine into this tissue, it generally extends rapidly and terminates fatally; and a nearly similar result follows its appearance after important surgical operations, as after lithotomy, amputations, and the ligatures of veins and arteries for aneurismal dilatations of them.

31. V. PATHOLOGICAL INFERENCES. — *a*. Conformably with recently accumulated facts connected with diffusive inflammation of the cellular tissue, it may be concluded that it presents various morbid associations and grades of intensity, as well as distinct relations to the attendant constitutional disturbance, according to the diversified causes which occasion it: — 1st, That depressed vital power, or a previously disordered state of the chylopoietic viscera, or general cachexy, is often requisite to its occurrence: 2d, That abrasions, the irritation of acrid secretions or decomposed animal or vegetable matter, simple punctures, injuries received during the dissection of subjects in a state of incipient decay, and the contact of morbid fluids, most commonly produce the disease primarily in the part in which the injury is sustained, the mischief spreading continuously from thence; although occasionally appearing afterwards in other parts, without any continuous connection, when the circulation has become contaminated by the primary affection: 3d, That, when originating and spreading as now stated, sometimes the skin, at other times the veins, occasionally the lymphatics, on some occasions the thecæ or fasciæ, and more rarely the voluntary nerves, or any two or more of these, participate more or less in the disease: 4th, There appear to be other causes, which, acting in the manner of specific poisons, produce comparatively but little effect on the part to which they are directly applied; but which affect the system universally, chiefly by depressing and otherwise changing the organic, nervous, and circulating functions, the alteration of the cellular tissue appearing subsequently: 5th, That the local affection in this form of disease, which may be denominated consecutive diffusive inflammation of the cellular tissue, is often of very small extent compared with the severity of the constitutional disturbance; and, very frequently, appearances of contamination of the frame present themselves before the cellular tissue is affected, and even then the affection may be trifling, or even not recognisable (see POISONS — *Animal.*): 6th, That the malady originating in the inoculation of a poison or virus, particularly during the examination of recently dead bodies, cannot be ascribed to inflammation of veins, or of lymphatics, or of nerves, or of fasciæ, or even of the cellular tissue itself; and that, although this last most frequently exhibits morbid appearances, yet are these appearances obviously contingent upon general disease of the frame, interesting in a special manner its various vital manifestations. (See *Author*, in *Lond. Med. Repos.* vol. xx. p. 24. 1823.)

32. *b.* As respects the *association of the local and constitutional affection*, all the cases of this disease may be divided into two classes: — 1st, Those in which the constitutional disturbance is mainly owing to the primary local lesion, or its extension, whether it be inflammation of the cellular tissue alone, or of this tissue associated with inflammation either of veins, lymphatics, thecæ, aponeuroses, or of the skin; the relation subsisting between the intensity of the primary local affection, and the constitutional disorder, being more or less apparent and co-ordinate (§ 12, 13.): 2d, Those in which the local lesion is obviously the least important change that has been induced, either directly by the exciting cause, or consecutively by the constitutional affection; and, even when it becomes the most serious, is manifestly the result of the constitutional affection (§ 14.), and disproportioned to it. Thus the local and the general symptoms are presented to us in a different order in these two forms of the disease. In the *first*, also, the febrile action is more inflammatory than in the second, but still partaking of the irritative character, as has been very justly insisted upon by Mr. TRAVERS. In the *second*, it is more asthenic; the nervous system is much more disordered; the anxiety, distress, and mental and physical depression, are greater than in the first; and all the organic functions more gravely affected; the blood, the secretions, and soft solids, becoming at last very evidently altered.[*] (See BLOOD, § 139. *et seq.*)

33. VI. PROGNOSIS.—The danger of this disease is much less when it is accompanied with inflammatory, than with adynamic or highly irritative fever, and morbidly excited sensibility. In general, the rapid extension of the disease from the arm to the trunk; great tumefaction of the region of the pectoral muscles; the first appearance of the inflammation in this situation, or in any part of the trunk, from causes which first occasioned serious constitutional disturbance; remarkable frequency of pulse following rigors, with anxious collapsed countenance, ferrety eyes, delirium, difficult respiration, depression of mind, the accession of fresh rigors, extreme debility, and stupor; are all indications of great danger. The nature of the cause, also, should influence the prognosis. When it proceeds from the ligature of a vein, venæsection, and particularly from wounds in dissecting recent subjects, the danger is great. There is, however, less risk when the disease arises in the part to which the cause has been applied, and when the skin becomes much affected with a disposition of the inflammation to limit itself, and form healthy pus, than when it appears consecutively of a pustule merely in the part inoculated, and of fever with extreme depression.

32. VII. TREATMENT. — *A. Prophylaxis.* Precautions are absolutely requisite when punctures are received in *post mortem* examinations, or when the cuticle about the nails and hands of the examiner is abraded. Some constitutions are more liable to be inoculated in this way than others, particularly persons who are out of health at the time, or whose vital energies are depressed. Wearing gloves during a morbid dissection may be of use in such circumstances. Dr. DUNCAN suggests the anointing of the hands with camphorated oil, or with simple axunge, before handling the viscera. Abrasions about the fingers should be protected by adhesive plaster. If, notwithstanding, punctures are received, or if an abraded or punctured part come in contact with any of the fluids or soft solids of a recently dead body, with animal or vegetable matter in a state of decomposition, with acrid or morbid secretions, suction or perfect ablution of the part ought instantly to be performed; a pledget of lint, wet with either a strong solution, or the oil, of camphor (F. 449.), or with turpentine, applied to it, and the application covered so as to prevent its quick evaporation. On the several occasions of the employment of these means, in the persons both of myself and of my medical friends, no disturbance has accrued from these accidents. Two partial exceptions, however, have occurred, but in such a way as to confirm the propriety of this practice, and illustrate the nature of one form of the disease. The punctures, in these two cases, were received when examining the bodies of females who had, but a few hours previously, died of malignant puerperal fever; and the application was not resorted to until after leaving the apartment where the inspection was made. In one of those cases, — that of a pupil, — camphor was used; in the other, — that of my friend, Mr. CHURCHILL, — ammonia was employed. Both these gentlemen experienced, within twenty-four hours afterwards, considerable general disturbance, with sickness at the stomach, and nervous depression and debility. All disorder, however, disappeared in a day or two after the exhibition of warm diaphoretics and stimulants; but in neither case was the least irritation observed in the part punctured. The morbid impression was evidently made upon the organic nervous system, as evinced by disorder of the functions more immediately dependent on it; but was not so intense, relatively to the state of predisposition, as to occasion further disease. As to the use of ligatures, &c., I must refer the reader to what I have stated respecting them in the article on *Animal* POISONS.

35. *B. Curative treatment.* — *a.* It will be evident, from the history of diffusive inflammation of the cellular tissue, that *local means* are chiefly applicable to certain of its states and complications. When the primary local affection is attended by much pain, both cold and warm applications have been recommended by different writers. The choice, however, between them, may be determined by the sensations of the patient: but warm fomentations, unremittingly employed, appear to me the safest, particularly when inflam-

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[*] It may be stated at this place, that the disease which has been observed to follow inoculation of an animal poison during the examination of recent subjects is obviously distinct from diffuse inflammation of the cellular tissue, although this local affection, or some modification of it, often takes place in the advanced stage of that disease, which has accordingly been referred to in this article as one of the chief causes of the lesion now under consideration. The subject is, however, considered more fully in the article on POISONS. In justice to myself, I should state, that I published, in the *London Medical Repository for July*, 1823, p. 24—27., some remarks on the nature of the malady infected by inoculation from recent subjects, and the operation of animal poisons on the economy; and I request the favour of the reader who is interested in these important subjects to refer to these remarks, and to the conclusions, to which Mr. Travers has come, in his work on Constitutional Irritation, p. 413. Lond. 1826.

mation is externally apparent. When the local affection is limited chiefly to the part to which the cause was applied, or its vicinity, the detraction of blood from it by *leeches* or *scarifications*, and *incisions* through the integuments, ought not to be neglected. The latter of these two modes of local evacuation, as first recommended by Mr. **Copland Hutchison**, is evidently the most beneficial, not merely by procuring a more decided and rapid discharge, but also by giving an external outlet to the matter which otherwise would infiltrate the cellular tissue, and extend the mischief. Even in cases of great vital depression, and when the cellular tissue is consecutively diseased, incisions should not be neglected; they being compatible equally with an energetic, tonic, or stimulating treatment, as with its opposite: and they are not the less necessary in the early stages than at later periods, and when fluid is diffused through the cellular structure. When the part affected is deeply seated, they should be deep and large, so as fully to reach it; their number being proportionately diminished. But the great object is to make a free passage for whatever fluid matter may have formed, or that will form subsequently. This practice has received the approbation of Dr. **Duncan**, and the best recent writers on this disease; and its propriety has satisfactorily been shown in those cases which have fallen under my own observation.

34. *b.* The *general means of cure* are usually directed with the intention of subduing the local affection, and more especially the state of high nervous sensibility and vascular irritability which exists, whether this state be consequent upon the primary lesion produced by the exciting cause, or whether it be the immediate effect of that cause, and the antecedent of any affection of the cellular tissue, as in cases of inoculation by morbid matters or animal poisons. But, although this intention is generally kept in view, very different, and even opposite, measures have been recommended for fulfilling it. It is evident that the same measures are not suitable to all states and periods of the disease; and possibly to this cause may be imputed the great diversity of means which have been advised, and the partial success attributed to very opposite methods. Much also is owing, more generally than has been admitted, to the constitutional powers of the patient. A number of practitioners and writers advocate general blood-letting, and trust chiefly to it for the fulfilment of the above intentions, without adverting to the fact, that the morbid states forming the essential characters of the disease are, in their severest and most deadly forms, independent of sthenic action, and cannot be either limited or subdued by venæsection, although it may be required to a moderate extent; particularly when the local affection arises primarily and directly from the exciting cause, implicates any of the parts which I have noticed as being involved in its complicated forms, and is chiefly antecedent of the grave constitutional disturbance characterising the advanced stages of disease. But even in such cases, the depletion should be practised early, and confined chiefly to young, plethoric, or robust persons; the local evacuation consequent upon free incisions being sufficient in most cases. In other respects, the treatment in this form of the disease may be similar to that recommended in inflammation of the veins; for the principle acted upon by Mr. **John Hunter** in respect of that malady, and which is founded in accurate observation, is equally applicable to this — namely, to impart energy to the system, so as to enable the vessels to form coagulable lymph, by which the extension of the morbid action may be limited, and a diffusive or spreading inflammation may be converted into the phlegmonous state. This practice is still more imperatively required in the other form of the disease, or that in which the affection of the cellular tissue is consecutive of a constitutional disturbance, excited by a morbid virus or animal poison.

35. The frequent inefficacy of depletions and the antiphlogistic treatment, and even their injurious effects, as shown by the rapid sinking consequent upon them, are fully demonstrated by the history, given by Dr. **Butter**, of the disease which occurred in Plymouth Dock, and by the cases after wounds in dissection recorded by various writers. The instances of recovery after this practice cannot be brought as evidence of its efficacy; inasmuch as the smallness of their number; the tonic treatment, which, in several of them, followed vascular depletions; and constitutional energy; may be adduced to disprove it. After studying the cases which have been published by Dr. **Duncan**, Dr. **Colles**, Mr. **Travers**, Dr. **Dease**, Dr. **Butter**, &c., and reflecting on my own limited experience, I would strenuously recommend the following measures, in addition to those already advised: — As to the question of blood-letting, that is already disposed of; but I may further add respecting it, that, however great the severity of the pain, or the sensorial excitement; or however frequent, open, sharp, or bounding the pulse; these symptoms should be arguments against, rather than in favour of venæsection. But if the pulse be not remarkably frequent, or if it be firm and constricted, then this operation ought to be performed. Yet I should expect little or no advantage from this practice, in those cases of the disease which proceed from the inoculation of putrid or morbid animal matters or poisons, whatever the character of the pulse may be. It is, however, seldom such as can warrant depletion in these cases; being generally of the former description, and rarely of the latter. The object which we should propose to accomplish, next to that already stated, is to rouse and support the energies of life, and thus to oppose to the extension of the disease an augmented vital resistance. This can be done only by a stimulating and tonic treatment, and by the expulsion from the frame of such impurities and morbid matters as may tend to impede the natural functions, and depress their energies. The means which we should employ with these views, if judiciously selected, will be more efficacious than any other for the fulfilment of the intention proposed above (§ 34.). The agents which I have found most successful in attaining them, are large doses of camphor, with opium, sometimes also with calomel, and the occasional exhibition of spirits of turpentine, either alone or with castor oil, and of one of the enemata (F. 148, 149.) contained in the Appendix. The plan I have followed in several cases of this disease, mostly of a more or less complicated

nature, which I have treated, has been to give the following bolus, or the pills first prescribed; and a few hours afterwards the draught, which, in three or four hours, should be followed by an enema (F. 151.): —

No. 104. ℞ Camphoræ rasæ gr. x.—xv.; Hydrarg. Submur. gr. x.—xx.; Opii Puri gr. jss.—ij.; Pulv. Capsici gr. iv.; Conserv. Rosar. q. s. ut fiat Bolus, statim sumendus, et horas post tres vel quatuor repetendus.

No. 105. ℞ Camphoræ rasæ gr. vij.—xij.; Ammon. Carbon. gr. xv.; Hydrarg. Submur. gr. xx.; Pulv. Capsici Annui gr. viij.; Opii Puri gr. iij.; Mucilag. Acaciæ q. s. ut fiant Pilulæ xij., quarum capiat binas omni horâ vel bihorio.

No. 106. ℞ Olei Terebinthinæ ℥ss.—℥j. (vel etiam Olei Ricini ℥ss.); Olei Cajeputæ ♏ vj.; Lactis Recentis ℥ij. Fiat Haustus.

36. If a free evacuation of the bowels be procured, the bolus and draught should not be repeated more than once; if the evacuation be scanty, they may be given a third time, having prolonged the period between the second and third doses; in the intervals between which, as well as subsequently, the following pills and draughts may be taken: —

No. 107. ℞ Camphoræ rasæ gr. iij.—v.; Ammon. Carbon. gr. iv.; Pulv. Capsici gr. j.; Mucilag. Acaciæ q. s. M. Fiant Pilulæ ij., secundâ, tertiâ, vel quartâ quâque horâ sumendæ, cum Haustu sequente.

No. 108. ℞ Mist. Camphoræ ℥j.; Liq. Ammon. Acet. ʒjss.; Spirit. Æther. Sulphurici Comp. ʒj.; Tinct. Capsici Annui ♏ x.; Syrup. Aurantii ʒss. M. Fiat Haustus, cum Pil. supra prescriptæ capiendus; vel

No. 109. ℞ Infus. Cinchonæ ℥j.; Liq. Ammon. Acet. ʒij.; Spirit. Ammon. Arom. ʒss.; Tinct. Capsici ♏ xij.; Olei Cajeputæ ♏ vj. M. Fiat Haustus, ut supra sumendus.

37. In the slighter cases, less active means will be found sufficient; but when the disease assumes a serious form, and particularly if the constitutional symptoms manifest themselves before the affection of the cellular tissue has commenced or made any sensible progress, the above or similarly active remedies must be energetically prescribed.

38. During the course of the more adynamic states of the malady, after alvine evacuations have been procured, I have seen the best effects follow the liberal use of wine, and large doses of bark with the aromatic spices. If the tongue and mouth be parched, the pills or bolus, and the turpentine draught, prescribed above, should precede the exhibition of the wine, bark, or sulphate of quinine. The irritability of the stomach and delirium, often accompanying the advanced stage of the worst states of the disease, being more readily allayed by powerful stimuli, as camphor, capsicum, ammonia, ether, spirits of turpentine, cajeput and other essential oils, wine, bark, sulphate of quinine, brisk bottled ale and stout, very small doses of opium, brandy, &c., than by medicines of any other description, it will be necessary to administer these, in forms of combination suited to the circumstances of the case; chiefly with the view of rousing and supporting the energies of life, changing the state of morbid action, and thereby preventing the extension of the local mischief, and the tendency to contamination of the fluids and solids of the frame. The regimen during the treatment should be in accordance with these intentions, and the patient should be allowed what he may crave for; as desire in such cases for articles of food, or for particular beverages, is the instinctive expression of the wants of the economy.

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Cellular Tissue — Induration of. Syn. *Œdematie concrète*, Billard. *Sclérème*, Chaussier. *Squirrho-Sarque*, Beaumes. *Skin-bound*.

Classif. III. Class, I. Order (*Author*).

1. Defin. *A wax-like consistence of the skin and sub-cutaneous cellular tissue, commencing in the hands, face, and lower extremities — the parts most remote from the centre of the circulation; often extending to the trunk, the parts being cold, often pale, yellowish, or rose-coloured, frequently mottled, or livid, with weak pulse and respiration, terminating in congestion of the lungs and asphyxy.*

2. This affection was first described, in 1718, by J. A. Uzembezius, physician to the hospital at Ulm, and afterwards more fully investigated by Doublet, Andry, Auvity, Hulme, Denman, and Underwood, as well as by several contemporary writers. It is very prevalent and fatal in some of the lying-in and foundling hospitals on the Continent, but is comparatively rare in this country, especially during recent times. Its nature and seat have been much discussed by foreign medical writers; and even at present, various points connected with its pathology are not fully established. It is, however, evident that the disease assumes various forms, and exhibits different morbid relations, which may be referred to the two following varieties.

Var. i. *Œdematous Hardening of the Cellular Tissue; Sclérème œdemateux*, Chaussier and Dugès.

3. In this form of the disease, the sub-cutaneous cellular tissue is infiltrated with a yellowish coagulable albuminous serum; the limbs of the infant are more or less tumefied as well as hard, are somewhat rigid, and the skin assumes a violet tint, owing to the pulmonary congestion accompanying it; with weak oppressed respiration, and feeble irregular pulse. In some cases, it commences with simple œdema, particularly when it arises from exposure to cold. If the cold have acted upon the greater part or whole of the surface of the body, the affection is sometimes more or less universal, but usually most remarkable in the limbs. It rarely attacks the abdomen, chest, and neck. The parts diseased are cold, tumid, discoloured, insensible, hard, and receiving and preserving the impression of the finger when very firmly applied. During the progress of the affection, the cry becomes very weak and peculiar, dyspnœa increases; the thorax is dull on percussion; and the impulse of the heart, and the respiratory murmur, are found weak on ausculta-

tion. Death often follows in from four to eight days, without any convulsion, but generally preceded by a lethargic somnolency; and spasmodic attacks resembling slight trismus, and opisthotonos sometimes occur in the advanced stage. The indurated parts occasionally assume an erysipelatous appearance, and, in rare instances, pass into sphacelation. In favourable cases, or after an early and judicious treatment, the affection subsides; the hardness, and afterwards the œdema, disappearing in the course of two or three weeks. M. GARDIEN states, that he observed suppuration of the affected part to occur in one case only.

Var. ii. *Induration affecting chiefly the Adipose Tissue; Sclérème concret*, CHAUSSIER, DUGÈS; *Skin-bound*, of English authors.

4. This variety generally depends upon the sudden impression of severe cold; is comparatively rare, and is chiefly met with in lying-in and foundling hospitals. The cheeks, limbs, fore-arms, thighs, back, abdomen, chest, and neck, successively, or two or more of them simultaneously, assume a remarkable hardness, which yields not to the pressure of the finger. The temperature and sensibility of the surface are much depressed; and with difficulty raised. The skin is pale or yellowish, and wax-like; sometimes livid or mottled. Trismus and opisthotonos are more common in this, than in the preceding variety. There is little or no tumefaction or œdema; the skin being fixed and immoveable upon the subjacent parts. In some instances, the extremities and back are somewhat emaciated, dry, and even rigid, particularly in the advanced stage; and the cheeks and temples are collapsed. At the commencement, the appetite and digestion are often not much affected; but during the progress, and towards the close of the disease, the bowels become more or less disordered. Dr. DENMAN and Dr. UNDERWOOD seldom met with it but accompanied with some bowel complaint. The infant soon becomes too feeble to draw the breast; it utters a peculiar moaning noise, or feeble whining cry; and has the appearance, even early in the complaint, of dying; and, at last, sinks apparently asphyxied. In favourable cases, the skin and extremities lose their hardness and rigidity, and the infant recovers gradually, if pulmonic inflammation does not come on, and carry it off. Inflammation of the indurated parts seldom or never appears in the course of this variety.

5. PATHOLOGY. — M. GARDIEN states, that he has sometimes remarked a slight increase of heat precede the insensibility, coldness, and hardness of the parts affected; but without any general febrile symptoms. The only indications of disorder he has observed to usher in either variety, are difficulty of respiration, and a peculiar feebleness of the pulse and of the voice. Somnolency or lethargy is very usual during the course of the disease, and, as M. DOUBLET observes, increases towards a fatal termination. The affection, particularly the latter variety, is rarely congenital. M. DUPARCQUE has detailed two cases in which the infant upon delivery was so hard and rigid as to resemble a mummy, the vessels of the umbilical chord being diseased.

6. *A. Causes*. — The different states of this disease have been attributed to a syphilitic taint. It is, however, most commonly owing to the influence of cold upon new-born infants, and generally occurs from the second to the fourteenth day from birth. Imperfect or unwholesome nourishment, and the influence of a vitiated atmosphere, particularly the air of crowded hospitals, upon the imperfectly developed respiratory functions, are, in my opinion, amongst its most energetic causes. It is very apt to occur in prematurely born infants, in those of a feeble constitution, and who are deprived of the mother's or nurse's milk. M. PALLETTA remarks, that out of sixty-five cases, forty were prematurely born. M. RATIER states, that its dependence upon atmospheric cold is shown by the greater number of cases at the *Hospice des Enfans Trouvés*, when winter sets in. But as a free ventilation, and dissipation of the foul air of an hospital ward, are in some measure prevented during cold weather, the prevalence of the disease at this season may be equally owing to this circumstance. M. BILLARD has shown that the number of cases in the warm months is usually not much less than in the cold, in the above-named hospital. Dr. BIOESCHI, however, states a fact, in his report of the Lying-in Hospital at Florence, which shows the great influence of cold in causing this affection. He observed the disease very prevalent during the winter season, especially if rigorous; and he consequently ordered the infant to be kept in the mother's bed, as warm as possible; and from that time no case of it occurred. M. SOUVILLE has met with the disease frequently in the northern departments of France, and also attributes it chiefly to cold, the influence of which is likewise admitted by PALLETTA. It sometimes, also, occurs in the course of the bowel complaints incidental to infants, particularly when improperly nourished; and it is frequently complicated with the jaundice of this epoch. M. BILLARD states that, in seventy-seven cases with œdematous induration, thirty were jaundiced.

7. *B. Appearances in fatal cases*. — In the first or most common variety, the cellular tissue is found loaded by a thick albuminous serum, which coagulates by heat, and which, according to M. LEGER and M. BILLARD, partly escapes upon dividing it. Dr. PALLETTA, however, states that, upon division, it remains firm and concrete, the infiltrated matter not escaping. In the second or more rare form of the affection, the cellular and adipose tissues are hard, concrete, and frequently of a deep yellow colour. The adipose tissue often presents a number of small dark yellow grains dispersed through it. The lymphatic glands, as well as the mesenteric glands, are enlarged; and slight serous or sero-albuminous deposition into the cellular tissue is observed throughout the body, with sanguineous or sero-sanguineous infiltration of parts of it; and effusion into the shut cavities. The vessels of the brain are usually congested. The cavities of the heart are loaded with blood; the foramen ovale is sometimes more open than it should be; the pericardium contains some sanguineous serum; the lungs are often congested or hepatised; and the larynx and epiglottis œdematous. The liver is frequently large and congested; the gall-bladder and hepatic ducts full of bile; and the gastro-intestinal mucous surface more or less inflamed. The most constant morbid appearances are the engorgement of the venous system; the dark or black state of

the blood; the accumulation of a thick, deep-coloured, viscid, or coagulated fluid in the adipose and cellular tissues, imparting to them a condensed or firm appearance; and the congestion of the thoracic viscera: but these latter are commonly not otherwise diseased.

8. C. *Proximate Cause.*—The first variety of this affection may be considered as a form of œdema; the peculiarity resulting chiefly from the thick, coagulable nature of the effused fluid, and the deficient developement of animal heat in parts far removed from the centre of the circulation; in consequence of which the adipose matter either is secreted in a morbid state, or cannot be preserved in its natural semifluidity. The second or more rare form of the affection is chiefly to be attributed to this change of the adipose substance, which, owing to defective vital manifestation in the part, and the depressed grade of animal warmth, assumes the condition which it usually presents soon after death. M. DENIS supposes that the disease is connected with the gastro-intestinal irritation so frequently found upon dissection. Dr. HULME and, more recently, Dr. PALLETTA viewed it as consecutive of, and occasioned by, the congestion of the lungs and the difficulty of the pulmonary circulation; whilst M. BARON, physician to the Parisian Hospital, in which from two to three hundred cases occur every year, considers that the internal congestion takes place subsequently to the appearance of the disease. I believe that this is the more correct view; for M. BILLARD found unusual congestion or hepatisation of the lungs in less than one half the cases he examined. There can be no doubt, however, that as the affection of the cellular tissue proceeds, and as the circulation in this tissue and in the extremities is more and more retarded, congestion of the internal viscera comes on; but not always in the same organ; the encephalon, cavities of the heart, liver, and spleen, also experiencing this change; sometimes with serous or sero-sanguineous effusion into the adjoining shut cavities. The frequent complication of the disease with jaundice would seem to indicate that the biliary organs are more or less affected; and such may be the case in respect of their functions: but M. BILLARD found, in ninety cases, twenty only of organic lesion of the liver, the icteric appearance being evidently dependent upon the morbid state of the serum of the blood, and the deficient vital endowment of the cutaneous capillaries. M. BRESCHET had found the foramen ovale more than commonly open in many cases, and inferred that the affection was caused by this circumstance. M. BILLARD states, that his numerous examinations do not countenance this inference, but admits that they are often coincident changes. This writer, who has paid much attention to the subject, concludes, that general debility, congenital plethora of the vascular system, congestion of venous blood in the tissues, and unusual dryness of the skin previous to the exfoliation of the epidermis, are its chief predisposing causes; and that vascular plenitude, an engorged state of the cellular and adipose tissues, and the influence of external agents interrupting cutaneous transpiration, are its more immediate causes; the coldness of the extremities and affected parts resulting from the slowness of the circulation and the depression of the vital powers.

9. DIAGNOSIS and PROGNOSIS.—*A.* This affection is obviously more or less intimately related to œdema on the one hand; and, in some instances, to erysipelas on the other:—to the former, by the effusion of fluid in the cellular tissue; but differing from it chiefly in the persistent, firm, wax-like, and coagulated state of the infiltrated part, and in the reddish yellow, livid, or mottled appearance of the skin;—to the latter, by its frequently dark red, or livid colour; but differing still more widely from it, in the principal affection of the cellular tissue, in the remarkable coldness of the part, languor of the circulation, and general absence of any change in the skin itself. And it is distinguishable from both, by the peculiar cry of the infant; the weak, moaning, and sibilant respiration, the dyspnœa, the feeble irregular action of the heart; the leipothymia and lethargy, and the frequent complication with trismus and tetanic spasm; as well as with the peculiar jaundice of infants. It may be also mistaken for *erythema nodosum;* but the knotted sensation, upon passing the fingers over the skin, furnished by this affection, is sufficient, of itself, to distinguish it from the smooth, cold, and diffused hardness of the present disease.

10. *B.* The *Prognosis* should be always reserved or cautious. A large proportion of those attacked die, particularly in hospitals, even under the most judicious management; sometimes, in two, three, or four days, in the most severe cases, and in prematurely born children that have been exposed, soon after birth, to cold. But, generally, the disease does not terminate either way in less than from six or eight days to twenty or thirty. It may even be more prolonged; and when recovery is advancing, inflammation of the lungs or digestive canal, or effusion on the brain, may occur, and either cut off the patient, or put his life in the utmost jeopardy.

11. TREATMENT.—The intentions of cure will vary with the particular form of the disease. In the *first*, or œdematous variety, in which vascular plethora is generally present, depletion is often of service; particularly if the circulation in the extremities and affected part be at the same time excited by means of frictions with warm stimulating liniments. MM. BARON and BILLARD prefer frictions to the use of the vapour bath, recommended by MM. DUGÈS, PÉLIGOT, and others. In the *second* variety, in which there is less œdema, and greater induration, and, according to several recent writers, a coagulated state of both the adipose substance and the fluid effused into the cellular tissue, blood-letting may not be admissible. MM. CHAMBON, PALLETTA, and GARDIEN, however, consider that, in this variety also, depletion should be practised, in order to relieve the cerebral congestion attending it; and therefore recommend two small leeches to be applied behind the ears. In this practice I have generally concurred, but have adopted it with much caution in prematurely born or weakly infants; directing, also, for all the states of the disease, calomel or hydrarg. cum creta, with soda, and small doses of ammonia; the compound decoction of sarsaparilla with liquor potassæ; the warm bath, followed by repeated frictions of the surface with stimulating

liniments; and the nourishment Nature intended for the infant. Although a very common and fatal disease in France, it is seldom observed in this country; and even at the Infirmary for Children, cases of it have very rarely presented themselves. I have not met with an instance of it in the Queen's Lying-in Hospital.

12. After the above means have been persevered in for a time, a few drops of spirits of turpentine and sweet spirits of nitre may be given occasionally in sugared dill-water; and the infant enveloped in very soft flannel or wash-leather, which ought to be covered over with oiled silk, in order to prevent the dissipation of the animal heat. Dr. Palletta states that he treated, with uncommon success, the very numerous cases that occurred in the Lying-in Hospital at Milan, with half a grain of the *kermes mineral* (F. 637.) given three or four times a day, and warm bran or warm flour applied to the parts affected. Andry and Gardien advise the use of blisters; — the former to the affected parts; the latter to the nape of the neck, with the view of preventing the occurrence of cerebral congestion; — but I have had no experience of their use in this disease; and consider them less efficacious than frictions with stimulating liniments, several formulæ for which are given in the Appendix. During treatment, a pure warm air, and the natural food of the infant, furnished by a healthy nurse, will be found extremely conducive to recovery.

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CEPHALITIS. See Brain, *Inflammation of.*

CHEST. Syn. *Thorax*, Fr. *Der Brustkasten*, Ger. *Torace*, Ital. *The Thorax.*

External Examination of, in the course of Disease. — Classif. General Pathology — *Semeiology.*

1. *Regions of the Chest.* — It is necessary to divide the chest into different regions, in order to give precision to our diagnostic researches. This is done by drawing horizontal and vertical lines from certain conspicuous parts of the body. The first horizontal or transverse line extends anteriorly from the humoral extremities of each clavicle, across the junction of the clavicles with the upper part of the sternum, posteriorly passing over the last cervical vertebræ; the second, around the middle of the chest, anteriorly passing over the nipples, and posteriorly passing between the spine of the scapulæ and their inferior margins; the third passes around the lowest part of the chest, from the zyphoid cartilage, and over the hypochondria. The first vertical line extends from the upper to the lower extremity of the sternum; the second and third, from each acromial extremity of the clavicles to the external rami of the pubes; the fourth and fifth, from each posterior margin of the axillæ to the crests of the ilia; the sixth and seventh, from the clavicular transverse line along the posterior border of each scapula, or a little exterior to it, to the middle horizontal line; and the eighth, along the spinous processes of the dorsal and cervical processes. To these lines may be added one drawn on each side, from the last cervical vertebra, around the lower part of the neck, and sloping downwards to the upper part of the sternum. Thus the chest will be divided into sixteen regions, viz. *two superior*, or humoral regions; *four anterior*, — the subclavian and submammary; *four lateral*, — the axillary and subaxillary; and *six posterior*, — the scapular, subscapular, and interscapular.

2. The viscera lodged beneath each of the different regions of the chest, and the nature of its parietes, are too well known to require any notice. I therefore proceed to point out the various methods which are employed to investigate the diseases of the thoracic organs. These consist of *inspection*, *mensuration* and *manual examination*, *percussion*, *succussion*, and *auscultation*.

3. *A. Inspection.* — It is important for the physician to take into consideration the *form* and *size* of the chest, in estimating the causes, nature, and tendencies of disease. Vigour of constitution is generally incompatible with a small or ill formed thorax; this conformation not only disposing to various affections of the viscera contained in this cavity, but also aggravating their severity. Every change from the due proportions of the chest ought to be considered of importance. This cavity is generally artificially modified in its form in females. Its capacity is reduced in a transverse direction, by the lateral compression to which it is subjected; and, owing to the same cause, the superior abdominal viscera are pushed upwards, and it is thereby further diminished in a vertical direction. But the compression thus exercised not only reduces the absolute capacity of the chest, but it also prevents the elevation of the ribs, and the descent of the diaphragm during respiration, rendering each inspiration of small amount, and insufficient for the developement and wants of the frame. It moreover presses the lower ribs downwards and inwards upon the more important viscera contained in the abdomen; prevents the ascent of the contents of the cæcum; and favours lateral curvature of the spine, which, in its turn, tends remarkably to diminish the capacity of the chest.

4. During inspection of the thorax, there are other circumstances, besides its form and size, which should fix attention. The actions of its parietes, the equality of the motions of each side, and their connection with the movements of the abdomen, are of the utmost importance. In pleuritis, the motions of the ribs of the affected side are greatly impeded; and if both sides be affected, the costal parietes are but little moved during respiration, this function being chiefly performed by the diaphragm and abdominal muscles. On the other hand, when the diaphragm, or either of its serous surfaces, are inflamed, or when intense inflammation affects any of the superior abdominal viscera, respiration is chiefly performed by the costal parietes. In the first case the respiration is said to be *abdominal*, in the second *thoracic*.

5. It is chiefly by actual inspection of the chest that we can ascertain the existence of œdema of its surface: the distance between the

ribs, the prominence of the spaces between each. the existence or non-existence of partial contractions, and bulgings or prominences of its walls, —are all important facts in our diagnosis of diseases seated in this cavity. Thus, in phthisis, when the pulmonary tissue is tuberculated, shrunk, or contracted, &c., a falling in of the ribs, particularly of the subclavian region of one or both sides, is observed; whilst in asthma and emphysema of the lungs, the ribs are full and expanded. This state, however, of the ribs may exist only on one side; as in cases of pleurisy of one side, terminating in effusion, in empyema, and in pneumothorax, we often observe the affected side expanded, and the intercostal spaces prominent, whilst the other is natural. In other instances of organic disease, one side may be uncommonly contracted; as after cures of old, or chronic, or circumscribed pleurisy, in partial or general destruction of one lung, and in lateral curvature of the spine. In many of these, the opposite or sound side is fully developed, owing to a slight hypertrophy of the sound lung; in cases of curvature, one side is always prominent in proportion to the depression of the other. The prominence of the sternum, and lateral depression of the ribs, which is so common in children; and the falling in of the sternum, and prominence of the ribs; are ascertained by inspection.

6. *B. Manual examination and mensuration.*— It is of importance to ascertain the existence of tenderness on pressure in various parts of the chest, particularly when the patient complains of pain, or difficult respiration. This can only be done by manual examination. Extreme sensibility of the external surface indicates either irritation of the membranes of the spine, or rheumatism affecting the parietes of the chest. When pressure in the intercostal spaces is required to develope the pain, disease is usually seated in the pleura, or parts beneath it, or in the pericardium. It is seldom, however, that we can occasion pain by pressing between the ribs in cases of organic disease of the substance of the lungs, or even of the pulmonic pleura, unless this latter has formed adhesions to the costal pleura. During manual examination, attention should be paid to the existence, the kind, and the extent of moisture on the surface of the chest; to its temperature, which is generally more or less increased in inflammations; and to the palpitations or impulse of the heart. It is evident that the existence of œdema or emphysema of the surface of the chest is chiefly to be ascertained by manual examination of it.

7. *Mensuration* of the chest may be sometimes required, in order to ascertain either the degree of prominence of one side, or of the contraction of the other. In both cases a piece of tape is used; the measurement being made from the spinous processes of the vertebræ to the central line of the sternum, and from the top of the shoulder to the lowest rib. The admeasurement should be taken during a full inspiration and expiration, and the progressive increase or decrease noted. It will often happen that no difference between either side exists during a state of tranquil respiration; and yet, upon forced respiration, the difference is very manifest.

8. Mr. Abernethy proposed, many years ago, —and the proposition has been recently revived on the Continent,— to ascertain the capacity of the lungs, by measuring the quantity of air they are capable of containing, as an indication of the extent of disease by which they are affected. The recommendation was rational, and deserving of greater attention in several affections of this organ than it has received, particularly when the evidence furnished by the measure is duly estimated in conjunction with other signs. The method simply consists of the patient taking as deep an inspiration as he is able, and then expiring through a tube, one end of which is passed under a glass jar, containing, and inverted over, water. The quantity of water displaced is the measure of the capacity of the lungs. A person, full grown and in health, usually displaces from six to eight pints. If the amount be much less than this, it may be inferred that the lungs are obstructed by disease of their substance, or by tumours, effusions of fluid in the pleura, or other causes pressing upon them externally. Although muscular debility, or spasm, may diminish the quantity of air inspired, yet there can be no doubt that the method is calculated to furnish very useful information.

9. Some years since, it was proposed by a physician on the Continent, to test the capacity and soundness of the lungs by causing the patient to take as full an inspiration as possible, and to count from one upwards, in a deliberate manner, during the following expiration, and whilst expiring as slowly as he can. The number that will be reached, either during the expiration or whilst the breath is retained, or before a new inspiration is entered upon, will be an index of the soundness of this organ. Dr. Lyons, who has more recently recommended a modification of this method, advises that the period should be noted by the seconds hand of a watch. He states that a healthy individual will not continue counting above thirty-five seconds; and that, in confirmed phthisis, the period never exceeds eight, and seldom six seconds. I have practised this method during the last five years, and have seldom found a healthy person who could proceed beyond thirty-five seconds, and scarcely one who could go beyond forty; but I have met several cases of pulmonary consumption, where, up to a very advanced stage of the disease, twelve, fifteen, and, in one case, twenty seconds were reached; and even in the last stage, eight or ten seconds are not uncommon; although the number mentioned by Dr. Lyons is much more frequent.

Percussion, *succussion*, and *auscultation* of the chest are comprised in the articles Auscultation and Percussion.

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Deformities of the Chest. — Classif. I. Class, III. Order (*Author*).

1. I. Lateral Depression of the Chest.—Depression of the lateral parietes of the chest had escaped the attention of authors, although of very frequent occurrence, until M. Dupuytren wrote a memoir on the subject (*Repertoire Gén. d'Anatomie, &c.* t. v. p. 110.) A few scattered remarks on the subject may be found in the writings of Van Swieten, J. L. Petit, Levacher, and

others, who have attributed it to rickets and other affections, and have evidently been unacquainted with its nature, causes, effects, and method of treatment. Not a week passes without cases of this contraction being presented at the Infirmary for Children; and although sometimes a congenital deformity, it has appeared to me very frequently to be greatly increased, if not altogether occasioned, subsequently to birth, by the very common practice among nurses of lifting the child by pressing the palms of the hand on the sides of the chest, immediately under the armpits. This deformity consists of a greater or less depression of both sides of the thorax, with a proportionate protuberance of the sternum and abdomen forwards, and of the vertebral column backwards.

2. It is most commonly found in infants born of debilitated, lymphatic, scrofulous, and rickety parents, — particularly those inhabiting low, cold, and moist situations, or who live in small ill-ventilated apartments, — and amongst children who are badly clothed and nourished. In many cases the deformity does not consist of merely a level depression of the lateral parietes; but the ribs are actually bent inwards, the sternum and spine forming a curve outwards. In some, the lower or upper parts of the sternum are the most prominent. This extreme grade of depression is seldom or ever met with at the moment of birth; M. DUPUYTREN thinks differently. My experience leads me to state that it generally comes on gradually after birth, owing to deficient inflation and developement of the lungs, arising from the weakness of the muscles of inspiration, and flexibility of the ribs at the time of birth. In cases of this description, the vital energy of the lungs is insufficient for their healthy actions, and the respiratory mechanism is unable to accomplish their full expansion, or to sustain the continued pressure of the atmosphere, before which the soft and imperfectly formed thoracic parietes gradually yield. The manner in which nurses frequently lift infants, as already stated, tends further to increase the mischief, particularly in those who are originally weak and ill-nourished. The effects of this coarctation of the thorax upon the functions, and ultimately on the structure, of the lungs and heart, soon become very evident. We usually find the pulse quick, and the breathing oppressed; with a weak voice, occasional anxiety, and incapability of speaking or reading for any time, or of uttering many words without frequent pauses. In the newly born infant, there is great difficulty of suckling, from its inability to raise the ribs with sufficient power to perform this process. It is seized with suffocation when at the mother's breast, which it often quits with fits of crying. As it advances in age, the disorder of respiration and circulation is still more remarkable, particularly upon ascending acclivities. The pulse becomes quick, irregular, or intermittent; and is accelerated upon the slightest cause, whether physical or mental.

3. In children whose chest is thus compressed, the tonsils generally, or rather constantly, become tumid, — so much so, as frequently to increase the disorder of the respiratory actions; and all the structures and organs of the body are impaired both in function and in developement, owing to the derangement which the depression occasions to respiration and circulation. In many cases which have come before me, rapid emaciation, great debility, defective assimilation and sanguifaction, an atrophied and flaccid state of the muscles, softening of the bones, frequently asthenic or chronic bronchitis, and swelling of the glands, have followed the deformity, and terminated the life of the patient.

4. *Organic lesions.* — In these cases the appearances observed on dissection are such as the original and consecutive ailments lead us to expect. These consist in retarded developement of the skeleton; want of union between the bones composing the cranium; enlargement of the heads of the long bones, sometimes with softening and flexures of their bodies. Dentition is also retarded; and, if it have proceeded, the crowns of the teeth are eroded. The voluntary muscles are atrophied, soft, pale, and exhibiting a fish-like structure. The lungs are compressed towards the vertebral column, and present a corresponding depression to that of the lateral parietes of the chest, with the marks of the ribs indented in their posterior and lateral surfaces. This organ is often studded with tubercles of various sizes; portions of it are frequently often inflamed or hepatised; and, in some cases, attended with bronchitis, the bronchi are more or less loaded with mucus, or muco-purulent matter. The substance of the heart is commonly pale and flaccid; and, in young infants, the foramen ovale is sometimes widely open; and in older children, but imperfectly closed. The mucous follicles of the intestinal canal are often tumefied, but rarely ulcerated, excepting when a chronic diarrhœa has attended the latter stages of the thoracic compression. The mesenteric glands are also occasionally much enlarged.

5. II. DEPRESSION OF THE STERNUM, *with lateral prominence of the ribs.* — This deformity is the reverse of the former: the sternum is pressed inwards, either at its middle or lower part, or along its whole extent; the ribs are very much bent, and prominent laterally; the chest being broad, but compressed anteriorly, the shoulders high, and the spine either straight or but little altered from its natural form. This change has also been much overlooked by authors. Mr. COULSON, however, has lately noticed it in an instructive article on deformities of the chest. It is by no means uncommon both in young and grown up subjects, although not so frequent as the lateral depression. In cases of depression of the sternum, the lungs and heart are compressed anteriorly; their functions much altered, and ultimately their structures. This deformity is very seldom congenital, being the consequence of weakness, or of a scrofulous or tubercular diathesis. I have met with two instances of it out of six members of one family who died of consumption soon after puberty. It is in some cases antecedent of any apparent disease of the lungs; in other instances, it is consecutive of pulmonary disease; and in others, of external pressure and stooping occupations.

6. It is not uncommon to find females with the chest of a cylindrical or oval form, instead of being a truncated cone; entirely in consequence of the inordinate pressure to which its lower part has been long subjected from tight lacing of the stays. In some of these cases, the sternum, particularly its lower part, is pressed inwards. The effects, however, of this habit, and of the deformities which it occasions, have been alluded to in an-

other part. (See Chest — *Examination of the*, § 3.)

7. Treatment. — *A. The cure of the lateral depression of the chest* is by no means so hopeless as it may appear, particularly if it be attempted at an early period, and before serious organic mischief has been produced. Invigorating medicines and nourishing diet are requisite, particularly in conjunction with various external and mechanical means.

8. *a.* The *external* treatment which I have found the most successful, consists of warm or tepid salt water bathing in infants; and in directing the mother to make pressure very frequently through the day upon the protuberant spine and sternum, by placing one hand on the former and the other on the latter. But this pressure must be so managed as to be made only at the moment of expiration, and entirely suspended during the moment of inspiration, so that no impediment may be in the way of the free dilatation of the parietes of the chest. The practitioner should take care to instruct the mother in the manner of employing the pressure upon the sternum and spine, with the view of throwing outwards the depressed lateral walls of the chest. The more frequently this pressure can be employed, the better; and its benefits will be considerably promoted by applying the following liniment, night and morning, along the spine, or even upon both the sternum and spine. I have employed this and similar liniments, in these situations, with the greatest advantage, in this and several other diseases connected with debility, particularly in young subjects.

No. 110. ℞ Linimenti Camphoræ Comp., Linim. Saponis Comp., āā ℥j.; Olei Terebinthinæ ʒvj.; Benzoini ʒij.; Styracis Balsami ʒjss.; Olei Cajeputæ, Olei Limonis, āā ʒss. M. et fiat Linimentum.

9. In public practice, I have usually substituted for the above, either equal parts of the compound camphor and turpentine liniments; or these, with the addition of the soap liniment, or their equal quantities of olive oil and turpentine, with a little soft soap. In conjunction with these means, the artificial salt water bath, with a very large proportion of salt, at a temperature suited to the peculiarities of the case, will be found extremely serviceable. As soon as children affected by this depression of the walls of the chest can be brought to employ the muscles of the upper part of the body in a determinate manner, this mode of treatment should also be employed. Perhaps the best mode of overcoming the depression, by developing muscular action and power, is to cause the child to raise weights, by means of ropes and pulleys placed at a considerable height over its head; so that, by taking hold of the rope with both hands raised above the head, and pulling it downwards, the muscles may be brought into action, and the parietes of the chest thereby dilated. But moderate and duly regulated exercise, particularly of the muscles of the arm and trunk of the body, accompanied with invigorating medicines and regimen, will be productive of benefit.

10. *b. Internal treatment* should always be conjoined with the means stated above. The digestive functions generally require regulation, and tonic or permanent excitement. After having evacuated morbid secretions and fæcal accumulations from the bowels, by means of the usual purgatives, of which rhubarb, or senna combined with a tonic bitter, is among the most suitable, Brandish's alkaline solution, or the solution of potash, or other preparations of this substance, may be given, either in some gruel or mutton broth, or in a tonic infusion, or combined with the preparations of iron. The following powders may also be taken once, twice, or thrice daily: —

No. 111. ℞ Ferri Sulphatis exsic. gr. ij.—vj.; Potassæ Sulphatis gr. xij.—xx.; Pulv. Cascarillæ ʒj.—ʒjss. Misce benè, et divide in Cartulas xij. æquales, quarum capiat unam bis terve quotidiè.

No. 112. ℞ Potassæ Sub-carbon. gr. j.—iv.; Ferri Subcarbon. gr. iij.; Pulv. Rhei gr. iv.—ix.; Pulv. Cascarillæ (vel Calumbæ) gr. v.—xij. Misce. Fiat Pulvis.

No. 113. ℞ Ferri Tartarizati gr. iij.—xvj.; Pulv. Calumbæ gr. vj.—xij.; Pulv. Zingib. gr. ij. M. Fiat Pulvis.

11. Instead of these, the tincture of ammoniated iron; mixtures containing sulphate of quinine; or the tincture of iodine, in doses of one to three drops, twice or thrice daily, may be employed advantageously. In every other respect the treatment is the same as that recommended for Rickets. But whatever mode of cure be adopted, change of air, or at least a wholesome pure air, with regular exercise, is requisite to its success. In this deformity, the various exercises resorted to with the view of imparting strength and agility to the frame, will be useful, if judiciously directed.

12. *B.* The *treatment of the other deformities of the chest* must be conducted very nearly on the same principles; the pressure, in cases where it may be proper to have recourse to it, being made in an opposite direction to that recommended above, when the anterior parietes are depressed. But this deformity is very seldom met with so early in life as to admit of any expectation of advantage from the use of pressure. The other means, as long as the pathological states of the thoracic viscera do not contra-indicate them, are the most applicable.

Bibliog. and Refer. — *Dupuytren*, in Répertoire Générale d'Anatomie et Pathologie, &c. t. v. p. 128. — *Coulson*, in London Medical Gazette, vol. iv. p. 69.

CHICKEN-POX. Syn. *Varicella*, *Crystalli*, *Variola Spuria*, *Variola Lymphaticu*, *Variola Volatica*, Auct. Var. *Variola Pusilla*, Heberden. *Exanthema Varicella*, Parr. *Synochus Varicella*, Young. *Emphlysis Varicella*, Good. *Verole Volante*, Fr. *Die Unächten Kindspocken*, Ger. *Ravaglione*, Ital. *Water-jags*, *Water-pox*.

Classif. 1. *Class*, 3. *Order* (Cullen). 3. *Class*, 3. *Order* (Good). III. Class, III. Order (*Author*).

1. Defin. *An eruption over the body, of semi-transparent glabrous vesicles, with red margins, accompanying a slight attack of fever, seldom passing into suppuration; but, on the third day, bursting at their tips, concreting into small puckered scabs, and leaving no cicatrices.*

2. Under the name chicken-pox, or *varicella*, have generally been comprised certain eruptions, which closely agree in many features with each other, and which in some respects resemble small-pox. It is from this latter circumstance that they claim a very particular notice, as they are generally of so slight a nature as to require but little medical treatment. They were formerly very generally confounded with small-pox; but the difference between them was remarked as early as the beginning of the sixteenth century by Vidus Vidius and Ingrassias. Sennert and

RIVERI, professors at Wirtemberg and Montpellier at the commencement of the seventeenth century, and **DIEMERBROECK**, state that the distinction was well known in Germany, France, and Italy, to the vulgar, who had a separate appellation for this eruption. **MORTON** was the first in this country to mark the difference, and to describe this disease under the name "*chicken-pox*," by which it appears to have been commonly known before he wrote. Since then it has been noticed by **FULLER**, and accurately defined as a distinct disease by **HEBERDEN**. He, however, continued to designate it by the term *variola pusilla*; whilst his contemporaries, **VOGEL**, **BURSERIUS**, and **SAUVAGES**, also applied to it the generic term *variola*, with the specific designation of *volatica*, *spuria*, and *lymphatica*. But, as Dr. **BATEMAN** has remarked, this circumstance cannot be considered evidence of their considering it as generically the same with small-pox. The entirely distinct nature of chicken-pox was very generally believed in, since Dr. **HEBERDEN** pointed out the difference between it and the small-pox, until recently questioned by Dr. **JOHN THOMSON**, by whom the opinion of the earlier physicians, that they are merely varieties of the same disease, has been revived. This learned physician, and M. **BÉRARD**, urge in favour of this opinion the circumstance of variola and varicella appearing from the same exciting causes, whether those affected have been vaccinated or not; and affirm, that persons exposed to the infection of chicken-pox have caught small-pox, and that the former appears only in those whose constitutions have been modified by the influence of either small-pox or cow-pox. On this subject MM. **SCHEDEL** and **CAZENAVE** remark, that in those epidemics which they have had opportunities of noticing in Paris, the several eruptions might be classed under three heads: 1st, Variola properly so called; 2dly, The malady termed varioïde, or variola modified; 3dly, An eruption purely vesicular, offering every appearance of varicella. The same cause, namely, variolous infection, seemed to develope these several eruptions, which were observed in the same quarters, in the same streets, in the same houses. When the disease made its appearance among a numerous family, some had small-pox, some modified small-pox, and others chicken-pox. One circumstance was striking to every one, namely, the mildness of the disease in those persons who had been vaccinated, and in the majority of those who had already had variola.

3. These facts certainly favour the opinion of Dr. **THOMSON**; but, as the above writers have stated, many cogent arguments have been urged against it, especially by **ABERCROMBIE**, **BRYCE**, **LUDERS**, &c.: — 1st, It is very difficult to determine, during a small-pox epidemic, whether the occurrence of that disease among individuals coming in contact with persons infected with chicken-pox is rather the result of this communication, than of the variolous infection which at that moment developes the malady on all sides: 2d, Vesicular varicella, properly so called, is not transmitted by inoculation, and never produces variola: 3d, Those persons who consider chicken-pox as contagious, have confounded it with modified small-pox: 4th, Varicella appears in persons who have not been vaccinated, and who have never had the variola; consequently, in such cases, it cannot be regarded as a variola modified by the prior existence, either of this disease or of vaccination: 5th, Vaccination practised shortly after the disappearance of varicella pursues its course in the most regular manner, which never happens when vaccination follows variola: 6th, The progress of varicella is uniformly the same, whether it occurs before or after vaccination, or after variola: 7th, Variola sometimes reigns epidemically, without being accompanied by varicella; and, on the other hand, the latter may become epidemic without being attended by the former. In fact, the characters of the eruption, and the symptoms of varicella, differ essentially from those of variola.

4. I. **DESCRIPTION.**—*A. Of the eruption.* Under the name *chicken-pox* are included different varieties of eruption, generally characterised by very slight and brief antecedent fever, consisting of vesicles or very imperfect pustules which maturate and decline in three, four, or five days, occurring chiefly during infancy and childhood, but also at adult age, and occasionally prevailing epidemically. The generic term, *chicken-pox*, comprises three *species*, or rather varieties, which have been distinguished from each other for very many years in different parts of this country, by the popular names of chicken-pox, swine-pox, and hives. These **WILLAN** and **BATEMAN** distinguished, according to the form of their vesicles, into, 1st, *Varicella Lentiformis*; 2d, *V. Coniformis*; and, 3d, *V. Globularis*. Dr. **GOOD** has adopted these names and distinctions, but has added a *fourth*, the *V. Corymbosa*, the clustering or confluent chicken-pox; which, if considered at all as a distinct variety, is not of frequent occurrence; but has occasionally been observed by **BATEMAN**, **RING**, and myself.

Var. i. **LENTICULAR CHICKEN-POX**, *Varicella Lentiformis*; *V. Lymphatica*, Plenck.

5. This variety appears, on the first day of eruption, in the form of small red protuberances, of an irregularly circular, or rather tending to an oblong figure, with a nearly flat and shining surface, in the centre of which a transparent vesicle is very soon formed. On the second day of the eruption the vesicle is filled with a whitish lymph, and is about the tenth of an inch in diameter. On the third day the lymph is straw-coloured; and, on the fourth, the vesicles which have not been broken subside, and are puckered at their margins. Few of them are entire on the fifth day; but the orifices of several which have broken are closed or adhere, so as to confine a little opaque lymph within the puckered margins: on the sixth day, small brown scabs appear in place of the vesicles; and become yellowish on the seventh and eighth days, gradually drying from the circumference to the centre. On the ninth and tenth days they fall off, and leave for a time red marks on the skin, without depression. The disease may, however, be longer than now stated, owing to fresh vesicles appearing during two or three successive days, and going through the same stages as the first. The eruption is usually distinct, is general over the body, and comes out first on the back and breast. The vesicles, even when they suppurate, leave no cicatrices. The pustules of small-pox break out first on the face, neck, and breast, and always leave depressions.

Var. ii. Conoidal Chicken-pox, *Varicella Coniformis; Varicella Verrucosa*, Plenck; *Variola Lymphatica*, Sauvages; *Pemphigus Variolodes*, Frank; *Verolette*, Fr.; *Ravaglio*, Ital.; *Swine-pox*.

6. The vesicles of this variety arise suddenly, have a somewhat hard and inflamed base, and are on the first day acuminated, containing a transparent lymph. On the second day they are a little more turgid, their bases more inflamed, and the lymph in many of them is of a light straw-colour. On the third day the vesicles are shrivelled, and those which are broken have their lymph concreted into slight gummy scabs. Such of them as remain entire, and have their bases much inflamed, contain, on this day, a whitish puriform fluid; every vesicle of this kind leaving, after scabbing, a durable cicatrix. On the fourth day, thin dark brown scabs are seen intermixed with others, which are rounded, yellowish, and semi-transparent. These scabs gradually dry, separate, and fall off in four or five days.

7. A fresh eruption of vesicles usually takes place on the second or third day, and has a similar course to the preceding; the whole duration of the eruptive stage being thus six days in this variety of varicella. In some instances minute red tubercles appear, and subside without forming vesicles. The scales last formed are generally not not separated till the eleventh or twelfth day. In some cases, when the febrile symptoms have been severe, slight ulceration takes place in the vesicles from which the scabs have fallen off, leaving depressions or cicatrices, but only in parts subjected to pressure.

Var. iii. Globular Chicken-pox, *Varicella Globularis; Hives*.

8. The vesicles of this variety are large and globular, but their base is not quite circular. They are surrounded by inflammation, and contain a transparent lymph, which is slightly turbid, and resembles milk whey, on the second day of the eruption. On the third day they subside, become shrivelled as in the former varieties, and appear yellowish from the admixture of a small quantity of puriform matter with the lymph; some of them remaining in the same state till the following morning; but before the conclusion of the fourth day, the cuticle separates, and thin dark scabs cover the basis of the vesicles. The scabs dry, and fall off in four or five days afterwards.

9. *B. Of the constitutional affection.* — All these varieties of chicken-pox may attack the same individual at different epochs, and offer the same symptoms, whether before or after small-pox or vaccination. They are frequently associated with the epidemic prevalence of small-pox. They appear principally in the early months of the year, and the spring; seize chiefly young persons, and adults sometimes; and each of them, with few exceptions, affects a person only once in their lives. Varicella is preceded, for twenty-four or forty-eight hours, by chills, depression, anorexia, costiveness, and thirst, with heat of skin, flushed countenance, accelerated pulse, tendency to perspiration, and other febrile symptoms. Sometimes there is nausea, or even vomiting, with pain at the epigastrium and through the limbs. In some cases, the fever is so very slight as to be overlooked; and, in infants, is often indicated only by heat of skin and fretfulness. The eruption usually commences on the back and breast; appearing next on the face, neck, and scalp; and lastly on the extremities. It is sometimes preceded, for a few hours, by a general erythematous rash; and the vesicles are usually most abundant in the conoidal form; they being sometimes coherent, or seated close together, but seldom confluent. When thus coherent or clustering, they form the fourth variety of Dr. Good (§ 4.). Owing to the itching which accompanies them, children often break the vesicles by scratching; whence proceeds an increased inflammation, forming a yellowish pus, more or less consistent. This happens particularly on the face. The crusts which replace these pustules remain much longer, and leave small cicatrices. As the vesicles appear successively during two or three days, we may perceive the eruption exhibiting its several stages at the same period, in the same individual.

10. II. Diagnosis. — The vesicle full of serum on the top of the pock, on the first day of the eruption, — the early abrasion of many of the vesicles, — their irregular and oblong form, — the shrivelled state of those that remain entire on the third and fourth day, and the radiating furrows of others which have had their ruptured apices closed by a slight incrustation, — the general appearance of the small scabs on the fifth day, at which time the small-pox pustules are not at the height of their suppuration, — sufficiently distinguish chicken-pox from small-pox. Dr. Willan has pointed out the characteristic circumstance, that variolous pustules are, on the first and second day, small, *hard*, globular, red, and painful; imparting the sensation, when the finger is passed over them, similar to that which one might conceive would be excited by the pressure of small round seeds under the cuticle. In varicella, almost every vesicle has, on the first day, a hard inflamed *margin*; but the sensation communicated to the finger is like that from a round seed flattened by pressure. As the pustules of small-pox, moreover, become gradually developed, they contain a white thick matter; the formation of which precedes suppuration, as shown by Dr. Ashburner. When the globular vesicles or hives appear, as is sometimes the case, intermixed with the lenticular or conoidal eruption, they afford a ready distinction from the small-pox, to the pustules of which they bear little resemblance.

11. It is not, however, so easy to distinguish varicella from modified small-pox. The symptoms precursory of the latter are usually intense, which is never the case with the former. In modified variola, the eruption is pustulent, and the pustules are small, circular, and generally depressed in the centre. After the scaly crusts drop off, tubercles are frequently seen, which disappear but slowly. In varicella, the vesicles, which are at first transparent, contain a fluid which becomes sero-purulent; and they are never followed by tubercles, as in modified variola. To this I must add, that varicella is not infectious; whereas modified variola may be transmitted by inoculation, and may even, in some cases, occasion a very severe attack of true small-pox.

12. III. The Treatment of varicella is very simple: the patient should remain in bed, in a temperate atmosphere; ought to be placed on low diet, and abstain from animal food for a few days;

should have the bowels duly regulated, and partake freely of lukewarm diluents.

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CHLOROSIS. DER. AND SYN. From χλωρὸς, paleness, yellowish green. *Pallidus Morbus; Fœdus Virginum Color; Pallor Virginum; Morbus Virgineus; Fœdi Colores; Icterus albus; Icteritia alba; Cachexia Virginum vel Muliebrum; Febris Amatoria; Chlorosma, &c.* Auct. Var. *Chlorose; Pâles Couleurs*, Fr. *Die Bleichsucht*, Ger. *Green Sickness*, Eng.

CLASSIF. 2. *Class*, Nervous Diseases; 2. *Order*, From Defect of Vital Energy (*Cullen*). 5. *Class*, Diseases of the Sexual Function; 2. *Order*, Affecting the Orgasm (*Good*). I. CLASS, II. ORDER (*Author*, in *Preface*).

1. DEFIN. — *Pale yellowish green complexion, languor, debility; depraved appetite, with occasional nausea or sickness, and disorder of the sexual secretions; generally occurring about puberty, or soon afterwards.*

2. Chlorosis has been very generally considered as a variety merely of amenorrhœa, particularly by CULLEN, PINEL, and FRANK, although they have classed it as a distinct disease. As to its occurrence independently of retained or suppressed menstruation, there can be no doubt, although it is frequently connected with such disorder. It is also similarly related to dyspepsia, and to anæmia; Dr. YOUNG classing it with the former disease. SAUVAGES includes, as a variety of chlorosis, the cases of *anæmia* which occur in infants and children, denominating them the *chlorosis infantum*. But, although several such cases are met with in practice, they seldom present the yellowish green tinge of this disease, being usually of a white or exsanguineous paleness, unless when complicated with jaundice, which is but rarely remarked. They are entirely referrible, in respect of their pathological relations and terminations, to anæmia (see BLOOD—*Deficiency of*); and are sometimes, owing to the exhaustion attendant upon their last stages, mistaken for hydrocephalus. SYDENHAM considered chlorosis as a variety merely of hysteria, connected with a cacochymia,—its frequent complication with that disease being evidently the source of this fallacy; and, lastly, VAN SWIETEN viewed it as a form of cachexy. These opinions serve to show the propriety of considering it as a distinct disease, but more or less intimately related to those complaints, owing to the circumstance of them all originating in a nearly similar state of vital energy, particularly as manifested in the organic nervous system; specific differences between them consisting in the particular viscus or part more especially affected, and in the grade and mode of such affection.

3. Dr. GOOD divides chlorosis into two species, the atonic and entonic; but this is an unnecessary refinement, no phenomena which warrant such a distinction presenting themselves in practice. Indeed, the entonic only consists of a state relatively of less deficiency of vital power than the atonic, and is, in many cases, merely the first stage of the disease; particularly when it occurs in tolerably strong females, and whilst the torpid function has not as yet extended much further than the sexual organs, in which it originated, the digestive, assimilating, and vascular organs not having sustained much disorder. Dr. GOOCH has likewise made mention of an acute chlorosis, occurring chiefly in married women. But the state of disease thus designated by this physician, is simply that chronic disorder, often attended with slight irritative fever, following large losses of blood, which are not readily supplied by the digestive and assimilating functions; and is in all respects a state of anæmia. (See BLOOD, § 34. *et seq.*)

4. I. CAUSES. — *A. Predisposing causes.* Chlorosis is most frequent in girls about the age of puberty; either previously to the appearance of the menses, or when they are retained, or occur irregularly, or with difficulty. But married women, particularly widows and those who have not borne children, are not exempt. It is even met with in males, although rarely, about the period of puberty; as remarked by HAMILTON, BLANE, DESORMEAUX, ROCHE, and myself in two or three cases. When observed in this sex, it is apparently connected with protracted evolution of the sexual organs; and one or two of the young females of the same family are sometimes also affected. The lymphatic and melancholic temperaments; feeble and delicate constitutions; residence in cold, moist, and miasmal localities and climates; insufficient, unwholesome, innutritious, and watery vegetable food; inattention to the digestive functions, particularly those of the bowels; the abuse of diluents, of acid weak wines, or of spirituous liquors, early in life; too great indulgence in warm bathing; prolonged sleep; tight lacing at an early age; and whatever debilitates and relaxes the system; predispose to this disease. The most frequent causes in this country are sedentary occupations in crowded and ill-ventilated manufactories and towns, especially those employments which require a stooping position, and are prosecuted by females at a very early age, or before the frame is developed.

5. *B.* The more common *exciting causes*, are longings after objects of desire; depressing passions and affections, especially unrequited love, or unfortunate or imprudent attachments; long entertained feelings of sadness or anxiety, particularly when caused by removal from friends, and the scenes of recent happiness and affection. According to MM. DESORMEAUX and ROCHE, privation of the physical gratification of love is a very frequent cause. Retention, difficult and imperfect occurrence of the menses, have very generally been enumerated amongst its causes; but the uterine disorder is rather a coincident effect of the same pathological state that produces chlorosis (§ 12.). Suppression of the menses, excessive menstruation, and manustupration, are sometimes concerned in its appearance; the latter acting chiefly by debilitating the frame generally, by exhausting the energy of the sexual organs, and

thereby assisting the operation of other causes, particularly when the functions of the stomach and bowels are torpid, or otherwise disordered. The influence of constipation, and fæcal collections in the cæcum and colon, in occasioning the disease, cannot be questioned, although somewhat exclusively insisted upon by Dr. Hamilton, in opposition to the opinion of Dr. Cullen, who referred it chiefly to an inactive state of the ovaria. It seems, however, quite as evident that the torpor of the digestive organs, especially of the lower bowels, and the inactivity of the uterine organs, depend upon the state of the organic system of nerves, which supply not only those viscera, but also those concerned in assimilation and circulation, — all those functions presenting more or less disorder in the course of the disease.

6. II. History and Symptoms. — Chlorosis presents two stages; the *incipient*, and the fully developed or *confirmed*. It also manifests various morbid associations or *complications*. *A.* The *incipient* stage commences insidiously, and almost insensibly. The patient is at first languid, listless, weak; loses her complexion; has no disposition to amusement, if it require mental or physical exertion; is often without appetite, or craves for particular, and sometimes unwholesome, kinds of food; the bowels are costive; bodily exertion soon occasions shortness of breath, and fatigue; the breath is offensive; the tongue is white or pasty; sleep is disturbed or unrefreshing, and oppressive in the morning; she often complains of intermittent headach, pain of the left side, and palpitations, which are induced by the slightest cause; the pulse is quick, weak, and small; and the catamenia are either retained, or are scanty, and of a pale colour: all these symptoms gradually increase, and the countenance becomes more and more pale, and assumes a greenish yellow tint.

7. *B.* The *fully developed* disease presents its characteristic complexion—the pale greenish yellow of an etiolated plant. The lips, gums, insides of the cheeks, are pale; the eyelids are livid, sometimes œdematous, particularly in the morning; the conjunctivæ are remarkably white; the soft solids flaccid; the extremities cold; and the ankles œdematous. The tongue is usually pale, soft, flabby, and indented at the edges by the teeth; sometimes it is smooth, glossy, and fissured. The appetite is more and more capricious and morbid; sometimes with pica, or a desire for pickles and acids; and nausea and vomiting, especially in the morning, and cardialgia or gastrodynia after meals, not infrequently occur. If the menses have already appeared, they become gradually more difficult, and scanty; are attended with syncope or pain; are of short continuance, pale, or watery; recur at longer periods, and at last disappear. The patient is often sad; entertains depressing and sinister ideas; prefers solitude, and is capricious. In the more advanced or inveterate cases, the finger nails are brittle, dry, and split or break off; the hair is weak, falls out, is lank, dry, and splits at its extremities. The abdomen is often tense, distended, and slightly painful. A constant pain is complained of under the left breast, sometimes with a slight cough; the constipation alternates with diarrhœa; some degree of emaciation takes place; the œdema extends, or assumes the form of anasarca or ascites; various irregular states of hysteria occasionally appear during the course of the disease; and some one or two symptoms become prominent, occasionally deceiving both the patient and medical attendant by their severity. Thus the headach, pain of the side, palpitations, cough, &c. occasionally lead to the apprehension of inflammatory states of the brain, or of the pleura, of disease of the heart, or of phthisis.

8. *C. Terminations and complications.* — When the disease becomes inveterate from neglect, inefficient treatment, or the continued operation of its causes, &c., it often assumes diversified forms, owing to morbid associations. The continued disorder and debility of the digestive organs, and the consequent insufficient supply of healthy chyle to the blood, as well as the imperfect sanguifaction of what is supplied to it, sooner or later gives rise to anæmia, which, in its slighter grades, owing to the causes hereafter to be noticed (§ 12.), even accompanies the early stage of chlorosis. In females who have been married, or in those who, previously to the appearance of the disease, had the uterine functions and discharges regularly and fully established: hysteria, in some one or more of its numerous states, is commonly observed. Chlorosis is sometimes also complicated with swellings of the glands, or with chronic cutaneous eruptions, or with hæmatemesis and malæna; and occasionally terminates in dropsy of either the thoracic or abdominal cavities. Mania and delirium rarely ensue in the course of its advanced stages and inveterate forms.

9. III. Diagnosis. — Chlorosis is most intimately related, in its symptoms, and the nature of the changes which constitute it, to anæmia. Indeed, the advanced stage of the former is often identical with the latter; the chief differences consisting in the pale, greenish, or greenish yellow tint of the countenance, the torpor or disorder of the uterine functions, and affection of the stomach in chlorosis. It also often resembles other chronic diseases, particularly those seated in the stomach, and tuberculous affections; but not so closely as to be mistaken for them. Neither the nervous headach, nor the hysterical pains, particularly those complained of in the left side and under the left breast, nor the palpitations of the heart, can with due attention be confounded with inflammation or organic change in these situations: yet have I seen these mistakes made, and nearly fatal consequences ensue, — the practitioner having been deceived by the frequency of the pulse in such cases. In this, as well as in other diseases, much advantage will accrue from recollecting that the most acute pain is generally owing to a pathological state the reverse of inflammatory; and that the most frequent pulse is very far from indicating a necessity for blood-letting, which, if practised in such cases, will increase the morbid sensibility and the vascular irritability, even when it does not hasten a fatal termination.

10. IV. Prognosis. — Chlorosis is always chronic; is generally cured, particularly in its simple form; but sometimes also terminates fatally, owing to the associated lesion of various functions and organs. Recovery may be confidently expected, when it is incipient or uncomplicated, and none of the internal viscera betray marked disease; especially if it have not continued longer

than two or three months, and the menses have not appeared. If it occur in married women, sterility is often the consequence; or, if children are borne, they are generally feeble and unhealthy. Chlorosis should be viewed in a serious light, if it have been of long duration; if the catamenia, after having appeared, are gradually suppressed; more particularly if the signs of anæmia to a considerable degree be present; if emaciation be rapid, with quick respiration and cough; if the œdema of the extremities extend; if symptoms of effusion of serum into the cavities supervene; if hæmatemesis or malæna occur; and if it have resisted, in its early stage, a judicious treatment. In the advanced progress of the disease, especially when it is complicated, death sometimes takes place unexpectedly, but seldom without evidence of excessive depression of the organic nervous influence, and of great deficiency of the circulating fluid. (See BLOOD, § 42. *et seq.*)

11. V. PATHOLOGY. — *A. Morbid appearances.* The adipose substance is sometimes not much diminished; but the rest of the soft solids is flaccid and pale, from a deficiency of the red blood. Effusion of serous fluid is commonly met with in the large cavities, particularly those of the pleura, pericardium, and peritoneum, and occasionally also in the ventricles of the brain. The lungs are frequently œdematous, or studded with tubercles; the liver is often enlarged, and sometimes pale or tuberculated; the stomach small, pale, and contracted; the mesenteric glands slightly enlarged; the ovaria and uterus, in some instances, are imperfectly developed, or contain small tumours; the cavities of the heart are occasionally somewhat enlarged, and their parietes are generally flaccid and pale, or slightly atrophied; the blood is commonly pale, aqueous, and deficient in coagula, — those which are found in the large veins and auricles of the heart being of a very light colour, and small. These are the most common lesions; but others are sometimes noticed, both in the organs now mentioned, and in different parts, as in the spleen, pancreas, gall-bladder, kidneys, &c. In some cases but little change beyond the exsanguineous state of the various structures are observed, as in those recorded by LIEUTAUD.

12. *B. Nature of the disease.*—It has been considered by many writers, and amongst others by WEDEL, KORTE, CULLEN, DESORMEAUX, and ROCHE, that chlorosis is chiefly dependent upon debility or torpor of the nervous influence developing and actuating the ovaria and uterus. HOFFMANN, DARWIN, and SAUNDERS connect it more immediately with obstructed function of the liver. HAMILTON refers it chiefly to torpor of, with accumulated sordes in, the digestive organs, particularly the lower bowels; and ANDRAL, to the deficient and morbid state of the blood. If we reflect upon the character of the associated phenomena constituting the disease, in relation to their causes on the one hand, and to their consequences and terminations on the other, we must necessarily arrive at the inference, that all the organic functions — those of digestion, assimilation, sanguifaction, nutrition, and generation, — are inadequately performed; and, as the organs devoted to these offices are intimately connected one with the other, and actuated by the organic nervous system, that consequently the vital energy of this system is insufficient for the purposes it is destined to perform. We know that the evolution of the sexual organs is owing to the state of vital power; and that, by a reciprocal influence, the activity of those organs increases all the other functions of the frame. Therefore, as we commonly observe this disease at the period of puberty, and associated with imperfectly developed or performed function of the sexual organs, we must necessarily infer, that the defective energy of the organic nervous system delays or arrests their developement, and weakens their functions; the whole frame being thereby deprived of the stimulus they impart to it. Consequently, if the causes continue to operate, or if this system experience no salutary or natural excitement, all the organic functions languish more and more; the chyle is imperfectly prepared; and sanguifaction and assimilation are inadequately performed; all the phenomena of an advanced state of the disease being the result.

13. VI. TREATMENT. — *A.* In its *first stage*, this affection is generally soon removed, 1st, by a due attention to the causes, — particularly the mental or moral causes, — and by removing or counteracting them as far as possible; 2d, by evacuating all morbid and accumulated sordes from the alimentary mucous surfaces, and regulating the alvine secretions and excretions; and, 3d, by imparting vigour to the digestive and organic functions, and exciting at the same time the torpid or imperfect actions and secretions of the uterus. It will generally be necessary to ascertain the causes of the affection, or to direct the attention of the friends of the patient to their nature, tendencies, and the best means of counteracting them. The medical treatment may be commenced with a moderate dose of calomel or blue pill, and a few grains of powdered ginger, given at bed-time; and the following morning the secretions should be more fully promoted and evacuated by a dose of castor oil, or of the compound decoction of aloes. After the bowels have been freely evacuated, the following pills, or Form. No. 877. should be taken daily, either during or after dinner: —

No. 115. ℞ Alöes Socot., Ferri Sulphatis, āā gr. ij.; Gum. Mastich. gr. j.; Pulv. Capsici gr. ij.; Syrup. Simp. vel Olei Caryoph. q. s. M. Fiant Pilulæ duæ.

During the use of these, it wiil generally be requisite to promote the functions of the liver, and excite the bowels, by the occasional repetition of the calomel and ginger at bed-time, and the purgative draught the following morning. In some cases, the operation of the medicine may be very advantageously promoted by an enema. In many instances, nothing beyond what is now recommended will be necessary; but, in addition, a course of chalybeate mineral waters may be directed; and, under every circumstance, exercise in the open air, particularly on horseback, change of air to the sea coast, a light nutritious diet, and warm clothing, especially of the lower extremities, should be recommended. Flannel drawers will be found of service in winter.

14. *B.* In its *second stage*, or in the more obstinate cases, or when the affection is attended with difficult or scanty menstruation, the tinct. ferri ammoniati, or the tinctura guaiaci ammoniati, and the phosphate of iron, are preferable to the sulphate of iron, — the compound aloetic de-

coction being the most suitable aperient. When pains of the head, or of the left side, or other symptoms of hysteria, or palpitations, are complained of, these medicines will be advantageously associated with camphor and hyoscyamus. When the torpor of the uterine system is evident, conium will, however, be preferable in such cases to hyoscyamus, and may be given either with these medicines, or with any of the ammoniated spirits. In a few obstinate cases of the disease, I have prescribed, with marked advantage, small doses of the extract of nux vomica, and the *strychnine*, as in Formulæ 542. 565. and 907.

15. If the disease still persist, if the ankles swell, or if dropsical symptoms come on, and the menstrual evacuations continue suppressed, advantage will sometimes accrue from rubbing the loins assiduously every night with either of the liniments, Form. No. 296. and 311., and acting gently on the bowels by means of the following pills:—

No. 116. ℞ Pilul. Alöes cum Myrrha ʒj.; Saponis Castil. ʒ ss.; Olei Crotonis Tiglii ♏ iij. Contunde benè simul, et divide in Pilulas xxiv., quarum omni nocte capiat unam, binas, vel tres.

16. In the course of practice, I have seen three cases of the disease complicated with swelling of the parotid and submaxillary glands. In order to remove these tumours, I prescribed *iodine* internally, in small and frequent doses, giving also at bed-time the aloes and myrrh pill. In these instances, the menses gradually came on, and all disorder vanished. I have on other occasions observed a very marked emmenagogue, as well as tonic effect, produced by the preparations of iodine; and from these effects, as well as from their efficacy in the above cases, I consider them calculated to prove of use in certain states of obstinate chlorosis. On some occasions, particularly when chronic eruptions appear in the course of the disease, sulphur will be found the best aperient, and the following pills will be productive of benefit; but, in addition to those already particularised, several recipes will be found in the Appendix suited to the different forms and complications of this affection, as well as of other derangements of the uterine functions.

No. 117. ℞ Sodæ Sub-boracis ℈ ij.; Sulphur. Præcip. ʒj.; Mucilag. Acaciæ q. s. Fiant Pilulæ xxiv., quarum capiat tres ter quotidiè. (See also F. 519.)

No. 118. ℞ Sub-boracis ℈ ij.; Pulv. Capsici Annui ℈ j.; Pilul. Alöes cum Myrrha ʒj.; Olei Sabinæ q. s. M. Fiant Pilulæ xxx., quarum capiat binas ter die.

No. 119. ℞ Ferri Sub-carbon. ʒ j.; Sulphur Depur. ʒj.; Myrrhæ Alöes Soc., Fellis Taur. Insp., āā ʒ ss. Contunde benè simul, et divide in Pil. gr. iv., quarum sumat binas vel tres bis terve in die. (*Recommended by* Richter.)

17. Electricity and galvanism have been advised by Renaud and Sigaud la Fond for this disease; and the ammoniated copper, by Bianchi. The preparations of iron have very properly been directed, in conjunction with the alkalies and myrrh, by Willan, with stimulants and bitters, by Schæffer, with assafœtida, by Hirschel, and with cinchona and rhubarb, by Ranoë. Marriage has been suggested as a remedy for chlorosis, by Wedel, Le Blanc, Korte, and several others. Cold bathing has been recommended by Brandis, and condemned by Darwin; and purgatives have been chiefly depended upon by Hamilton. The use of mineral waters is certainly of much service in chlorotic cases. Those of Driburg, Pyrmont, Spa, Carlsbad, &c. on the Continent, have been much praised by Brandis, Marcard, and Kressig; and the chalybeate springs in this country, by most practitioners. But equal advantage will sometimes accrue, in the inveterate forms of the disease, from the sulphureous and saline waters, in addition to a judicious course of medicine; and from the Bath and Buxton warm springs, used in the form of baths. The warm hip-bath, some salt and a little mustard having been added to the water, is also beneficial. (See Menstruation.)

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CHOLERA. Syn. *Cholera Morbus*, *Passio Cholerica*, *Diarrhœa Cholerica*, Auct. Lat. *Cholérée*, *Cholerragie*, *Trousse-galant*, Fr. *Die Gallenruhr*, *Brechruhr*, Ger. *Diarrhœa Cholera*, Young.

Classif. 2. *Class*, Nervous Diseases; 3. *Order*, Spasmodic Affections (*Cullen*). 1. *Class*, Diseases of the Digestive Functions; 1. *Order*, Affecting the Alimentary Canal (*Good*). II. Class, III. Order (*Author*, in *Preface*).

1. Defin. *Griping pains, followed by vomiting and purging, very rarely with flatulent eructations and dejections, and always with spasms of the extremities, particularly the inferior, and anxiety.*

2. I. History and Symptoms. — The term Cholera has been in use since the time of Hippocrates, who admitted two species of the disease, — one humid, the other dry, — χολέρα ὑγρὴ, χολέρα ξηρά. According to Celsus, it is derived from χολὴ, and ῥέω, signifying literally *bile-flux*. Trallian, however, derives it from χολὰς and ῥέω, *intestinal flux*. Galen, adopting the distinction established by Hippocrates, attributed the humid cholera to the presence of acrid humours generated by the corruption of the food; and the dry cholera, to an acrid flatus. With very slight modifications, this doctrine was received by Fernel, Baillou, Sydenham, F. Hoffmann, Bianchi, Sauvages, and Vogel, the difference chiefly consisting in the part they ascribed to the bile, and to the state of this secretion, in the production of the disease. Cullen directed attention, more accurately than his predecessors, to its nervous and spasmodic characters. Pinel was, however, the first who made any considerable innovation on the opinion of the Ancients as to its nature. He classed it as a species of the genus of fevers, to which he applied the term of *Meningo-gastric*. M. Geoffroy (*Dict. des Scien. Méd.* t. v.) subsequently attributed to it an inflammatory character; and MM. Broussais and Gravier afterwards contended that it consists of inflammation of the mucous surface of the digestive tube commencing with nervous symptoms.

3. This diversity of opinions will be fully accounted for in the sequel; but I may at present remark, that they may be in many respects reconciled, inasmuch as the particular form of disorder, for which each exclusively contends, frequently exists as a part of the morbid condition constituting the disease. After having paid considerable attention to the literature of cholera, and had much experience of all its forms — of two of them in my own person — I consider that it admits of division into the following distinct *varieties*: — 1st, The *Cholera Biliosa*, or bilious cholera; 2d, *Cholera Flatulenta*, flatulent cholera; 3d, *Cholera Spasmodica*, the spasmodic cholera, or *Mort de Chien*. As I believe the disease which has appeared in recent times, and has received numerous appellations, among which that of *epidemic* cholera has been most commonly used, to be a different malady from the other forms of cholera, I have treated of it in a distinct article. (See Pestilence.)

i. Cholera Biliosa, *Bilious Cholera*; *χολέρα ὑγρῆ*, Gr.; *Cholera Humida*, Lat.; *Cholerragie*, Fr.; *Die Gallenruhr*, Ger.

4. Defin. *Copious and frequent vomiting and purging, at first of the alimentary and fæcal matters, with a redundancy of bile, and spasms of the legs and thighs.*

5. *Causes, States, &c.* — This is the most common variety, and presents itself *sporadically*, *endemically*, and in an *epidemic* form. When it appears *sporadically*, it is often slight, and of short duration; but it is also sometimes extremely severe, according to the state of the patient, and nature of the exciting causes. In this form, it is not infrequently met with during summer and autumn, and but very rarely in spring. It generally attacks persons whose bowels and secreting viscera have either been, for some time previously, in an inactive state, or become loaded by an accumulation of retained, and thereby altered secretions, particularly bile; and arises from exposure to the sun's rays, or to a high degree of temperature, and afterwards to cold, or cold combined with moisture, particularly when applied to the extremities; from sudden atmospheric vicissitudes, particularly cold easterly or northerly winds after hot weather; from cold miasmal night air, and dews, after a warm sun; cold drinks when the body is overheated, and the incautious use of ices; from cold, indigestible, or unripe fruits, particularly melons, cucumbers, pine-apples, and poisonous or irritating ingesta of any kind; the excessive use of spirituous or malt liquors, and ingurgitation; from large doses of cathartic or emetic drugs (Henry, *Diss. de Chol. Morbo*. Hal. 1740.); fright, particularly from thunder (*Phil. Trans.* 1667.); and from whatever occasions a sudden depression of the vital energies of the frame, and irruption of accumulated bile into the duodenum.

6. The intimate relation existing between this species of cholera, and the *colica cibaria* or surfeit, in respect of their causes, and several of their symptoms, did not escape the notice of Sydenham. Dr. Good has also remarked the similarity. But the distinctions are nevertheless sufficiently marked, and more numerous than those writers have assigned. The spasms of the extremities in the latter; the retraction of the testes, the copious vomitings and alvine evacuations, with redundancy of bile, particularly after the vomiting and purging have continued for some time, and the more acute character of the disease, are sufficient to mark the wide difference between them.

7. In the *endemic* form, cholera is seldom presented to the observation of practitioners in northern countries. To certain districts in some southerly climates, particularly between the tropics, bilious cholera may be said, from the frequency of its occurrence, to be strictly endemic, although in a less marked degree than certain forms of fever, or dysentery, or even hepatitis. According to my own observation, and that of several friends whose range of experience has been great, bilious cholera is very prevalent in situations which are subject to emanations from decayed vegetable matter, or putrid matter of any description; particularly from swamps, moist grounds, the banks of rivers, lakes, or canals, &c., and from foul drains or cesspools, during warm seasons, or wide and rapid changes of temperature; or when the thermometer rises high during the day, and sinks low towards the night and morning.

8. Bilious cholera assumes the *epidemic* form, sometimes in warm climates, and not infrequently also in temperate countries. In the latter, this form of the disease manifests itself only in the months of July, August, and September, — the number of cases increasing from June to September, when they are usually most numerous, and diminishing rapidly in October. The epidemic bilious cholera is generally most remarkable during very warm summers and autumns, occurring after a very rainy winter and spring, or after a succession of wet seasons; and when the days have been warm, bright, and sunny, and the nights comparatively cold or chilly, with heavy dews. Owing to this state of season, the atmosphere is humid, and loaded with the miasms of decayed vegetable and animal matter; and, owing to this cause, together with the high range of temperature, the bile is secreted in greater abundance than usual, and is more liable to become acrid or otherwise altered (see Liver — *Disordered Function of the*); and the cool nights, particularly if the air be much loaded with exhalations set free from the soil by the rays of a scorching sun, tend to check the cutaneous exhalations, and determine the chief current of circulation and secretion to the abdominal viscera. The use of fruit, which is usually abundant at these seasons, also augments the frequency of the disease, by promoting the operation of the other causes. It increases the acidity of the prima via, as contended for by Bertrand and Linnæus, renders the contents of the bowels, and the secretions poured into them, of a more irritating quality to the nerves of the stomach and intestinal canal, and thereby often promotes the irruption of acrid bile, which had been long pent up in the gall-bladder and hepatic ducts, and which is a great cause of irritation when it is suddenly poured into the duodenum.

9. During states of temperature and of season which favour the extrication of exhalations from the soil, the epidemic visitations of this variety of cholera are more severe. In many cases, occurring at these periods, the disease can scarcely be imputed to the state of the biliary secretion merely, but rather to the internal congestions occasioned by its exciting causes, giving rise to

spasmodic contractions of the alimentary canal, to vomiting and purging, and to spasms of the voluntary muscles, &c.; the bile accumulated in the gall-bladder and hepatic ducts being let loose and thrown into the intestines only subsequently to the seizure, and owing to the vomitings and purgings which usher it in. In some cases, indeed, this irruption of bile is prevented from taking place, until an advanced stage, by spasm of the common duct, extended to it from the duodemum, as more commonly occurs in the third variety of the disorder. When the various *causes* now referred to combine to produce the disease, particularly in persons of a nervous and irritable temperament, and who have neglected, for a considerable time before, the state of the bowels, and secretions poured into them, it cannot be a matter of surprise, that its *symptoms* assume the severe form described by Sydenham.

10. *Symptoms.* — Bilious cholera, in whatever state it occurs, differs chiefly in its degree of severity. It is chiefly characterised by anxiety, and by painful and violent gripings, evidently proceeding from spasmodic contractions of the alimentary canal, taking the duodenum for their point of departure, and occasioning the continued or frequently repeated rejection of their contents by vomiting and purging. Owing to the anatomical connection of the great sympathetic or ganglial system with the voluntary nerves and other parts of the frame, the spasms extend to the abdominal muscles, and muscles of the lower extremities, — the testes being forcibly retracted to the abdominal ring, — and are accompanied with great pain. The tongue is dry or clammy; thirst is very urgent, and the urine scanty and high coloured. The pulse is at first full and frequent; but, as the disease continues, it becomes smaller, weaker, and more rapid. At more advanced periods, the spasms sometimes extend to the arms and hands. The symptoms often continue with little variation for some hours; but, when the attack is severe, seldom without the patient's strength being greatly reduced; the countenance at last becoming anxious and collapsed; the breathing frequent, interrupted, and laborious, and sometimes with singultus; the pulse feeble, irregular, and intermittent; and the extremities cold or clammy, with leipothymia or fainting.

11. *Duration* and *Prognosis.* — The cholera of temperate climates is seldom fatal, unless when it is more than usually prevalent, after very rainy and hot seasons. But, when neglected or improperly treated, especially at such times, a fatal issue may occur, but very rarely in less time than twenty-four hours. In milder cases, it may extend to two or three days, and then terminate either favourably or unfavourably, most commonly the former; the vomiting, purging, and spasms subsiding, and entirely ceasing, the pulse becoming slower and fuller, and the countenance resuming its former expression. An unfavourable issue is indicated by a continuance of the purging and vomiting, particularly after substances are taken into the stomach, a hurried, gasping respiration; great frequency, feebleness, irregularity, and intermissions of the pulse; collapse and paleness of the countenance; coldness and pulselessness of the extremities, with anxiety, and frequent faintings, &c. In general, however, even when left to itself, the disease operates its own cure in the course of some hours; or it continues for one, two, or in milder cases for even three days, and ceases by degrees; the morbid secretions which excited the attack having been evacuated, and the irritation they occasioned having subsided. Although nature may accomplish this without aid, yet the assistance of art is generally required to ensure its attainment. The febrile symptoms attending the early stage of the disease, unless in some instances of its epidemic prevalence, are merely the consequence of the pain, spasms, vomitings, and general commotion of the nervous system, and usually subside immediately these disorders are allayed.

ii. Cholera Flatulenta, *Flatulent Cholera*; χολέρα ξηρὰ, Gr.; *Ch. Sicca*, Lat.

12. Defin. *Vomiting and purging rare, sometimes retchings; gripings and spasms of the abdominal muscles, with great and oppressive flatulence, temporarily relieved by eructations, and dejections of flatus.*

13. This variety was formed by Hippocrates, continued by Sydenham, and, after having been discontinued by the majority of modern writers, who, if they at all remarked it, considered it rather as a form of colic than of cholera, was again distinguished as a species of this latter disease by Dr. Good. It is very rarely met with in practice; and generally holds an intermediate rank between flatulent colic and cholera, sometimes approaching more nearly to the former. In none of the very few cases of this description which have come before me (not exceeding two or three), have I observed a natural secretion of bile; but, on the contrary, the liver has evinced signs of great torpor, and the whole digestive organs have been manifestly enfeebled, long protracted dyspepsia and hypochondriasis having existed previous to the attack.

14. This form of the disease is chiefly characterised by spasms of the alimentary canal, apparently excited by acrid, rancid, and indigestible substances; and by an irritating gas, either secreted from the digestive mucous surface, or generated from the decomposition of the imperfectly digested food. (See articles Colic and Flatulency.) The painful and flatulent griping is accompanied with severe spasm of the abdominal muscles, anxiety, occasional retchings, flatulent irritations, and calls to stool, with slight tenesmus, and very scanty, offensive, pale coloured, and watery evacuations, with flatus. Considerable depression of the powers of life, acceleration of pulse, pale, anxious countenance, coldness of the extremities, and sometimes alarming sinking, supervene, when the disease has been neglected.

15. *Causes.* — This rare form of cholera chiefly appears in the debilitated, and those of a melancholic temperament; and is generally excited by a surfeit, by cold drinks when the body is overheated, by the use of cold or unripe fruits, particularly melons, water-melons, cucumbers, unripe plums, mushrooms, and animal poisons, especially the rank parts of bacon, or tongues, sausages, &c. when kept too long, or insufficiently cured; also by unhealthy or stale fish, and by cold or moisture after having been exposed for some time previously to a high range of temperature. The author was very recently the subject of an attack as described above, from having partaken of

tongue kept too long after having been imperfectly cured. In this case the affection was much more nearly allied to cholera than to colic; and this he is the better enabled to state, from the circumstance of having been the subject of the other varieties of the former disease at different periods of his life.

iii. Cholera Spasmodica, *Spasmodic Cholera; Mort de Chien*, Fr.

16. Defin. *Vomiting and purging of watery matters, without any appearance of bile; spasms violent, and extending generally through the frame; speedily followed by sinking of the powers of life.*

17. This variety of cholera may be said to be *endemic* in some intertropical countries, particularly in the eastern hemisphere, where it has occasionally assumed also an *epidemic* form, nearly approaching the remarkably fatal *pestilential cholera*, which appeared in Bengal in 1817, and which has subsequently spread over all Asia, Europe, and part of Africa. (See Pestilence.) It has been very imperfectly noticed by Bontius, Curtis, Paisley, Sonnerat, and Girdlestone; but its nature and treatment were very imperfectly known, until Dr. Johnson described its symptoms, and pointed out a more successful method of cure than had previously been employed. Several of the cases of cholera, which Sydenham has described as epidemic in 1669, seem to have been of the variety now under consideration.

18. *Causes, symptoms, &c.*—This form of cholera proceeds from exposure to cold, or to a cold, raw, and moist atmosphere, or to the night air loaded with terrestrial emanations after the prevalence of warm weather, or exposure to a hot sun; or, in a word, it generally results from a more intense grade of the same causes, particularly the exhalations from the soil, that produce the bilious cholera. It commonly commences with chilliness, sometimes amounting to a rigor or shiver; soon followed by gripings, and frequent purging of a watery, slimy, or sero-mucous matter, which is sometimes thrown off with great force. To these succeed nausea and retchings, with the ejection of a watery fluid; anxiety at the epigastrium; spasms of a violent, painful, and tonic character, attacking the muscles of the abdomen, thighs, legs, thorax, and, lastly, the arms and hands; a small, quick, and contracted pulse; great thirst, and immediate rejection of whatever is taken into the stomach. As the disease proceeds, the pulse becomes weaker and smaller; the spasms more general; the purging constant and painful, generally with tenesmus; the vomitings are renewed, upon the ingestion of substances into the stomach; and the powers of life rapidly fail. During this time, the fluids evacuated from the stomach and bowels present no appearance of bile, although occasionally bile is seen in the evacuations to a small extent. In the course of a few hours, the features shrink, the hands and feet become cold and clammy, the exacerbation of the spasms force out a cold clammy sweat on the face and breast; the pulse is extremely small and weak, or nearly disappears; — in a case which came before me in Africa, in 1816, the pulse could scarcely be felt four hours from the attack; — the spasms assume more of the clonic character; and the contents of the stomach are now, in the more dangerous cases, sometimes thrown off, without any effort or retching. Commonly, during all this time, fæcal matters, and the biliary secretions are retained, apparently owing to the extension of the spasm from the duodenum to the common biliary duct; and to spastic constrictions of parts of the colon; the epigastrium and hypochondria being sore, tense, and tumid. When the disease is treated with decision, the vomitings cease; free evacuations, with a discharge of bile, take place; and the patient soon recovers. But if neglected, or improperly managed, the powers of life fail very rapidly; the eyes sink, and are surrounded with a livid circle; the countenance assumes a remarkably anxious cast, or is pale, wan, and shrunk; and the spasms extend to the very fingers. The breathing now becomes extremely laborious; the patient is restless; and at last is carried off, sometimes in the space of ten or twelve hours.

19. Such is the progress of spasmodic cholera, as it was observed by the writer in the years 1816 and 1817, in an intertropical climate, and as he then experienced it in his own person. About the same time other cases of a milder form occurred, and presented the characters described as constituting the bilious variety of the disease, with which the writer had also been formerly attacked in this country, in the end of September, 1815, — a season of unusual warmth, — when he was attended by his friend Mr. Queade. There can be no doubt that the first and third varieties of cholera chiefly differ in degree, and in the circumstance of the latter arising, in most cases, from the operation of causes of a more intense grade than those which induce the former. But as additional phenomena are developed in the latter variety, and other symptoms assume a different or modified character, and especially as a distinct method of cure is requisite to its removal, the propriety of distinguishing it as a separate form of the disease is manifest.

20. II. Diagnosis. — This disease can be mistaken only for the pestilential cholera, or for poisoning by acrid substances. The diagnosis between this and the *pestilential* malady is fully pointed out in that article. It is often difficult to distinguish between the different varieties of *true cholera* (the pestilential disease which has been very generally viewed as a form of cholera being, in my opinion, very different in all its relations from this), and the disorder occasioned by irritating poisons. Dr. Christison, in his very able work on Poisons (p. 93.), has assigned the more rapid termination of poisoning, in fatal cases, as a ground of distinction. But he supposes that death from cholera occurs at a later period than it usually does: and, hence, this source of diagnosis cannot be much relied upon. Death from irritating poisons usually takes place within thirty-six hours, and sometimes within twelve hours; being seldom delayed beyond sixty hours; but the fatal issue in cholera is very rare, he considers, in less than three days. I believe, however, that, although death from the common cholera of this climate is rare, it more frequently occurs from twenty-four hours to eight and forty, than at a later period. Greater dependence is to be placed upon the appearance of the matters vomited, which are more frequently sanguinolent after irritating poisons than in cholera. But the

chief diagnostic sign is the sense of heat, acridity, or burning in the throat, descending in the course of the œsophagus to the stomach, which is so much complained of in poisoning, and precedes the vomiting. In cholera, when a similar sensation is felt, it is usually confined to the region of the stomach, and is consequent upon the vomiting.

21. The diagnosis between cholera and other diseases which resemble it the nearest is easy. It is distinguished from *colic*, by the frequency of the vomiting and purging, the spasms of the muscles of the extremities, and the greater acceleration of pulse; — from *diarrhœa*, by the vomiting and the spasms; and by the quickness of the pulse in the latter stage of cholera; — from *dysentery*, by the tenesmus, bloody stools, absence of the spasms of the extremities, and of the vomiting; or the occasional presence merely of this last symptom in that disease; — from *ileus*, by the appearance of the matters vomited, and the obstruction of the bowels constituting that malady; — and from *painters' colic*, by the absence, or occasional occurrence only, of vomiting; by the constipation, the paralytic signs, &c. characterising that disorder; and by the history of the case.

22. III. CAUSES AND PATHOLOGICAL STATES. — The *remote causes* have been already noticed in connection with the symptoms and forms of the disease they occasion. *A.* As to the *morbid appearances*, they may be stated as generally being very slight in rapidly fatal cases, and consisting merely of irritation of the mucous surface of the duodenum, stomach, and small intestines; but without any change of structure. If death takes place at a more or less remote period, injection of the capillaries, with congestion, sometimes with ecchymosis, and enlargement of the mucous follicles, is observed more or less extensively — either in streaks or patches — in the inner surface of the digestive tube. In fatal cases of the third variety of the disease, the liver has been found congested, the gall-bladder and hepatic ducts filled with dark coloured inspissated bile, and the common ducts sometimes constricted or obstructed.

23. *B.* The *pathological state* constituting the disease, seems to consist of irritation of the mucous surface of the digestive tube, commencing in the duodenum, and extending in each direction — to the stomach, small intestines, and along the common duct, to the gall-bladder and liver, — with increased action of the muscular coats of these viscera, and determination of the circulating fluid to them. This irritation or morbid excitement, owing to the connections of the organic nerves supplying these parts, is propagated to the spinal nerves, by which the muscles of the abdomen and extremities are affected by painful and violent contractions; and it is chiefly owing to the exhaustion of the vital manifestations of the organic system of nerves, and to the frequent and profuse discharges, that a fatal issue takes place: the circulating organs, which are actuated by this system, being, in consequence, incapable any longer of performing their functions.

24. A question may arise as to whether the disease commences with the irritation of the mucous surface of the duodenum and adjoining portions of the digestive tube, or with determination of the circulation to the liver and adjoining viscera, and an irruption of bile, which has become more than usually irritating, owing to its retention in the biliary apparatus, or to its formation from redundant or noxious materials accumulated in the circulating fluid (see BLOOD, § 119. and 120.), during high ranges of temperature, and moist miasmal states of the air. It is not very material which of these phenomena is the first to occur: probably either may precede the other; and even, in some cases, that both may be nearly coetaneous. It is, however, most likely that the procession of morbid phenomena described above (§ 22.) obtains in the great majority of cases.

25. *C.* The different states of cholera may *terminate* differently from either of the ways already noticed (§ 10. 14. 18.): it may pass into inflammation of the stomach or of the intestines, or of both; it may also lapse into dysentery, or into a regular attack of gastric, bilious, remittent, or intermittent fever. The supervention of some of these diseases upon, or their association with, cholera, has been long since noticed by MORTON and TORTI; and, more recently, by JACKSON, J. P. FRANK, and SCHMIDTMANN; and must be familiar to experienced practitioners, particularly in warm, moist, or miasmal climates. In many such instances, this mode of termination is to be imputed to the nature of the exciting causes, the constitution of the patient, and sometimes also to the premature arrest of the evacuations by opium, and the neglect, subsequently, of procuring the discharge of morbid secretions by purgatives, &c.

26. IV. TREATMENT. — Demulcents, diluents, and weak broths or soups, have been very generally given at the commencement of a choleric attack, particularly of its first or common form, since the time they were recommended by SYDENHAM. In slight cases, and at its beginning merely, this is as judicious treatment as can be adopted. But in the more severe seizures, and particularly if a delay of two or three hours has taken place in applying for or procuring medical aid, much more decided means should be resorted to. In such cases, it is no longer necessary to promote the evacuation of the offending matters, which have generally by this time been expelled. It is preferable, therefore, in these, and, indeed, under most circumstances — 1st, To allay the irritable state of the stomach, the spasms, and other urgent symptoms of the disease; 2d, To remove, by appropriate means, as blue pill, diluents, mucilaginous fluids, and deobstruent aperients and enemata, whatever morbid secretions may be retained or re-accumulated; 3d, To prevent the occurrence of inflammation of the digestive mucous surface, by sheathing the surface of the bowels from the irritating action of the morbid and accumulated secretions during their discharge; 4th, To support the powers of life when they appear to sink; and, 5th, To restore and promote the functions of the various emunctories.

27. *A. Opium*, generally in the form of pill, is the medicine most to be depended on for the accomplishment of the *first intention*, especially in mild cases of the first variety. From one to three grains of it may be taken at once; but, in more severe attacks, and in the second and third varieties, it is preferable at first to combine it with from ten to twenty grains of calomel, which, in

a large dose, is one of the most quickly efficacious means we possess of diminishing vascular irritation of the internal surface of the stomach and small intestines. When a large dose of these remedies has been given, a repetition may not even be required; but, in the severe states of the disease, it will be necessary to repeat it once or even twice, after an interval of from three to six hours, or even longer, according to the urgency of the case. If the attack require the exhibition of two or three such doses of calomel, little apprehension of its affecting the mouth should be entertained, as such a state of disease admits not of the retention of the whole of it; and, when it is necessary thus to repeat it, the biliary organs will derive benefit from it. If the first doses of opium and calomel be not retained, they should be immediately repeated. In plethoric or robust subjects, when the pulse is fully developed, and the spasms severe, especially in the *third* variety of the disorder, a full or moderate bleeding may be directed; but it should be performed early, and restricted to young or robust subjects. This practice was employed by Dr. J. Johnson in India; and subsequently adopted by numerous other practitioners, as well as by myself. I should, however, state, that I have prescribed it only for Europeans who had recently arrived in a warm climate; but natives, or acclimated Europeans, require a different treatment (§ 30, 31, and 32.). In slighter cases opium, if not too early exhibited, will be sufficient to cure the disease; and the instances must be few, in which its use, in some form or other, can be dispensed with. Its superiority to other medicines in cholera has been admitted by Linnæus (*Morbi Naut. Indiæ.* Ups. 1768.), Thomann (*Annalen ad* 1800.), Young (*On Opium, &c.* p. 36.), Quarin (*Animadversiones Pract.* pp. 204—207.), and by most recent writers. Reide (*View of Dis. of the Army*, p. 63.) advises it to be given in copious draughts of tepid diluents; Percival (*Essays*, vol. ii. p. 405.), in enemata; and Sydenham (*Opera*, p. 177. ed. Lug. Bat.), after diluents and demulcents had been freely given, and the offending matters removed. When, however, vomiting and purging have existed some time, more particularly in severe cases, opium ought to be immediately exhibited; but in order to secure the effect of it, or of calomel combined with it, the patient should now refrain from diluents, in order that the rejection of the medicines may not be risked by them; and should merely rinse his mouth frequently with some cooling beverage, swallowing only minute portions of it, at short intervals. Sydenham has very justly remarked, — and the importance of the observation has been acknowledged by Frank and Schmidtmann, — that when opium is given too early, much disorder of the bowels and abdominal organs, with more or less fever, continues afterwards to be complained of; evidently owing to the arrest of a salutary effort, and the retention of morbid secretions. But the second intention of cure (§ 26.), and the combination of calomel with the opium, have for their objects to prevent this result in cases where all the morbid secretions may not have been expelled before the opium has been administered.

28. It is not unusual to find, upon being called to a case of the disease, that aperients had been freely exhibited with the view of promoting the evacuation of the offending secretions. But this is a hazardous practice, and is often, as Sydenham has remarked respecting it, adding fuel to the fire: its propriety at a later period, when the vomiting and spasms have disappeared, will be admitted.

29. If the spasms, pain at the epigastrium, and internal heat, be severe, very warm fomentations, or the hot bath at about 100° or 102°, are of much service if used early in the attack. But neither these, nor blisters, nor sinapisms, are so instantly and perfectly remedial as the turpentine fomentation applied over the abdomen. (See *Art.* Cæcum, § 32.). Several authors have recommended the use of cold or iced fluids, with the view of allaying the heat complained of in the stomach. They deserve notice chiefly from being recommended by Aretæus (*Curat. Acut. Morb.* l. ii. ch. iv.), Cælius Aurelianus (p. 258.), Lienard (*Ergo Choleræ Morbo Frigidus Potus.* Paris, 1626.), Hoffmann (*De Cholera*, obs. v. Opp. iii. p. 173.), Cleghorn (*Diseases of Minorca*, p. 222.), Penada (*Osservazioni, &c.*, *Weigel Ital. Bibl.* b. iv. st. 1. p. 134.), and Panzani (*Beschr. der Krank. von Istrien, &c.*). Bartholinus (*De Usu Nivis Med.* p. 141.) advises the application of ice over the epigastrium; and Birnstiel, cold vinegar to the same region. The nitric acid drink has been much employed in India in cases of cholera. A favourable account of it in this disease was published by Sir J. Macgrigor, in Duncan's *Annals* for 1802. And Mr. Hope has recently recommended it conjoined with opium, in the cholera of temperate climates.

30. When the severity or duration of the more urgent symptoms has occasioned feebleness of pulse, with cold skin, and other symptoms of exhaustion, restorative means are requisite. Ammonia, camphor, the æthers, brandy, Cayenne pepper, the various aromatics and spices, are now the most serviceable medicines, and should be given frequently, and in moderate doses, variously combined, and generally with small quantities of opium. Although at an earlier stage it was necessary to prescribe opium in a large dose, yet at this period very small quantities only ought to be given, particularly if exhibited frequently. Any of the following will be now of advantage: —

No. 120. ℞ Aq. Anethi ʒj.; Magnes. Carbon. ℈j.; Spirit. Ammon. Arom. ♏xxvj.; Pulv. Capsici gr. iij.; Tinct. Opii Comp. (F. 729.) ♏x.; Confect. Arom. gr. vij. M. Fiat Haustus, secundis horis capiendus.

No. 121. ℞ Aq. Menth. Virid. ʒx.; Ammon. Carbon. gr. v.; Magnes. Calcinat. ʒss.; Tinct. Capsici An. ♏xij.; Spirit. Pimentæ ʒj.; Tinct. Opii Comp. ♏xij.; Olei Cinnam. ♏j. M. Fiat Haustus.

No. 122. ℞ Infus. Caryoph. ʒx.; Magn. Calcin. ℈j.; Tinct. Cardamom. Comp. ʒj.; Tinct. Opii Camphor. (F. 728.) ʒj.; Syrup. Zingiberis ʒj. M. Fiat Haustus.

31. In this stage of the disease, the application of sinapisms or blisters to the epigastrium, as directed by Celsus (l. iv. ch. xi.), Morelli (*Nuovo Giornale di Milano*, 1792.), and Aaskow (*Acta Reg. Soc. Méd. Haun.* i. p. 154.); of stimulating and irritating frictions of the surface, as advised by Aretæus (*Cur. Acut. Morb.* l. ii. ch. iv.), Cælius Aurelianus (p. 257.), and Alexander Tralles (l. v. ch. vi.), and of warm analeptic and aromatic epithems and embrocations, as prescribed by Morton and Quarin (*Animad. Pract.* p. 206.), may be resorted to. In the third *variety* of cholera, —which differs

from the first chiefly as to severity and the more prolonged obstruction to the flow of bile in its early stages, or throughout its course in fatal cases;—in addition to the means already stated (§ 30.), the external measures now mentioned may be employed; but they are much less efficacious than the embrocation noticed above (§ 29.). One of our principal objects in this state of the disease is to procure a discharge of bile into the intestines. Large doses of calomel, with opium and camphor, are the internal remedies most to be depended upon for the attaining of this end. But, if the energies of the frame begin to sink before it be obtained, it will be necessary to have recourse to diffusive stimulants in order to counteract the depression: at this period the calomel either may be left off, if a sufficient quantity has been taken, or may be combined with full doses of ammonia or camphor; the stimulants already prescribed (§ 30.), or warm brandy and water, being also given at short intervals, or in larger quantities. The *second* variety requires the measures now stated, with the addition of purgative and emollient enemata. If the flatulence be urgent, F. 135. 150. will be productive of immediate relief.

32. The natives of warm climates, or Europeans acclimated in them, require from the beginning, that the calomel should be combined as now advised; and that aromatics, antispasmodics, and anodynes, be given early in the disease. The large quantities of hot spices usually employed by these classes of persons, as well as the nature of the attack resulting from the constitution, natural and acquired, of those affected, render it necessary to prescribe aromatics and hot spices, especially Cayenne pepper, in large proportions, in conjunction with opium, camphor, &c. and to have recourse to the external means already noticed, almost from the commencement of the attack. Afterwards when urgent disorder has subsided, calomel, or blue pill, with aromatics, followed by warm stomachic aperients, and by purgative and antispasmodic enemata, will be required.

33. *B.* Having relieved the more urgent symptoms, whether of violent irritation or of consequent exhaustion, and having allowed some time to elapse in order that the viscera may recover their functions, it will be necessary to promote the discharge of the secretions which may have accumulated during the calm which had been procured, particularly when the inordinate action is followed by complete torpor of the bowels. In cases where calomel had been freely exhibited, mild stomachic aperients will be all that is necessary; but they should be given with caution, and at a time when there appears no risk of re-exciting the choleric attack, which may be readily done by the too early exhibition of purgatives. It will therefore, at first, be better to trust chiefly to enemata; to prescribe the mildest aperients only, and when they are absolutely required; and to administer chiefly mucilaginous fluids, &c. If calomel have not been previously given, a moderate dose, either of it or blue pill, at bed-time, will be even now necessary; and the latter may be repeated every third night, an aperient draught, or a dose of castor oil, being taken on the mornings following, for some time subsequently, until the alvine functions assume a healthy state. But if the stomach still remain irritable, it will be preferable to prescribe merely a blue pill, or the hydr. cum creta, at bed-time, and employ enemata.

34. *C.* If, during the progress of disease, or when the urgent symptoms have somewhat subsided, the pulse continues frequent, sharp, or constricted, with tenderness at the epigastrium, a furred tongue, great thirst, nausea, and retchings upon substances being swallowed, and general uneasiness, we should conclude that inflammation of the stomach and upper part of the intestinal tube has come on. In this case, from twelve to twenty-four leeches should be placed upon the epigastrium, and afterwards a succession of warm poultices, the last of which should be followed by the terebinthinate fomentation already noticed. In some cases, it will be necessary, from the severity of this consecutive disease, and the patient's habit of body, to bleed from the arm, previously to applying leeches. In cases where the fomentation is not employed, sinapisms or blisters may be directed, but not until depletion has been carried as far as may be considered either necessary or judicious; and small doses either of hydrarg. cum creta, with magnesia or sub-carbon. of soda, may be given every four or five hours; or of nitrate of potash, and almond emulsion, or any other demulcent substance, with the frequent use of enemata. The termination of cholera in gastric, bilious, remittent, and intermittent fever, or in dysentery, and the circumstances to which I have imputed this occurrence (§ 18. 25.) ought not to be overlooked, but should influence our practice both at the commencement and during the course of the attack. When it has passed into these diseases, it must necessarily be treated according to the new form it has assumed.

35. An attack of cholera soon occasions great exhaustion; and sometimes so great sinking, that even fatal syncope has occurred from allowing the patient to remain too long on the night-chair, or suddenly to assume the erect posture. In severe cases, the patient must be kept in a horizontal position; and besides the medical treatment already prescribed in this state of the disease, mild demulcent soups, beef tea, chicken broth, jellies, and sago or arrow-root, with wine, may be given him. In cases of this description, the exhibition of aperients by the mouth must not be ventured on during convalescence, at least not for several days; and even then with circumspection, and in conjunction with stimulants or tonics. We must endeavour to regulate the secretions by gentle alteratives, and to procure their discharge by enemata. During convalescence from cholera, strict attention should be paid to the state of the digestive functions. The patient ought to abstain from all irritating and indigestible kinds of food, and heating liquors, and from overloading the stomach. Change of air, gentle travelling, and moderate exercise, are extremely conducive to perfect recovery.

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CHOLERIC FEVER OF INFANTS. *Cholera of Children, Cholera Infantum*, Rush and Dewees. — CLASSIF. III. CLASS, I. ORDER (*Author*).

1. DEFIN. *Vomiting and purging, with fever generally of a remittent type, irregular spasmodic convulsions, and rapid emaciation, attacking infants and children.*

2. I. HISTORY, &c. — This disease attacks children during the summer and autumnal months, and sometimes as early as April and May. It occurs at any period, from the age of two or three weeks to that of several years. After this age, the same causes which produce it occasion, according to their combinations and the state of predisposition of the patient, either fever of some kind, or cholera, or inflammation of the stomach and bowels.

3. *A. Causes.* — It is often independent of any disorder from dentition, as shown by the age at which it frequently occurs, and the seasons to which it is almost entirely limited. That it is not always caused by acid, acrid, or stale fruit, and indigestible substances, has been proved by examination of the history of numerous cases; although, doubtless, this cause, as well as dentition, will contribute to its occurrence. It is certainly not owing to worms, as far as my own observation may be depended upon; besides, it is often met with at an age anterior to that at which worms form in the intestinal canal; and, in fatal cases, worms are not more frequently expelled from the bowels than in many other diseases, as remarked by Dr. RUSH. But it is evidently owing to the influence of high ranges of atmospheric temperature acting upon malarious localities, and upon close, low, thickly inhabited, and imperfectly cleansed and ventilated streets, closes, and lanes, assisted by the above causes, particularly by premature weaning, want of the mother's milk, errors in diet and clothing, &c. That it originates chiefly in an atmosphere loaded with putrid or mephitic effluvia is shown by its occurrence among children thus circumstanced; by its frequency during the seasons already specified in temperate climates, particularly in localities which possess the materials or sources of such exhalations; by the periods of its prevalence among children in warm climates, and in America; and by its appearance at the same time with the cholera of adults, and with remittent and intermittent fevers. This origin is further shown by the circumstance of its being generally accompanied with fever, frequently of a remittent type. In some very unhealthy climates within the tropics, the children born of European parents seldom reach two or three years without having an attack; and, in some places, scarcely one will survive this age, if allowed to remain in them, — this disease cutting them off before they reach a year or two, and often when they are only two or three weeks old. According to Dr. DEWEES, it is one of the most fatal diseases of children in the large towns of the United States; and it is certainly not an infrequent malady of the same class of patients in this metropolis.

4. *B. Symptoms.* — The choleric fever of infants sometimes begins with diarrhœa; but more commonly with violent vomiting and purging, which are soon followed by fever. The matters vomited are usually yellowish or greenish yellow; and the dejections are slimy, watery, sometimes offensive, with a sour or putrid odour, and tinged with blood. The natural fæces are generally retained, although small lumps are occasionally passed. In some cases, at an advanced stage, they consist nearly altogether of water, or of substances recently taken. The muscles are irregularly and spasmodically convulsed or contracted; the child is much pained, is restless, and throws the head backwards and forwards, the lower limbs being forcibly drawn upwards. Thirst is intense and unquenchable, cold fluids being eagerly desired. The pulse is small, quick, and feeble. Determination to the brain is soon sympathetically excited, as evinced by increased temperature of the head, and a tendency to stupor. The extremities are commonly colder than usual; and the abdomen is hot. All the febrile symptoms are exacerbated in the evening, and occasionally attended by delirium during the night. The eyes are languid and hollow, are half-closed during sleep; the countenance soon becomes contracted and collapsed, and the cutaneous surface insensible. In the most acute cases, death may occur in twenty-four hours; but the disease is most frequently of considerable duration, presenting occasional remissions. Its violence is much lessened by cool dry states of the air, and increased by a close moist atmosphere. In some cases the vomitings soon abate, and it seems to pass into dysentery, or chronic diarrhœa, either with or without tenesmus, tormina, and occasionally with prolapsus ani. It often runs on several weeks with temporary exacerbations and remissions; occasioning remarkable emaciation, and, lastly, flatulent distension of the abdomen, and aphthæ on the tongue, lips, &c.

5. *C.* The *Prognosis* will depend upon the effect of the remedies employed, particularly on the state of the discharges. If these become more abundant, of a darker colour, and more bilious; and if the irritability of the stomach, the cerebral disturbance, and the fever, subside: we may expect a *favourable* issue. On the contrary, increase of restlessness, of the spasms or convulsive movements, and of the cerebral symptoms, rapid emaciation, small thready pulse, cold damp surface, watery pink-coloured stools, constant puking, and especially flatulent distension of the abdomen, and the appearance of aphthæ about the mouth, continued stupor, with the eyes half open, and occasional convulsions, are very *unfavourable* signs. A favourable issue should not be expected with any confidence until healthy bile appears in the stools, and the evacuations assume a natural character.

6. *D.* In *fatal cases*, the digestive mucous membrane is commonly found more or less inflamed, thickened, softened, its submucous surface infiltrated, and rarely ulcerated or excoriated. The mucous follicles, especially those of the small and large intestines, are enlarged or ulcerated;

the mesenteric glands are often enlarged; the liver is sometimes darker, and generally much larger, than natural; the gall-bladder is occasionally filled with bile; and the spleen is manifestly congested. In a few instances, the intestines have been found more remarkably inflamed, and adherent by means of exudations of lymph on their peritoneal surfaces. In the more protracted cases, effusions of serum are found within the cranium; but, in recent cases, the brain presents little or no morbid appearances beyond slight congestion.

7. *E. Its nature.*—The symptoms, and the appearances after death, clearly show that this disease consists of inflammatory irritation, often rapidly passing into inflammation of the greater part of the mucous surface of the stomach, and of the small and large intestines; frequently accompanied with depressed vital energy of the frame, congestion of the liver, and a morbid state of the abdominal secretions, and occasioning sympathetic disorder either of the functions or of the substance of the brain and its membranes.

8. II. Treatment.—At the commencement of the disease, demulcents may be administered. Dr. Rush recommends an ipecacuanha emetic; but Dr. Dewees disapproves of emetics,—an opinion which is agreeable to my experience. I have usually first had recourse, in the slighter cases, either to hydrarg. cum creta or calomel, in frequent doses, and combined with magnesia or soda; or to nitrate of potash with the sub-carbonate of soda, in demulcents; and to the application of leeches on the epigastrium, whenever tenderness of this region could be detected. After a few of these powders have been taken, a dose of calomel, sometimes with a grain of James's powder, has been given at bed-time, and castor oil the following morning: at the same time, oleaginous glysters have been administered, and, as the symptoms abated, those of an emollient kind employed. If the patient be not very young, a few drops of tinct. opii, or a little syrup of poppies, may generally be added to the injection. The warm bath, or the semicupium, should never be omitted in the treatment of this disease, the surface being well rubbed with a coarse towel upon coming out of the bath, and the child afterwards placed in warm blankets. These means, if early resorted to, will generally succeed in the less severe cases occurring in temperate climates. But, in the more intense states of the malady, medicines given by the mouth will not be retained; and such a dose of opium as will not be rejected, may be injurious. In these, it will be preferable to commence with the application of leeches to the epigastrium; and to endeavour to procure more healthy evacuations, and a discharge of bile downwards, by repeated injections, consisting of a solution of common salt (about two or three tea-spoonfuls) in warm water. The frequency of the stools ought not to prevent the administration of the injection; which will generally relieve the vomiting and other symptoms as soon as bilious or fæcal evacuations are procured.

9. When the disease appears to be brought on by improper ingesta, the vomiting may be promoted by diluents. But the object should be to quiet the stomach as soon as possible. For this purpose Dr. Dewees recommends, for very young children, as well as for those who are older, a tea-spoonful of strong coffee, without sugar or milk, every fifteen minutes. Of this treatment I have had no experience. In cases where the more bulky medicines are not retained, the plan of giving minute doses of calomel, adopted by Dr. Dewees, may be followed. He directs a quarter of a grain of calomel intimately mixed with half a grain or a grain of sugar, to be placed dry, every hour, upon the child's tongue, until the stools become more copious, less frequent, and of a dark green colour. When this change is effected, the powders are to be given less frequently. After the bowels have been well evacuated, he prescribes an injection in the evening, with a few drops of laudanum, according to the age of the child; and if the disorder is not much abated, he recommences with the calomel powders as above, on the following morning, repeating the injection at night. I have never tried this practice, having found the means recommended in the preceding paragraph (§ 8.), with those about to be noticed, generally successful.

10. In the more acute cases, especially when fever is early developed, and much heat of the abdomen or of the head is complained of, the disease should be viewed as being entirely dependent upon inflammation of the mucous surface of the digestive tube, and affecting the brain sympathetically. In these, leeches must be placed upon the epigastrium, or behind the ears; if applied to the former situation, a succession of warm poultices should follow them, a full dose of calomel, intimately mixed with a little sugar, be exhibited, and, soon afterwards, an oleaginous injection (olive oil or castor oil, or both, in gruel, strained mutton broth, or any other demulcent vehicle) thrown up. If these measures fail of producing the advantage expected, the back, loins, or insides of the thighs, should be rubbed twice or thrice daily with either of the *liniments* F. 296. 300. 311., particularly upon coming out of the warm-bath, or semicupium, which ought to be employed once or twice daily, and rendered more efficient by adding salt or mustard, or both, to it. The application of blisters for two, three, or four hours, and re-application of them for an equally short time in another place, may be subsequently had recourse to, when the preceding measures do not answer the purpose for which they were directed. In the more severe cases, particularly when the motions are bloody, a mucilaginous draught, with castor oil and two or three drops of laudanum, may be given; and, if it be not retained, an enema, consisting of the same ingredients, may be administered, or any of the enemata contained in the Appendix suited to the circumstances of the case, and proportioned to the age of the patient.

11. In the advanced stage of the disease, especially when it passes into a dysenteric state, and when the exhaustion is great, and the stools are offensive, small doses of the chlorate of lime, or of potash, in an aromatic water, or in mucilaginous draughts or injections, will be very serviceable. In this chronic period, when the disorder lapses into the form of diarrhœa, proceeding from chronic inflammation of the intestinal mucous surface, the following powders may be given alternately with the chlorates, or either before or after they have been tried:—

No. 123. ℞ Hydrarg. cum Creta gr. j.; Magn. Ustæ gr. iij.; Gum. Acaciæ et Sacch. Albi, āā gr. v.; Tinct.

Opii Comp. ♏j—ij. Fiat Pulvis, quovis in vehiculo idoneo sumendus, bis terve in die.

No. 124. ℞ Sodæ Sub-carbon. gr. iv.; Pulv. Acaciæ gr. xij.; Aquæ Cinnam. ʒ vj.; Syrup. Papaveris ʒ ss. M. Fiat Haustus.

12. It will often be of the utmost service, even at this advanced stage, to give a full dose of calomel, and, if there still be fever, a grain of James's powder, at bed-time; from half a drachm to a drachm of the spirits of turpentine occasionally, with an equal quantity of castor oil being taken on the following morning in some aromatic water, or in milk: or, from five to twenty-five drops of the spirits may be prescribed three or four times daily in any suitable vehicle. During this period of the complaint, small quantities of rhubarb, magnesia, and ginger; lime-water with milk, the preparations of columba with soda, those of catechu with chalk, the hydrarg. cum creta with Dover's powder, the decoction of pomegranate bark, or small doses of the sulphates of iron and of potash, may severally be employed according to circumstances. If pain be still complained of, small doses of the compound tincture of opium, or of Dover's powder, or of syrup of poppies, become absolutely necessary. In this chronic state of the disease, the sub-borate of soda given internally, either alone, or with an equal quantity of supertartrate of potash, has proved extremely useful in my practice at the Childrens' Infirmary; either of the liniments, No. 296. 300. 311., being rubbed daily over the abdomen, and a flannel roller afterwards placed around it. In this stage of disorder, Dr. CHAPMAN recommends the following:—

No. 125. ℞ Ferri Sulphatis gr. ij.; Acidi Sulphur. gtt. x.; Sacchar. Albi ʒj.; Aq. Fontan. ℥j. M. Capiat ℥j. ter quaterve quotidie.

13. The febrile nature of the disease, and its evident connection with inflammation of the mucous surface of the stomach and bowels ought not to be overlooked. In its early stage, therefore, cooling febrifuge medicine and beverages may be allowed the child, in order to assuage the thirst. With this view the liquor ammon. acet. with nitre, and spirit. æther. nit., may be given, with aq. fœniculi, at short intervals; and, in the more advanced stage, when the irritability of the stomach has subsided, small doses of the sulphate of quinine, either in syrup or in compound infusion of roses; or the infusion of cinchona, with a few drops of liquor potassæ, or of the sub-carbonate, may be directed. When the stomach will retain it, this infusion, with liquor ammon. acet., very small quantities of nitrate of potash, and the spirit. æther. nit., has proved beneficial.

14. *Regimenal and Prophylactic Treatment.*— *a.* When the disease occurs, as is most commonly the case, in infants under a twelvemonth, the diet should consist, at the commencement of the attack, exclusively of the mother's milk, or when it has been recently weaned, a healthy wet-nurse should be procured. If, however, the child will not take the breast, small quantities of diluted sweetened milk may be given, or thin rice or barley-water, with some gum added to it. Besides these, soda water, marsh-mallow tea, and the water poured off an infusion of toasted oatmeal, or oat-cakes, may be also tried. In the latter stages of the complaint, the usual farinaceous aliments may be allowed. Dr. RUSH attributes much importance to the moderate use of salted provisions at this period, and of port wine; and I have had occasion to know, that both of these are often extremely beneficial when properly restricted. I believe that the want of a sufficient quantity of salt in the food of children, in climates and states of the air requiring this condiment, is often concerned in the causation of the disease. For no malady is change of air more necessary than for this. The child should be removed from the crowded town to the open country; an elevated, dry, but not bleak, situation being selected. Removal to the sea-side is also very beneficial; or, when a more complete change cannot be enjoyed, a close, low situation may be exchanged, even for a time, for one that is more open and elevated.

15. *b.* The *prophylactic* measures may be briefly stated to consist of allowing the infant a healthy breast of milk till it is a year old; of wearing flannel next the skin, and keeping the lower extremities warm; of regulating the diet, and avoiding excess in fruit, and the use of unripe, over-ripe, or stale fruit; and of attending to the state of the gums during the period of dentition.

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CHOREA. SYN. *Chorea Sancti Viti* (from *χορέα* a dance with singing); *Saltus Viti, Chorea Sti. Modesti, Choreomania, Ballismus, Orchestromania, Epilepsia Saltatoria*, Auct. Var. *Chorée*, Fr. *Der St. Veitstanz*, Ger.

CLASSIF. 2. *Class*, Nervous Diseases;
3. *Order*, Spasmodic Disorders (*Cullen*).
4. *Class*, Nervous Affections; 3. *Order*,
Affecting the Muscles (*Good*). II. CLASS,
III. ORDER (*Author*, in *Preface*).

1. DEFIN. *Tremulous, irregular, involuntary, and ludicrous motions of the muscles of voluntary motion, more marked on one side than the other, without pain, occurring in both sexes, more frequently in the female, and chiefly between eight and fifteen years of age.*

2. This disease was formerly called the Dance of St. Guy by the French, and of St. Weit by the Germans, from the circumstance of it being so prevalent in Swabia, and other parts of Germany, during the fifteenth and sixteenth centuries, that patients crowded to a chapel near Ulm, dedicated to this saint, who had, by the aid of the priests, obtained great celebrity in its cure. It appears to have been known to the ancients; for the Scelotyrbe of GALEN very nearly resembles it. The earliest writers, since the revival of letters, who noticed this affection are, PLATER, HORSTIUS, and SENNERT, under the name of Chorea Sti. Viti. In 1560, BAIRO, physician to the Duke of Savoy, mentioned it under the name of "*Indispositio Saltuosa Membrorum.*" But SYDENHAM was the first author who accurately described it.

3. I. HISTORY, &c. *A. Symptoms.*—The pathognomonic characters of chorea consist in disordered movements of parts actuated by the voluntary order of nerves; the functions of volition and of muscular action being deranged analogously to the manifestations of the mind in mental alienation. The disordered movements vary very considerably, in respect of the number of parts affected, and of the intensity of the affection: hence it may be

partial or general, slight or severe. It is more frequently partial than general, and is very often confined to the muscles of one side of the body. The description by **Sydenham** has been copied with little alteration by many authors; and, although extremely accurate in respect of some states of the disease, it by no means embraces all the varieties: that by Dr. **Hamilton** is, upon the whole, the best, particularly as respects its fully developed form.

4. This affection is often *preceded* by more or less marked disorder of the organic functions: the appetite is variable, the digestion imperfect, the bowels costive, the abdomen tumid, and the vivacity and physical activity diminished. To these are frequently added timidity, fretfulness, desire of solitude, sighing, palpitations, concealed mental affection, &c. These symptoms of disordered health are followed by slight, irregular, and involuntary twitchings of the muscles, particularly those of the face. These motions increase, assume the form of irregular clonic and continued convulsions, and are often attended by increased hardness, or tumefaction, of the lower regions of the abdomen, and constipation. Owing to the irregular convulsive motions of the face, jaw, head, and neck, of the trunk and extremities, and from the circumstance of these motions taking place at different times, the patient has a jumping, starting, or palsied walk, and cannot perform the usual occupations of the extremities with the steadiness and regularity of health. The characteristic motions vary in degree; but they are always present during the continuance of the disease, excepting while the patient is asleep, when, in most instances, they altogether cease.

5. Different muscles are sometimes successively affected; but those first convulsed still continue so until the termination of the disease. When the affection is fully formed, articulation is impeded, but seldom completely suspended. Deglutition is often difficult; the eyes lose their lustre and expression; the countenance becomes pale, languid, vacant, and, in the severest and most protracted cases, conveys the idea of imbecility, or even of fatuity. In the course of disorder, the muscles seem much more soft and flaccid than natural, and emaciation takes place: vertigo and headach are often complained of. The pulse is a little accelerated; the bowels are always constipated, and the urine is usually pale and copious. The tongue and gums are pale; the former being occasionally protruded, irregularly and spasmodically. In some of the severest cases the mouth is variously twisted, and a drivelling of saliva takes place from it: the eyes are distorted, or rolled in various directions, and the sight is occasionally defective. The disposition and temper are unstable or irritable; the mind is often harassed by various concealed mental impressions and ideas; and the emotions or desires are variously excited, without any sufficient or apparent cause. In some cases, deglutition is much impeded, and fluids are forcibly thrown up from the pharynx in attempts at swallowing them. **Bernt** and **Frank** state, that the urine and fæces are occasionally passed involuntarily during the height of an attack; but this rarely occurs in simple chorea. There is seldom any pain complained of, and, although the movements cease during sleep, yet the rest is often disturbed.

6. Such is the state of the fully formed disease; but it presents endless varieties, sometimes insensibly lapsing into hysteria, in other cases approaching to paralysis; now scarcely to be distinguished from convulsions; in one instance resembling tarantulism, and in another being closely allied to paralysis tremens. In some cases, the muscles of the face and neck are more affected than those of other parts; whilst in others, those either of the upper or of the lower extremities, or of one limb only, are most convulsed.

7. *B. Duration, complications, and terminations.* — *a.* The *duration* of this affection under treatment is various — from two or three weeks to several months: the most common duration being from one to two months. The shortest period of treatment, in the cases which have occurred to me, was eleven days. Relapses are, however, not infrequent. I have seen the affection to return thrice in the same patient. *b.* Chorea is very frequently *associated* with other disorders: in females with chlorosis, retention or suppression of the menses, anæmia, hysteria; and, in males, with rheumatism, with paralysis, disease of the head, and dropsical effusions in the serous cavities. *c.* It also not infrequently *terminates* in these, and in convulsions, epilepsy, anæmia, dropsy, palsy, hydrocephalus, and complete idiotcy. A return, however, to health is its most common issue. In a case related by Dr. **Elliotson**, it terminated in apoplexy; and Dr. **Brown** refers to three instances in his practice, where it terminated in violent convulsions, with cerebral symptoms, coma, and death.

8. Its *complication* with rheumatism, rheumatic pericarditis, and disease of the membranes of the spine, was first demonstrated by the writer, in a case, the *post mortem* inspection of which is detailed in the fifteenth volume of the London Medical Repository; the connection having been subsequently confirmed by Dr. **Prichard** and by Dr. **Roeser**, who have met with similar cases. The association of chorea with hysteria is very frequent about the period of puberty; and when the former occurs, after this term. Indeed, the majority of cases exhibiting choreal symptoms at or subsequently to the epoch of puberty in the female, partake more or less of the hysterical character — in many instances to the extent of appearing as a modified form of hysteria, rather than as chorea: and, upon strict inquiry, some irregularity is generally detected in the accession or subsequent occurrences of the catamenia. Females who are attacked by, or have been subject to, chorea anterior to the period of puberty, occasionally experience at this age retention or postponement of the catamenial discharge; or, if this secretion at all appears, it is scanty and at irregular intervals. Both the chorea and disorder of the catamenia evidently depend upon a similar condition of the vital manifestations of the organic nervous system, and chylopoietic viscera. The following procession of morbid phenomena is not uncommon: chorea with defective action of the digestive, assimilating, and secreting functions, and torpor of the liver; at a subsequent term, protracted catamenia, or scanty and irregular appearance of the secretion, occasionally with various hysterical affections, seldom amounting to a complete fit of the hysteria; and, lastly, when the catamenia become established, the hysterical af-

fection is sometimes more fully pronounced; and, with the regular establishment of the uterine functions, the chorea disappears. Dr. White relates the case of a lady, aged 42, who appears to have been the subject of chorea of an irregular or rather doubtful character, and liable to attacks of hysteria. In this case, which has been too readily admitted by Dr. Good as one of chorea, the menstrual discharge is reported to have been regular; but it is probable that in this, as many other instances of diseases occurring in females, a more strict inquiry would have detected some derangement in the uterine functions.

9. *C.* The *appearances found* on dissection of fatal cases are rather referrible to the complications than to the disease itself. In general, the body is somewhat emaciated, and the muscles soft, flaccid and pale. The stomach, bowels, and associated viscera present only contingent lesions: they are, however, often flaccid and pale, sometimes with a slight effusion of serum in the peritoneal cavity. In a few instances, signs of irritation of the uterus have been observed. Dr. Hawkins, found, in a case he examined, besides increased vascularity of the uterus, earthy concretions in the pancreas, omentum, and mesentery, with tubercles in the lungs. In the fatal cases recorded by Dr. Prichard, Dr. Roeser, and myself, adhesions of the opposite surface of the pericardium, with effusion of serum in it, and slight effusion into the pleura, were observed. In a case which occurred in my practice, the surface of the heart was covered in parts with coagulable lymph; its cavities were much enlarged, and their walls thin, pale, and flabby, resembling the muscles of white-fleshed animals. M. Desperriere met with effusion of serum into the pericardium. Soemmering states, that he detected the results of inflammatory action in the membranes of the brain; and several authors have made mention of small ossific deposits in the arachnoid of the dura mater. Dr. Brown, in the only one, of the three cases which terminated with convulsions and coma, that he had the opportunity of examining, found congestion of the vessels of the brain, with slight serous effusion between the membranes, and in the ventricles, and a *calcareous concretion* of a cubic form, and the size of half an inch, in each side, in the medullary substance of the left hemisphere, — the convulsive movements having been chiefly on the left side of the body. Dr. Coxe found the vessels of the brain congested, and twelve ounces of serum in its ventricles: Dr. Willan, also, in two instances, observed several ounces of serum in the ventricles of the brain. Dr. Patterson describes appearances of the membranes, consisting of vascular congestion with effusion of serum, and states, that a patient cured of the disease very soon died of hydrocephalus. M. Serres found, in one instance, a fatty tumour resting on the tubercula quadrigemina; in another, appearances of increased vascularity, with sanguineous effusion; and in two others, inflammation of this part of the brain. He further states, that, in experiments on living animals, he remarked injury of these parts to produce phenomena resembling chorea; but he at the same time admits that he has sometimes met with cases of chorea, in which no diseased appearances in the brain could be detected after death. In a case which occurred to me in 1819, complicated or rather alternating with rheumatism, with metastasis of this disease to the heart, and subsequently to the membranes of the spinal chord, inflammatory appearances, with coagulable lymph, and an effusion of turbid serum, were found through nearly the whole extent of these membranes, the patient having died in a state of universal paralysis. Changes in the spinal membranes similar to those described by me were observed in the four very interesting cases detailed by Dr. Prichard: in these latter, also, more or less congestion of the vessels, with effusion of serum between the membranes, and in the ventricles of the brain, was remarked. Dr. Aliprandi has also detailed a case, in which morbid appearances similar to those described by myself and Dr. Prichard were found in the spinal canal.

10. II. Diagnosis and Prognosis. — *a.* This disease, in its ordinary states, may be distinguished from other affections of a similar kind by the permanency, the clonic, and the partly voluntary nature of the movements, and their cessation during sleep. In *convulsions*, the movements, however irregular, and in other respects resembling chorea, are not continued, are not even partially under the influence of the will, and are of the most violent or tonic kind. The disease to which the name chorea was originally given approached nearer this latter description, but presented no uniform character, — various nervous disorders, very different from each other in many of their essential symptoms and pathological states, as the nervous affections resulting from the bites of the tarantula or other insects, irregular forms of hysteria, and convulsion, receiving this appellation; and, even at present, many irregular forms of convulsion, particularly those of a clonic kind, are often confounded with chorea. The only other disorder for which it may be mistaken is *paralysis tremens*, which occurs at a later period of life than chorea, is generally more limited to a single limb or part of the body, the movements being more of a tremulous than of a spasmodic kind, and to a much less extent; and not partaking of the starting, jumping, twitching, and ludicrous character possessed by those of chorea.

11. *b.* The *Prognosis* in the simple or uncomplicated state of chorea is generally favourable. But when it comes on after attacks of rheumatism, or in conjunction with this disease; if it follow the disappearance of the acute or chronic exanthemata and eruptions, or arises from injuries of the head, or from manustupration; if it be associated with epileptic convulsions, or with more or less complete paralysis of some limb or part; and if signs of anæmia, chlorosis, dropsical effusion, affection of the functions of the brain, or idiotcy, manifest themselves, an unfavourable, or at least a cautious, opinion of the result should be offered. It would seem that the disease is more severe or more frequently complicated in large cities, or in some places, than in others, for the very different results of practice cannot otherwise be well explained. Dr. Parr states, that in about sixty cases, in which the treatment very generally employed by other physicians was resorted to, all recovered, and only two had relapses. I have met with three or four fatal cases; Dr. Prichard has recorded four; Dr. Brown refers to three in his practice; and I have occa-

sion to know that a similar issue is not rare in cases occurring both in London and in Paris.

12. III. Causes.—*A. Predisposing causes.* Chorea is much more frequent in the female than in the male sex. According to the experience of Heberden, Thilenius, J. Frank, Reeves, Manson, Elliotson, and myself, three of the former to one of the latter are affected by it. The most common period of life is from seven years to fifteen — from second dentition to puberty; but no age is entirely exempt from it. M. Bouteille met with it in a lady of 80, complicated with hemiplegia; Dr. Powell and Dr. Maton, in females of 70; Dr. Crampton, in a female upwards of 40. I have seen it in a man upwards of 50; and cases sometimes occur as early as five or six years. The nervous temperament, and great sensibility of the nervous system; hereditary disposition; constitutional debility from whatever cause, either from original conformation, or from bad or deficient nourishment in early infancy, particularly an insufficient supply from the mother or nurse's breast, or total deprivation of this nutriment; effeminate education, and premature exercise of the mental powers; precocious excitement of the desires and affections; debility of the digestive and assimilative viscera; neglected state of the bowels, leading to accumulations of deranged secretions in the prima via; torpid function of the liver, and other secreting and assimilating organs; cold and moist climates; confinement or sedentary occupations in low, unhealthy, or crowded places; low or innutritious diet, especially vegetable food; impure miasmal air; want of personal cleanliness; and the ricketty, scrofulous, and rheumatic diathesis; constitute the chief predisposing causes of the disease.

13. *B. Exciting causes.*—These are not often readily ascertained. The most common are the irritation of worms or of morbid matters accumulated in the bowels (Stoll, Baldinger, Wendt), and fright. Dr. Reeves and Mr. Bedingfield state, that the great majority of cases which they treated was attributed to fright; and a nearly similar statement is made by Stoll and Ecker. Injuries affecting some part of the nervous system especially, as falls upon the head and back (Grash, Frank); the improper employment of lead, mercury, &c. (De Haen); suppressed eruptions, discharges, &c. (Thilenius, Darwin, and Wendt), particularly tinea capitis, itch, herpes, perspiration of the feet, &c.; metastasis, or extension of rheumatism to the membranes of the spinal chord (Ploucquet, Copland, Prichard, &c.); previous disease, especially the eruptive fevers, epilepsy, hysteria, and mental disorder (Sallaba); second dentition; suppressed discharges; anxiety, the dread of impending occurrences, concealed mental impressions and moral emotions, and the influence of imagination (Darwin, Haygarth), particularly morbidly exercised imagination in connection with sexual desire; frequently excited jealousy and envy; masturbation, and retained, or difficult, or suppressed menstruation, particularly if occasioned by this practice (Richter, &c.), and cold long endured, — are all occasionally exciting causes of the disease.

14. IV. Nature of the Disease.—Opinions as to the pathological state originating chorea have been extremely various. Sydenham considered it as a species of convulsion, occasioned by a humour affecting the nerves. Sauvages, Cullen, and many others, ascribed it to general debility, attended by unusual mobility of the system; and several writers, among whom I may notice Bouteille, Clutterbuck, Serres, Lisfranc, &c., to inflammatory action of some part of the cerebro-spinal axis; thus viewing it as intimately related to paralysis. Dr. Hamilton attributed it to disordered functions of the bowels, affecting the muscular actions sympathetically; and a very large number of writers, to debility deranging principally the nervous and muscular systems; the torpid states of the organic functions being a related or associated manifestation of disorder.

15. *A.* The exact *seat*, as well as nature, of the disease can be inferred with accuracy only from attentive observation of the causes in relation to the states of the system at its commencement, of the phenomena in its course, and of the structural changes existing in cases which have terminated fatally. The writer was the first who demonstrated, by *post mortem* research, inflammatory appearances of the membranes of the spinal chord; but he cannot on that account infer that the disease is owing to that cause. Indeed, in the case in which he observed it, the affection of these membranes was recognised, during the life of the patient, as a contingent lesion arising from metastasis of the rheumatism with which it was associated. M. Serres, having found disease of the *corpora quadrigemina* in four cases, considers these bodies as the seat of chorea, and thinks the results of his experiments, and of those of MM. Flourens and Rolando, on the functions of this part of the brain, countenance this opinion. Other pathologists, particularly MM. Bouillaud and Magendie, conceive that it is seated in the cerebellum, because the functions which they ascribe to this organ are chiefly affected — the disease, in their opinion, consisting of disorder of the actions of this part. If we reflect, that a number of disorders, more or less resembling each other, have been considered as chorea; that these, as well as chorea itself, are often complicated with, or run into, other affections of an organic or inflammatory kind; and that it is never fatal excepting in consequence of its consecutive and associated changes, especially those affecting the brain and spinal chord; the diversity of lesion observed after death, and of opinions derived from this source chiefly as to its seat, will not appear surprising.

16. I think that chorea, in its simple state, occurs most commonly in persons whose vital powers are depressed, the whole circle of vital organs performing their functions imperfectly, and thereby occasioning increased susceptibility of the nervous system. This state constitutes the aptitude to be affected by the exciting causes of this disorder; whether those acting directly upon the brain, through the medium either of the mind itself or of the senses, as terror, fright, mental impressions, moral emotions, &c.; or those which influence indirectly the cerebro-spinal nervous system, by irritating or otherwise disordering the organic nerves, as worms, morbid matters in the prima via. The susceptibility of the frame having been induced, either class of causes may occasion the malady, — the former, by changing the condi-

tion of those parts about the base of the brain which direct or influence the functions of the spinal chord, and, through it, of the voluntary muscles, — the latter, by disordering the functions of the organic nervous system, and thereby affecting, through the medium of the branches communicating with the ganglia placed on the roots of the spinal nerves, the nerves of voluntary motion: occasioning the irregular muscular movements constituting the disease, in the same manner that irritation of the visceral nerves produces the automatic movements of the fœtus *in utero*. In such cases, the disorder of the organic nerves may be extended, by means of the sympathetic, to the spinal nerves either of one side only, or of both, as well as to the nerves and parts about the base of the brain, disease being also subsequently induced in those parts of the brain or spinal chord in which they originate. According to this view, will readily be explained the frequent connection of chorea with hysteria and uterine disorder, as the patient advances through the period of puberty and adolescence, as well as the disappearance of the disease after the developement of the sexual organs, and the healthy establishment of the uterine functions — events intimately related with, and necessary to, the due manifestation of vital energy throughout the frame.

17. In other words, therefore, the *proximate* cause of chorea, in its simple and true form, seems to consist of debility, with some degree of irritation of the organic or ganglial class of nerves, extended more or less to those of volition, and occasioning morbid susceptibility of the nervous system generally, with diminished power, increased mobility, and irregular actions of the muscular system, particularly of those muscles supplied with the nerves principally affected. Whilst this appears to be the pathological state of the majority of cases of chorea, yet instances not infrequently occur in which disorder evidently commences in the spinal chord or its membranes, disturbing the functions of the nerves issuing from the affected part. In many cases, the lesion of the chord and of its membranes is occasioned by irritation propagated to the roots of the voluntary nerves; but in those which are connected with rheumatism, as well as in some otherwise related and produced, the mischief evidently originates in the membranes of the chord itself. When, however, the disease commences in the organic nervous system, affecting the voluntary nerves only secondarily, pain is not complained of upon examining the spinal column; but when it is seated in the chord or its membranes, pain or uneasiness is felt in this situation, and the disordered motions are more or less limited to particular parts. When the original cause of mischief is seated in the brain, or when the cephalic organs become consecutively diseased, the affection partakes more of the characters of true convulsion, either with or without hysterical symptoms, but most commonly with such phenomena.

18. V. OF NERVOUS DISORDERS RESEMBLING CHOREA.—Whilst true chorea, according to the application of the term in recent times, seems to originate in the organic nerves, and to disturb the functions not only of the voluntary nerves, as explained above, but also of those parts of the cerebro-spinal axis in which they originate; the affections I am about to notice, most commonly depend upon a disordered state either of the mind, or of some of the parts within the cranium, and are often attended by more or less affection of the generative and digestive organs. The disease to which the name *Chorea Sti. Viti* was first applied, very nearly resembled that produced by the bite of the *tarantula*, as it is described by BAGLIVI and SAUVAGES; and, if the description of the former disorder furnished by SCHENCK, PARACELSUS, and FELIX PLATER had not been confirmed by the more accurate observation of modern practitioners, it might have been viewed as greatly exaggerated, if not entirely feigned. *a.* The chorea of the writers of the sixteenth century appears to have consisted of inordinate muscular exertions and movements in regulated measures, proceeding from an irresistible mental impulse, excited by the influence of music or imitation on the mind. HORSTIUS states, that it sometimes recurred annually at the same period; and that the sound of music often increased it to a state of phrensy, those affected continuing dancing for an incredibly long period, in a most excited manner. It appears to have consisted chiefly of a sort of lascivious dance, kept up an uncommon length of time, until the impulse to excessive muscular motion was subdued by exhaustion, and has not inappropriately been called *Morbus Saltatorius* and *Epilepsia Saltatoria* by later writers. *b.* According to the account given by BAGLIVI and SAUVAGES of the effects of the bite of the *tarantula*, the patient is seized, a few hours after the injury, with difficulty of breathing, anxiety, and sadness. The violent symptoms of the first days are succeeded by a peculiar melancholy, which continues until, by dancing or singing, it is at last entirely removed. Persons thus affected frequent churchyards and solitary places, lay themselves out as if they were dead, evince the utmost despair, howl and sigh, assume various indecent attitudes, run about, or roll themselves on the ground, and are either pleased with or dislike particular colours. Shortly after being stung, they fall down, deprived of sense and motion, either breathing with difficulty and sighing heavily, or lying as if quite dead. Upon the sound of music they begin to move their fingers, hands, feet, and successively all the parts of the body, sighing, dancing, and assuming a thousand fantastic gestures. They continue these motions for several hours, until they are exhausted, and covered by perspiration; but they return again, after some repose, to this violent exercise, which is kept up for ten or twelve hours each day, during four or five, but seldom so long as six days. This affection has received various names from Continental writers, amongst the chief of which are *tarantismus*, *tarantulismus*, *Choreomania*, *Melancholia saltans*, *Chorea Sti. Johannis*, *Chorea Sti. Valentini*, and *Dæmonomania*.

19. According to the above account of both affections — the original *chorea* of the Germans, and the *tarantismus* of SAUVAGES — there appears to be but little difference between the latter, at its advanced or second stage, and the former. It is very difficult to believe that the whole, or at least the greater part, of the phenomena in both these affections was not feigned. It is, however, admitted, that the poison of the tarantula spider is most successfully counteracted by the exciting

influence of music on the mind, and the profuse perspirations produced by continued dancing. A writer in the *New York Medical Repository* details an instance of a convulsive disorder occasioned by the bite of a spider, and cured by music. Mr. Kinder Wood has recorded a case, which originated in disordered menstrual function, with cerebral symptoms and painful affections of the nerves of the face, that resembled in every respect the malady to which the German physicians gave the name of chorea.

20. The disorder, also, which has usually been called the "*Leaping Ague*" in Scotland, seems to be very closely allied to the original chorea. It is described very nearly as follows by a writer in the *Edinburgh Medical and Surgical Journal*: — Those affected first complain of a pain in the head or lower part of the back, to which succeed convulsive fits, or fits of dancing, at certain periods. During the paroxysm, they distort their bodies in various ways, and leap about in a surprising manner. Sometimes they run with great velocity even in dangerous places, and when confined, climb or leap from the floors of the cottages to the rafters, or swing by, or whirl around, one of them. They often dance or leap about with greater agility, vigour, and exactness than they are capable of exerting at other periods; the affection apparently consisting chiefly of a morbid and irresistible propensity to dance, tumble, and run about in a fantastic manner. Cases of this form of disorder have been detailed by Tulpius, Penada, Reil, Brückmann, Westphal, Crichton, Piedagnel, Laurent, and others. In M. Piedagnel's case there was a propensity to run forwards, until the patient, a man, dropped down exhausted. On examining the brain after death, tubercles were found pressing on the anterior part of the hemisphere. A similar instance occurred in the father of a medical friend, and terminated in paralysis. The subject of M. Laurent's case was propelled backwards with considerable velocity.

21. Dr. Watt has given the history of a disorder which he has called chorea, or periodical jactitation, in a girl of ten years, that was preceded by excruciating headach and vomiting. To this affection of the head succeeded the propensity to turn around in one direction on her feet with great velocity, like a spinning top. This propensity subsided after having continued above a month, but was followed by an exasperated return of the headach, and loss of power over the muscles of the neck. She was afterwards seized by a different kind of motion, occurring in fits, which lasted daily, from two or three, to six or seven hours; this consisted in placing herself across the bed, and rolling rapidly round on her sides from one end of it to the other. When laid in the shallow part of a river she rolled around, although at the point of being drowned. The affusion of cold water did not stop the rotations, which were about sixty in a minute. In a little more than a month these movements were replaced by others of a different kind. She now laid herself on her back, and, drawing her head and heels towards each other, raised her trunk, afterwards falling with some force on her back by straightening her body. These motions were repeated ten or twelve times in a minute, were continued for about five weeks, and were then followed by the propensity of standing upon her head. Having raised her feet perpendicularly upwards, she fell down as if dead, but instantly placed herself on her head as before, again fell, and continued to repeat these movements for fifteen hours a day, and as rapidly as twelve or fifteen times a minute. The affection had resisted emetics, cathartics, local depletion, blistering, setons, &c., but disappeared after a spontaneous diarrhœa. Dr. Watt refers to two similar cases which had come to his knowledge; and another instance has been adduced by the writer, under the designation of "*Inquirer*," of an instructive article on the subject, in the third volume of the *Edinburgh Medical Journal*. Mr. Hunter has also given the particulars of an instance of rotatory affection resembling chorea, in the twenty-third volume of the same work.

22. Dr. Robertson has described a peculiar form of convulsion, in many respects like chorea, which spread at one time (1800) as an epidemic amongst a sect of religious enthusiasts in the states of Tennessee and Kentucky, evidently from the influence of imagination and irritation on morbidly excited minds. The seizure was violent, and distinctly convulsive at the commencement, but it usually passed from this state into one more chronic, and more nearly approaching chorea. Persons thus affected are described by Dr. Robertson as being continually interrupted in their conversation by the irregular contractions of the muscles, and as having no command over these contractions by any effort of volition; lying down in bed does not prevent them, but they always cease during sleep. Remissions and exacerbations are common, but occur without regularity. During the remission, a paroxysm is often excited by the sight of an affected person, but more frequently by shaking hands with him. The sensations of the patient during the fit are said to be agreeable, and are expressed by the enthusiastic by laughing, shouting, dancing, &c., followed by fatigue, and a sense of general soreness. The affection at last becomes slighter by degrees, and finally disappears. Cases of similar nervous disorders, and apparently intermediate between chorea and convulsions, and often partaking of many of the features of hysteria, as well as the affection called *Malleatio*, have been detailed by Tulpius, Horstius, Morgagni, Wichmann, Majendie, and others above referred to (§20.). It is difficult to believe, however, upon perusing the particulars of the foregoing cases, that they are altogether the actual phenomena of disease. It is very probable that the morbid affection of mind, — the disordered state of the desires, or of the mental impressions, — exalts the derangement of the nervous system to that singular pitch, of which these cases are rare examples. (See arts. Convulsions, and Hysteria.)

23. VI. Treatment. — A. *Conspectus of the treatment*. *Purgatives* have been recommended in chorea by Sydenham, Whytt, Hamilton, Cheyne, and others. Sydenham, however, did not confide the cure of this affection to them entirely, for he also directed occasional depletion, with tonics in the days intervening between the exhibition of the purgatives, and narcotics at bedtime. *Emmenagogues*, particularly aloës, myrrh, assafœtida, hellebore, savine, castor, the melissa officinalis, spiritus ammoniæ succinatus, saffron,

borax, &c. have been very proprely prescribed by **Richter**, **Schmidtmann**, and several other German writers, particularly when the disease occurs about the period of puberty, and is connected with hysteria, or disorder of the menstrual discharge. *Anthelmintics* are the chief medicines advised by **Hufeland** and **Thilenius**. **Watt** and **Sallaba** viewed the disorder as possessing an inflammatory character, and therefore directed for it the antiphlogistic regimen. *Tonics* have found supporters in **Dover**, **Werlhof**, **Mahon**, **Eckstein**, **Hildebrand**, **Elliotson**, and many other writers. But they do not agree in the kind of tonic which should be employed: thus, **Hildebrand** prefers the *sulphuric* and *mineral acids*; **Werlhof** and **Mahon**, the *cinchona* bark; **Griffith** prescribes the bark, with the carbonate of *potash*. **Eckstein**, **Wendt**, and **Elliotson** recommend the preparation of *iron*, in preference to other tonics. The *fixed alkalies* have been noticed favourably by **Wendelstatt**; and the mineral springs at Ems by **Brückmann**. Sir **Geo. Baker**, **Nagel**, and **Michaelis** prescribed the flowers of the *cardamine pratensis*; the latter in doses of a drachm every six hours. The leaves of the *Seville orange tree*, in the form of powder, decoction, or infusion, were much praised by **De Haen**, **Westerhoef**, **Werlhoff**, and **Engelhard**. The *arnica montana* received the commendation of **Theussink**; and the *chenopodium ambroisioides*, that of **Plenck** and of **Ecker**.

24. *Narcotics and sedatives* have also been prescribed in this affection. The inspissated juice of the root of the *belladonna* was employed in doses of one sixth of a grain, with apparent advantage, by **Stoll**, **Lentin**, and **Ketterling**. **Stoll**, however, directed at the same time friction with a liniment composed of the spiritus serpilli, essentia castorei, and camphor, to which I am inclined chiefly to attribute the benefit derived. M. **Allamand** has likewise prescribed belladonna with advantage. *Stramonium* was used by **Sidren**; *digitalis* by **Uwins** and some others; and *opium* by **Swainston**. The *prussic acid* has lately received the commendation of Mr. **Stuart**. He employed it in two cases, after purgatives had been exhibited in large doses, with decided advantage. The *prussiates* of iron or of zinc are also productive of benefit.

25. *Antispasmodic* remedies have been resorted to by several physicians. *Camphor* has obtained a well-deserved notice from **Werlhoff**, **Mahon**, **Wilson**, and others. The *cuprum ammoniatum* has been prescribed by Dr. **Walker**, after alvine evacuations, and found beneficial in cases where bark and other tonics have failed. **Willan**, **Uwins**, **Delarive**, and **Theussink** have also spoken of it favourably; and **Merk** carried it so far as to produce an emetic effect. *Valerian* has been recommended by **Bouteille**, **Bernt**, **Murray**, **Guersent**, &c. After the bowels have been evacuated, it is in many cases an excellent remedy, either given by the mouth, or administered as an enema. The *oxyde of zinc* has received a very extensive trial in this affection from **Hart**, **Burseri**, **Thilenius**, **Schraud**, **Wright**, **Hufeland**, and **Kerst**. **Stoll**, however, states that no benefit is derived from it, although pushed to a great length. I have seen much more advantage produced from the sulphate than from the oxide of zinc. Although the oxide may be given without advantage, and irritate the stomach, the addition of a full dose (gr. ij.) of the cuprum ammoniatum in combination with the zinc will be borne without inconvenience. This fact, which was first noticed by Dr. **Odier**, of Geneva, in a letter to Dr. **Duncan**, may be taken advantage of in the treatment of chorea; for I am not aware that it has as yet been acted upon in respect of this disease. The *nitrate of silver* has likewise been fully employed, and certainly with benefit if purgatives have been premised. **Franck**, **Uwins**, and **Crampton** have found it successful in extremely obstinate cases.

26. *Arsenic*, in the form of Fowler's solution, has also been directed with advantage in severe cases of chorea, especially after free alvine evacuations have been procured, by Mr. **Martin**, Dr. **Salter**, and Dr. **Gregory**. *Iodine* has been given by Dr. **Manson**, Dr. **Gibney**, Dr. **Peltz**, and myself; and, when judiciously prescribed, particularly when the disease appears about puberty, and is connected with obstructed menstruation, is often of great service. In cases of this kind, a blister applied over the sacrum, as recommended by Dr. **Chisholm** and Mr. **Swan**, and found beneficial by them, has been productive of marked advantage in my practice. The propriety of *scarifying* deeply the gums, when the affection occurs about the period of second dentition, has been very properly insisted upon by Dr. **Gregory** and Dr. **Monro**.

27. The *cold bath* has been much used by M. **Dupuytren** in chorea, and *sea bathing* has been recommended by **Hufeland** and **Himly**; but the *shower bath*, or the simple *affusion of cold water* on the head whilst the patient is seated, is preferable at first, in my opinion. If the shower bath be directed in cases of females, the patient should stand, whilst receiving the bath, in a pan of warm water. Dr. **Ferrari** prescribed with benefit a solution of *tartarized antimony* internally, and *ice* along the vertebral column, followed by immersion daily in a cold bath, and by purgatives, bitter tonics, and hyoscyamus. *Setons, issues*, and *moxas* in the neck, or over the vertebræ of the back, have also been employed by several practitioners. Dr. **Aliprandi**, however, relates a case where issues and *moxas* proved of no service. Drs. **Physick** and **Young** have made use of the *black snakeroot*, the *cimicifuga racemosa*, and experienced decided advantage from it. This substance seems to act more rapidly than others in the cure of the disease, and without any sensible action on the secreting functions. It is given in doses of from ten grains to a drachm. The animal oil of Dippel has been found of service by **Werlhof**; the *cajeput oil* by **Ramspek**; and the *cod* and *tusk-liver oil*, and *spirits of turpentine* by the author, who first prescribed them in this disease. *Electricity* has been suggested by **De Haen**, **Fothergill**, **Schaeffer**, &c.; and *galvanism* by several writers. Large doses of *musk* were directed by Dr. **Maton** and Dr. **Powell**, after free alvine discharges had been procured.

28. Respecting the propriety of *blood-letting* in chorea, much contradictory evidence has been furnished. **Sydenham** prescribed it as a subsidiary remedy; Dr. **Cullen** states that it was sometimes useful, at other times injurious; Dr. **Watt** obtained, he informs us, decided advantage from the practice; Dr. **Armstrong** found

it very hurtful; and Dr. Clutterbuck trusted to it almost entirely, repeating it several times after intervals of a few days. M. Bouteille viewed the disease as either congestive or inflammatory, and commenced the treatment with blood-letting, which he generally repeated, and with purgatives. M. Serres, having observed vascular turgescence about the corpora quadrigemina in four fatal cases, has recommended *leeches* and *counter-irritants* to be applied to the upper part of the spinal column; and M. Lisfranc, also, has directed blood-letting and leeches to the nape of the neck. Dr. Hunter and Dr. Harrower have depended upon purgatives and the inunction of the *tartar emetic ointment* on the scalp and along the spinal column. *Aromatic liniments* to the spine were directed by Chrestien; the turpentine and camphor *embrocation* to the same situation, by the author; and *tartar emetic plasters* by Dr. Johnson, who also advised a grain of the nitrate of silver, with two grains of pilul. hydrarg. and five of the extr. colocynth. comp. as a purgative. It may further be added, that Ecker justly insists upon the superiority of *sulphur* as a purgative in this disease. The application of *blisters* to the spine has been recommended; but, in two cases in which I have had recourse to this practice, I thought the effect was injurious rather than beneficial.

29. *B. Treatment recommended by the Author.* —A careful consideration of the nature of the disease will readily suggest a rational treatment. The *first indication* is to remove morbid secretions and fæcal accumulations, the usual cause of irritation of the organic nerves. The *second*, to subdue vascular irritation or erythism of the vessels of the spinal chord or brain, when the symptoms indicate its existence. The *third*, to rouse the energy of the organic nervous system, and the vital actions of the assimilating and secreting organs, and to impart energy to the frame. *a.* A judicious employment of purgative remedies, varied according to the peculiarities of the case, and the states of the patient's system, is indispensable to the fulfilment of the first intention. When the disease appears previously to approaching puberty, it is not very material what kind of purgatives are first prescribed: but it should be recollected, in the treatment of this disease, perhaps, more than in many others, that a judicious combination of purgatives, with tonic, or stimulating, or antispasmodic remedies will more rapidly restore the patient than confiding in purgatives merely. Indeed, we are enabled, by such combinations, partly to accomplish two indications of cure at the same time; and frequently we secure a more decided operation on the bowels and secreting viscera by the combined means. It will very generally be necessary to commence with the exhibition of a full dose of calomel, either alone or with other purgatives, or followed by them five or six hours afterwards: but the doses of calomel ought not to be frequently repeated in this disease; nor, in my opinion, will it be found serviceable to continue purgatives long, without either exhibiting them with a bitter tonic or antispasmodic remedy, or with both, or alternating them with these remedies. When purgatives are thus prescribed, they may be continued longer, not only without producing any detriment, but generally with decided advantage. Cases will not infrequently occur, in which little or no benefit can be remarked until they have been given almost unremittingly for a long period — the evacuations being at first nearly natural, but afterwards betraying disorder, and proving that the repeated exhibition of purgatives was requisite to unload the biliary ducts and gall-bladder, and remove fæcal matters retained in the cells of the colon. For this purpose, I have generally preferred the compound infusions of gentian and senna, in equal proportions, with some antispasmodic and a corrigent. This combination seldom acts frequently, but usually copiously. The oil of turpentine, either followed, soon after its exhibition, by some other purgative, if it does not act upon the bowels, or combined with it, is extremely beneficial; and, whenever the evacuations are offensive, or of a morbid appearance, especially if the case be complicated with worms, ought never to be neglected. In such cases, a single dose of calomel at bed-time, followed, in the morning, with the turpentine, combined with castor oil (in the proportion of three parts of the former to two of the latter), and floating on the surface of milk, or some aromatic water, is most decided. In this affection especially, the medical attendant should examine carefully the state of the evacuations, and be guided, in a great measure, by their appearance, as to the repetition and selection of purgative medicines. The benefit derived from this class of remedies in chorea was sufficiently demonstrated by Drs. Hamilton and Parr, and, although questioned by several practitioners of the present day, cannot be denied. Instances of their failure have been chiefly owing to the neglect of combining them in the manner insisted upon above, or of exhibiting tonics, stimulants, or antispasmodics, in the intervals between their operation. The good effect of treatment, as well as the operation of purgatives, will be much enhanced by rubbing either of the liniments F. 296. 311. on the loins or abdomen, once or twice daily, and by allowing a light nutritious diet, chiefly of animal food.

30. *b.* Contemporaneously with the fulfilment of the *first* indication, the *second* should receive due attention. In many cases, the means used to accomplish the former will be sufficient to remove existing irritation about the roots of the voluntary nerves; but when we have marked evidence of irritation of these parts, or of determination of blood to any part of the cerebro-spinal axis or investing membranes, either in the state of the pulsation of the carotids, increased temperature of the head, coldness of the extremities, tenderness or pain from the occiput along the spinal column, particularly when pressing between the vertebræ on each side of the spinous processes, the application of leeches behind the ears or along the spine, and repeating them according to circumstances, or cupping in that situation, will be requisite, and not incompatible with the use of tonic and antispasmodic medicines, in cases presenting symptoms indicating the propriety of resorting to them. After leeches, the cold affusion on the head or on the spine, night and morning, or the shower bath; rubefacient liniments to the latter situation, or the tartar emetic ointment or plaster; warm woollen clothing on the lower extremities, and attention to the mental emotions; constitute important parts of the treatment.

31. An accurate idea of the remote causes of the disease, as well as of their probable operation and continued effect, should lead not only to their removal as far as possible, but also to a treatment modified accordingly. The mental impressions and moral emotions are often more or less affected, particularly in those irregular forms of disorder, which have very generally been confounded with chorea. This circumstance should not escape the attention of the physician, as it points to the employment of moral management in aid of medical measures. As the mental affection, when it exists, has generally an intimate relation to the remote causes of the disease, the importance of ascertaining the existence of the former, as well as the nature of the latter, as a basis of an appropriate treatment, must be manifest.

32. *c.* Having removed accumulations of morbid matters, and subdued irritation existing about the origin of the voluntary nerves, or in parts of the cerebro-spinal axis, or enveloping membranes, and having excited the actions of the secreting and assimilating organs by the means stated above, the *third* intention of cure is to be now entered upon in a more decided manner, by the exhibition of tonics combined with antispasmodics, and by due attention to the state of the bowels, and functions of the secreting viscera and surfaces. The combination or alternation of bitter tonics with aperients and antispasmodics will often be necessary during this stage of the treatment; or an occasional dose of a brisk purgative, or of calomel, will be exhibited with advantage during the employment of tonics. Even when the bowels are so active as apparently to render this interference unnecessary, a dose of the pilula hydrargyri, given once or twice a week, either with or without the pilula aloës cum myrrha, will be found serviceable. As to the choice of tonics, no immutable rule can be laid down. The state of the pulse, and of the secreting organs, should be the chief guide in the selection of them. Attention to the mode of combining them is also of much importance. Bark, in any form, will be beneficial when judiciously prescribed. The following powder will be found serviceable, and may be taken in some aromatic water; the doses of the ingredients being varied according to the age of the patient, and the state of the bowels: —

No. 126. ℞ Pulv. Cinchonæ gr. xij.; Pulv. Rhei gr. viij.; Sodæ Sub-carb. gr. x.; Pulv. Capsici Annui gr. ij. Misce.

If the decoction be preferred, it will be found most beneficial when given with liquor ammoniæ acetatis, and a little of the spiritus ammoniæ aromaticus. The sulphate of quinine is an excellent medicine, especially when the patient is old enough to take it in the form of pill, when it may be most advantageously combined with aloës, as in F. 572—577., or with camphor and aloës as follows. In this state of combination a decided action will be exerted on the bowels: —

No. 127. ℞ Camphoræ rasæ, Quininæ Sulphatis, āā ℈ j.; Extr. Aloës Purif. ʒ ss.; Extr. Gentianæ (vel Pilul. Galban. Comp.) ʒ j.; Syrup. Simp. q. s. M. Fiant Pilulæ xxxvj., quarum capiat binas bis quotidiè.

33. In this stage of treatment much advantage will often be obtained from *valerian*, combined with other antispasmodics and tonics, or with the alkalies (F. 269. 368.); from the preparations of *iron*, as recommended in the article on Chlorosis, (§ 13.), or in F. 521. 523.; and from the sulphate of zinc (F. 582—587), or the arsenical solution (F. 364.). As chorea is sometimes complicated with disease about the heart, or the roots of the voluntary nerves, or the membranes of the brain or spinal chord, of an inflammatory nature, care should be taken not to exhibit this last active substance, or even the preparations of iron, or of bark, until the symptoms of these complications have been removed by local depletions, cold affusions, or the shower bath, and counter-irritation. A similar precaution is still more requisite in respect of the employment of *strychnine*, or the nux vomica (see F. 443. 541, 542. 565. 907.), which I have found of much service in the advanced course of treatment of the simple form of chorea, or when it has been associated with rheumatism of the joints or extremities, with chlorosis, hysteria, or amenorrhœa; in which complicated states of the disease I have likewise found the tincture of iodine, and hydriodate, or iodurretted hydriodate of potash of great service (F. 234. 722.). The formulæ for the above medicines given in the Appendix, or the following, may be adopted: —

No. 128. ℞ Olei Valerianæ ♏ xij.; tere cum Sacch. Purificati ʒ iijss.; tum adde Infus. Valerianæ ℥ vijss.; Liq. Arsenicalis ♏ xv. ad. xxx. Misce. Capiat cochlearia duo larga ter quotidiè.

No. 129. ℞ Pulv. Calumbæ gr. x.; Pulv. Valerianæ gr. xij.—℈ j.; Carbon Ferri Præp. gr. x.; Pulv. Cinnam. gr. vj. M. Fiat Pulvis, vel Electuarium molle cum Syrup. Zingib. q. s., bis terve quotidiè sumatur.

No. 130. ℞ Carbon Ferri Præp. ℥ ss.; Pulv. Supertart. Potassæ ʒ vj.; Confection. Sennæ, Syrup Zingiberis, āā ℥ jss. Misce. Fiat Electuarum, cujus capiat Cochleare unum minimum mane nocteque.

No. 131. ℞ Carbon. Ferri; Sulph. Præcip. āā ʒ ij.; Potassæ Supertart. Pulver. ʒ v.; Confectionis Sennæ et Syrup. Zingiberis āā ℥ jss. Misce. Fiat Electuarium. Sumatur Coch. unum minimum mane nocteque.

No. 132. ℞ Sub-boratis Sodæ, Supertart. Potassæ, āā in Pulv. ʒ iij.; Carbon. Ferri ʒ ij.; Confectionis Sennæ ℥ ij.; Syrup. Zingiberis q. s ut fiat Electuarium molle, cujus Cochleare unum minimum mane nocteque sumatur.

34. During the use of these medicines, the tartarized antimonial ointment or plaster may be applied to the spine; and when the tonics are not combined with aperients, the former may be exhibited in the course of the day, and the latter at bed-time, as they may be required. The nitrate of silver may also be tried in doses of half a grain, or a grain, combined with aloes, or the aloes and myrrh pill.

35. C. *The treatment of the complicated and irregular states of this disease* must necessarily be modified according to the diversified form it assumes. The association of the disease with rheumatism has been observed by me on several occasions, and, in nearly all, there has been a marked disposition of the rheumatic affection to recede from the joints or extremities, and attack the internal fibro-serous membranes, as those of the cerebro-spinal axis and the pericardium. This unfavourable result has generally been promoted by a too lowering treatment; but prevented by tonic and stimulating medicines, with due attention to the alvine evacuations. In cases, therefore, complicated with rheumatism, chlorosis, anæmia, or retention of the menses, the purgatives selected should be of a warm and stomachic kind, or combined with cordial and stimulating substances; the ammoniated tincture of guaiacum, camphor, serpentaria, and similar medicines, being also employed. In these states of disease, the internal use of the cod or tusk-liver oil will be found most beneficial. Having observed instances

in which the suppression of the rheumatic affection of the joints by the use of embrocations and liniments was rapidly succeeded by the appearance of internal disease, the application of such remedies to the external seat of the rheumatic disorder should not be resorted to.

36. In the *irregular forms* of chorea, particularly those which present more or less of an hysteric character, the functions of the uterus, and the circulation of the brain or spinal chord, or both, are often disordered. In these it will be requisite not only to evacuate the bowels freely, but also to allay uterine irritation, where it seems to exist, by leeches applied to the tops of the thighs, or cupping over the sacrum, and to promote the monthly evacuation, when scanty or retained, by purgatives and emmenagogues. In many cases of this description, the application of a number of leeches to the occiput, neck, and behind the ears, the cold affusion on the head, or the shower bath, with warm clothing on the lower part of the body, and due regulation of the moral emotions, will materially aid the treatment. The more the attack assumes the characters of tonic convulsion, the more requisite will it in general be tō have recourse to local depletions, especially if the affection occur after puberty, and be connected with interrupted menstruation.

37. During convalescence, and even in the advanced course of treatment, change of air, agreeable amusement, exercise in the open air, the use of chalybeate or aperient mineral waters, and a light nutritious diet, commencing with warm salt water bathing during the treatment, and concluding with cold salt water bathing in advanced convalescence, followed by smart frictions of the surface of the body upon coming out of the bath, will materially promote and confirm recovery, as well as prevent a return of the disease.

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CLIMACTERIC DECAY. — *Climacteric Disease.*

CLASSIF. 3. *Class.* 4. *Order* (Good). I. CLASS. V. ORDER (*Author*).

1. DEFIN. *General decline of the vital powers, at the age of senescence, without any evident cause.*

2. The ancients believed that very important changes took place in the economy at certain periods; the first being the seventh year, and the subsequent epochs answering to the numbers resulting from the multiplication of three, seven, and nine, into each other: as the twenty-first, the forty-ninth, the sixty-third, and the eighty-first years. The two last were called grand climacterics, as the life of man was supposed to have reached its allotted term. The doctrine of climacteric periods has been traced to PYTHAGORAS, who derived it from the Egyptians; and, although its truth has been denied by many eminent physicians, it has been believed in by others. The changes which take place at these epochs are of two opposite kinds; that of renovation, and that of decay. It is the latter of these which will here be considered.

3. SYMPTOMS. — This disease has been very minutely described by Sir H. HALFORD. It usually comes on insensibly. The patient first complains of fatigue upon slight exertion; his appetite becomes impaired; his nights are disturbed or sleepless, and his mornings unrefreshed. The tongue is somewhat white; the pulse a little accelerated; the face extenuated, occasionally slightly bloated; the body emaciated, and the ankles and legs disposed to swell. The urine is not deficient, but the bowels are sluggish, and pains, with vertigo, are occasionally felt shooting through his head and various parts of the body, but are not possessed of the rheumatic character. As the vital exhaustion proceeds, the stomach loses all its powers; the emaciation is greater; the lower limbs are more œdematous; restlessness through the day and sleeplessness through the night increase, and all the vital manifestations,

mental and physical, are gradually extinguished. Such is the usual progress of the simple form of the disease, or rather gradual decay of the vital energies, — a decay which is not peculiar to, but which may occur at any time intermediate between, the grand climacteric periods. This simple form of decay is, however, less frequently observed than its complication with other affections. Persons who, together with the anxieties, griefs, and distresses of life, have been subject to disease of some particular organ, as of the lungs, liver, brain, heart, &c., who are of a gouty, rheumatic, or calculous diathesis, generally experience at these epochs an aggravation of such diseases, which assume a more dangerous character from the vital decay which is thus attendant upon them. Indeed, in most cases, these accidents, moral and physical, constitute the exciting causes or occasions of the appearance of climacteric disease, as well as complicate and aggravate its progress.

4. Causes. — This disease is more common to men than women, probably owing to the more tumultuous and exhausting life passed by them — to their greater exposure, during the preceding terms of existence, to the numerous causes of mental and corporeal exhaustion incidental to the states of modern society and civilisation. It is not infrequently occasioned by the mental depression arising out of pecuniary losses and disappointments, and the death of old and attached friends and relatives. Thus, we sometimes observe it proceed rapidly to a fatal issue, or combated with great difficulty, after the loss of the partner of the principal part of the patient's existence. It may also be caused by a marriage contracted late in life, or by unusual intemperance, or some accidental shock or commotion of the frame.

5. As to its *nature*, climacteric decay is obviously the concatenated phenomena arising from that exhaustion of the vital energies which takes place at a more or less advanced age, in consequence of the cares, turmoils, and physical exertions, attendant on the existing states of society, particularly in the middle classes of life; the exhaustion manifesting itself especially in these functions which are most intimately related to, and concerned in, the perpetuation of the vital endowment of the frame, and which are actuated by the organic system of nerves. As this decay of the vital energies — this breaking up of the constitution, as it is commonly called — is necessarily experienced by the whole frame, it is obvious, that it may not only be hastened by whatever is either mentally or corporeally injurious, as well as by specific forms of disease, but that it will be more or less remarkably evinced in those organs which have especially suffered during attacks of previous illness: hence the complicated states in which senile decay is usually observed, and the rapid progress and unfavourable issue of maladies appearing about the climacteric periods.

6. Treatment. — The simple form of this disease requires tonic and cordial medicines, with generous diet, a dry wholesome atmosphere, change of air, the occasional use of the tonic and deobstruent mineral waters; agreeable occupations and amusements; and, above all, the consolations arising out of the recollection of a well-spent life, and confidence of the future. During the course of treatment, particularly of the complicated states of the affection, the digestive, secreting, and excreting functions require to be assisted, by means of the warm, bitter, and cordial aperients (F. 86. 214. 266. 572.); and if internal congestions, or sub-inflammatory disorders, manifest themselves, evacuations should not be practised without combining or alternating them with restoratives and tonics. The best aperients are, in such circumstances, rhubarb or aloes combined with gentian, quinine, guaiacum, or myrrh, or with the carbonates of the alkalies and the balsams. But, on all occasions, even of acute disease occurring at the climacteric epochs, it should be recollected, that the vital energies soon feel the shock, not only of the malady, but also of a too active or lowering treatment; and that, even when such practice is most required, we should endeavour to support the powers of life by means the best calculated to fulfil this object, without increasing the morbid action, and to meet the first indications of depression or exhaustion by suitable cordials and tonics. The utmost attention should also be paid to the previous habits and indulgences of the patient; and if the discontinuance of them is likely to sink the constitutional energies still lower, they ought not to be relinquished. Various instances have occurred, showing the ill effects of want of attention to the above caution, during the course of my practice.

7. A gentleman had been for some years attended by the writer. At the age of eighty-one years, during a severe winter, he suffered much from bronchitis, accompanied with great sinking of the vital energies. His habits were social, and he lived highly. He recovered, however, by means of warm diaphoretics, and tonic cordial aperients, with a due regard to his accustomed indulgences, and to the precept of Hoffmann, "*ne subito muta assueta, quia assuetudo est altera natura.*" The following year he had a similar attack, at his seat in the country. A nearly opposite treatment to that which was adopted by the writer in his previous illness was directed by his medical attendants on this occasion, and in a few days he expired *when seated* on the night-stool, (see Hoffmann's treatise "*De Situ erecto in Morbis periculosis valde noxio,*") about half an hour after the physician had left him, and given a favourable opinion of the result to his friends.

8. General —— had served nearly all his life in the East Indies, and was upwards of eighty, but of a robust constitution. His ailments, when he was seen by me, could not be referred to any particular organ, and were attributed at the time to senile decay: the liver performed its functions. Nothing beyond the regulation and promotion of the digestive and excreting functions was attempted; and he was allowed a light and nutritious diet, with change of air, the use of the Bath water, &c. Under this plan he improved greatly, and was able to travel with ease from one part of the country to the other, and, when in town, to dine daily at the Oriental Club. The last occasion but one on which I saw him, he came to my house, to inform me that his relatives were not satisfied with the progress he had made, and had repeatedly urged him to change his physician. I accordingly retired; but, a few days afterwards, was requested to see him. He was then sinking fast, evidently from the effects of a lowering treatment and of profuse evacuations upon a decayed frame. Speedy dissolution could not be averted;

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I therefore declined all interference. He died not many hours afterwards.

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CLIMATE. Syn. (From *κλίμα*, a region). — *Climat*, Fr. *Das Clima*, Ger. *Clima*, Ital.

Classif. General Pathology — *Ætiology and Therapeutics*.

1. Climate, in its rigorous acceptation, means only a district placed between certain equatorial and meridional circles; but it possesses a much wider signification in medicine, and is more commonly applied to the conditions of the soil, surface, elevation, and position of a country, in connection with the general states of the atmosphere, influencing the health of the human species, and of the higher races of the animal kingdom: — "L'ensemble de toutes les circonstances naturelles et physiques, au milieu desquelles nous vivons dans chaque lieu." — Cabanis.

2. I regret that my limits will not admit of entering fully upon the consideration of the physical conditions which combine in forming the climate of a country, and not only modify the constitution of men, giving rise to a great part of the most acute diseases to which he is liable, but also assist in removing others of a dangerous tendency. It is obvious, that a knowledge of the elements out of which disease arises, and which may be taken advantage of, and even artificially combined, for its removal, must be of essential advantage in the healing art. Indeed, the importance of the subject has been admitted since the time of Hippocrates, whose treatise *περί ἀέρων ὑδάτων καὶ τόπων* will be read, even at the present day, with the greatest advantage. I shall, therefore, draw a mere sketch of the subject, and indicate the sources whence more detailed information may be obtained.

3. I. The Physical Relations of Climate. — The climate of a district or of a country essentially depends, 1st, upon its position, in respect of distance from the equator; 2d, upon its elevation above the level of the sea, and its proximity to the shores of the ocean, or the beds of large rivers, &c.; 3d, upon the geological and mineralogical formations constituting the basis of its soil; 4th, upon the nature of the soil itself, its cultivation, and the vegetable productions by which it is covered; and, 5th, upon the prevailing winds or currents of air. Under these heads are comprised a number of subordinate phenomena, giving rise to important modifications in the climate of a district. In the brief account, about to be given of the subject, the temperature and humidity of a place will be first considered, and afterwards those circumstances which relate more immediately to the nature of its locality.

4. *A. Of the temperature and humidity of climates, and their effects.* — The temperature of a place influences not only the organisation, but also the diseases, of the inhabitants; and, as it varies with the latitude, physical conditions of a district, state of cultivation, &c., it is evident that the physicians of the northern countries of Europe have to treat different constitutions and states of disease, from those which come before practitioners in more southerly regions. The effects of temperature upon the human frame vary remarkably, owing to numerous concurrent circumstances, and the extent, rapidity, and frequency of its changes. The mean annual heat, the extreme range of temperature, not only during particular seasons, but also in each month; the usual mean of such month, and daily variation ; have altogether a manifest influence upon the human frame. Geographers have divided the globe, in relation to its temperature, into arbitrary divisions, well known as the torrid, the two temperate, and the two frigid zones; but the climate of the countries placed within these divisions are so greatly modified by other circumstances than by distance from the equator, especially by elevation above the level of the sea, by distance from the ocean, want of cultivation, &c., that many places within the temperate zones, and even in those parts of them which are the nearest the meridian, experience, particularly at one period of the year, remarkably low ranges of temperature; whilst others, much further removed from the equator, are subjected, during summer especially, to as great heat as places within the tropics. In countries or districts near the ocean, or large lakes and rivers, and particularly in islands or places partially surrounded or indented by the sea, the extremes of heat are moderated, but the air is moist, and the changes of season are uncertain and variable; whilst in those situate far inland, and removed from lakes or the beds of large rivers, the range of atmospheric temperature is very great, particularly in latitudes above 40° north, or in places considerably elevated above the level of the sea; and the air is remarkably dry. Even in countries within the tropics remote from the ocean, or having high ranges of mountains placed between them and it, that may attract and condense into clouds and rain the moisture carried by the sea winds over the land, the dryness of the atmosphere is very great, and, where the currents of air have passed over extensive tracts of arid country, is even extreme. This is well shown by the Harmattan winds, which, having blown over the dry countries of central Africa, visit its western coast, and change the extreme humidity of that part, during their continuance, to a state of remarkable dryness. In the more inland districts, therefore, of large continents or islands, placed without the torrid zone, the depression of the thermometer during their winter months, and elevation of it in summer, are greater than is indicated by their distance from the equator, and the air is much drier than in places otherwise circumstanced. In these latter, particularly insular situations, &c., the climate is more equable but much more humid. In the former the seasons are regular, the change constant and rapid; in the latter they are variable, irregular, their accession slow, and attended by storms and hurricanes.

5. The intensity of the *solar beams*, and consequently of *light*, in warm countries, is very influential in modifying not only the vegetable and animal creation which inhabit them, but also many of the physical phenomena which contribute to the constitution of their climates. It would seem as if the solar beams were decomposed by the soil and its products, and, whilst furnishing heat and light to objects upon the surface of the earth, served to supply or to replace the locomotive electricity, which is constantly circulating through, and actuating, not only the crust of the globe, but also the vegetable and animal creations which cover it; passing thence, at last, into the atmosphere. Observation has clearly shown that electrical phenomena are most energetic, and of most frequent occurrence, in countries and in seasons in which the solar influence is the greatest; and that, while dryness of the atmosphere causes its accumulation in objects placed on the surface of the globe, a moist state of the air favours its passage thence, and its excessive increase in the clouds, giving rise to various meteorological phenomena. In a dry atmosphere, particularly in inland districts, thunder and lightning,—the more violent electrical changes occurring in this fluid,—do not take place; whilst vegetables and animals, as well as other bodies, placed on the earth's surface, are more than usually charged with electricity; whereas, in a warm and moist atmosphere, especially in maritime or insular situations within the tropics, these phenomena are very frequent, and the electricity is rapidly carried off from the earth.

6. It is evident that the annual quantity of rain in a particular district is very intimately connected with the nature of the climate; depending as it does upon the sources and amount of evaporation, and the prevailing winds. In the middle countries of Europe, the annual quantity of rain usually ranges from 12 to 18 inches. In the south-east side of this island, and in the vicinity of London, it commonly varies from 20 to 25 inches; whilst it is nearly double this amount in the western parts of Great Britain and Ireland; the greatest quantity falling in July, when the mean monthly temperature is highest, and the smallest quantity in February and March. As we advance towards the equator, the annual quantity of rain increases, chiefly in maritime countries, and parts in which ranges of high hills or mountains skirt the sea-coast, and varies from 80 to 120 inches. But the number of dry days is increased, particularly in districts situate inland; the greatly augmented quantity of rain falling at a particular season, and in a much shorter space of time than in colder regions. In cold or temperate maritime places, on the other hand, the rain descends in slighter showers, and much more frequently, although in much less quantity; leaving fewer dry, and occasioning more foggy and drizzling, days than in warm or inland countries.

7. *B*. Besides the foregoing, there are other circumstances which concur in forming the climate of a place. The chief of these are, the *nature of the locality*, the *soil*, the *abundance and exuberance of the vegetable creation*, the *state of cultivation*, the *prevailing winds*, &c. In the consideration of the *locality*, elevation above the level of the ocean, proximity to its shores, the vicinity of large rivers or lakes, the condition of the surface, its elevation into hills or mountains, or depression into valleys or ravines, and the state of vegetation and cultivation, are the chief features that require notice. Places inland, which are elevated high above the sea, or the banks of large rivers or lakes, have their mean temperture diminished, in proportion to the elevation, much below those which, although equally far removed from the equator, are situate near the level of the ocean, or the bottoms of valleys; and the inhabitants thus breathing a drier, purer, and cooler atmosphere than in these latter localities, are more athletic, less subject to febrile diseases of a malignant or severe character, and reach more advanced ages. The influence of elevation above the level of the sea, and other circumstances of locality, upon the health of man, is chiefly shown in warm climates, and the more southerly of temperate countries. In the north of Italy, and in various districts in the south of Europe situate on the sea-coast, near the banks of lakes and rivers, and in low or narrow valleys, where a deep, moist, and rich soil abounds with organic substances in a state of decay, the air is humid, loaded with effluvia; is much more stagnant and dense; and, although the heat is moderated, as respects the extremes of its range, much within the limits to which it advances in elevated and inland parts, yet is it more oppressive, the atmosphere frequently being sultry and relaxing. Hence it is, that in these low situations the human frame is imperfectly or weakly constituted; a small proportion of the children born are reared; visceral and glandular diseases abound; and the mean duration of human existence is much shorter than in adjoining districts, which are either more highly elevated, or removed from the sources of contamination; and, from these districts, the diminution of the population of the former, continually occuring, is chiefly supplied. The East and West Indies, and the coasts of South and North America, furnish numerous illustrations of the influence of locality upon the climate, and thereby upon the constitution and health of the human race. So very different is the climate of Vera Cruz, and places in the vicinity, from other parts in the same latitude, but situated some hundred feet above the level of the sea, that the comparatively robust and healthy inhabitants of the latter are more subject to the endemic fevers of the former localities, when they visit them, than the natives; a continued residence having impaired the susceptibility of the inhabitants of the former places.

8. In the consideration of the soil, the geological and mineral relations of the place can scarcely be overlooked. In general, the older formations of rocks, and those of a homogeneous and compact nature, support a finer, a more deep, and more absorbent soil than the sandstone rocks and others, the *débris* of which form a coarse and gravelly substratum, through which the rain percolates and flows off, it not being retained in the surface to be evaporated, carrying with it into the air a portion of decayed vegetable and animal matter, as in the case of clayey, deep, absorbent soils, that yield by evaporation nearly all the rain which falls upon them. Whilst deep, rich, and moist soils, particularly near the banks or embouchures of rivers, on the shores of lakes, on

the sea-coast, and near its level, or in low confined valleys, or at the bases of mountains, especially in countries within 40° of the equator, are very productive of malaria; dry, sandy, or gravelly soils, somewhat elevated above or removed from the mouths and banks of rivers, and covering level, gently undulating, or moderately hilly places, are most salubrious. In northern and temperate regions, maritime places are equally healthy with inland districts, or even more salubrious, unless the latter be considerably elevated, possess a dry, well-cultivated soil, and be without marsh lands in their vicinity. But in warm climates, and even in many temperate countries, during warm seasons, places on or near the sea-coast are more productive of insalubrious exhalations than inland districts, owing not merely to their being more nearly on a level with the sea, and subjected to a denser and more moist atmosphere, but chiefly to the circumstance of the soil in such localities being more deep, rich, and absorbent; more liable to inundations from heavy rains or swollen rivers, and from the sea itself; more fertilised by the decay of vegetable and animal bodies; and hence more productive of the elements of unwholesome exhalations, when their extrication is favoured by a hot sun, and their retention and accumulation in the air are promoted by its more constant and greater humidity. Ravines, deep valleys, marsh grounds, the banks of rivers liable to exposure after inundations, the banks of lakes or canals similarly circumstanced; a soil profusely covered by succulent plants and other vegetable productions, and not reclaimed by cultivation, or but recently cultivated; grounds and soils exposed to the action of the sun, after having been long covered by an exuberant vegetation; the cultivation of rice, or other vegetable productions, which require occasional inundations or profuse irrigation; the partial admission of sea water, or its percolation through the natural embankments thrown up by the waves in low swampy parts of a coast; and the accumulation of dead vegetable or animal matter, of ordure, &c., in ditches, sewers, or drains, &c.; are the principal sources of those vapours and gaseous emanations which, being extricated by heat, and dissolved in the moisture of the air, act unfavourably upon the human constitution, and originate several of the most fatal diseases to which it is liable.

9. *C.* The *cultivation* of a country has also a marked influence upon the state of its climate. A district covered by a rank and exuberant vegetation — by extensive forests — is cold and moist, if situate beyond the tropics, its temperature and humidity being many degrees lower than that which a state of high cultivation would produce. A country similarly circumstanced within the tropics is also cooler and more moist than if it were cultivated; but the air is remarkably close and oppressive; and teems, as well as the soil, with the lower grades of animal creation, to the generation and nourishment of which its abundant wild vegetation chiefly contributes. Whilst the wooded and uncultivated districts of high latitudes occasion coldness and humidity of the atmosphere, abound in miasms from decayed vegetable matter, and produce the diseases usually proceeding from these causes, especially intermittents, catarrhs, rheumatism, pulmonary affections, &c., places covered by an exuberant vegetation within the tropics, particularly those near the sea-coast, and upon its level, abound with the effluvia arising not only from vegetable matter constantly in a state of decay, but also from animal exuviæ, and the dead of myriads of insects and reptiles which infest these localities, and occasion malignant and remittent fevers, dysentery, and diseases of the abdominal viscera.

10. Although cultivation renders a climate warmer, drier, and more salutary, especially in temperate countries, yet for many years after the soil is cleared from its more bulky vegetable productions, and when it is first exposed to the action of the sun, especially in low latitudes, its endemic diseases often become more severe than even previously, and not infrequently assume an epidemic or pestilential form. The medical history of the West India islands and adjoining coast of America, as well as of the United States, furnishes numerous proofs of this position. The surface of the earth, previously in a great measure protected from the action of the sun's rays by the thick and exuberant vegetation that covered it, and the temperature lowered by a freer evaporation and transpiration from the leaves, yielded a less noxious effluvium than when entirely exposed to the sun's rays, and to the free action of air heated many degrees higher by the exposure. In its unreclaimed state, the noxious exhalations proceed chiefly from the decayed vegetable matter covering the soil, a great portion of which seldom rises above or extends beyond the higher foliage of trees; in its cleared state, the emanations are the product of the earth itself, and result from its richer constituents, and those elements of animal and vegetable matter with which a deep absorbent soil abounds, particularly in warm countries. The exhalations from the former source are more constantly and uniformly generated; but, from the latter, they are only occasionally formed, and require a concurrence of circumstances, especially a high range of temperature, a situation but little elevated above the sea, the vicinity of the sea-coast, and probably a certain degree of humidity of the air, and peculiar state of its electricity, for their generation.

11. *D. Prevailing winds* have much influence upon a climate. In Great Britain, and most countries forming the north-west of Europe, northerly and easterly winds are frequent during March, April, and May, owing to the current established to replace the warmer air, as it rises from the surface of the Atlantic and more southerly countries, now warmed by the sun as it passes to the northward of the equator. These winds are generally dry and cold, precipitating the moisture in fogs, and occasioning catarrhal, bronchial, pulmonary, and rheumatic affections, and, under certain circumstances, agues. During summer and autumn, southerly and westerly winds are most prevalent, and the air is more moist, owing to the temperature of the inland countries of Europe being now greater than the surface of the Atlantic; and to the air, loaded with exhalations from the ocean, rushing to replace the strata which are constantly rising from the heated surface of these countries, and depositing the moisture in the form of showers, &c. as it passes over the land; the hills, mountains, and places in their vicinity, which first attract the

clouds formed by the exhaled moisture, experiencing the greatest fall of rain. During November and December, northerly and easterly winds are again frequent, and the fall of rain is much increased. As the atmosphere receives or dissolves a portion of those fluid or gaseous substances with which it comes in contact, it is obvious that currents of air passing over the sources of the insalubrious exhalations enumerated above (§ 8.), will be more or less fraught with them. On the other hand, the air readily imparts a portion of those foreign substances dissolved in it, when brought in contact with bodies differently circumstanced. Hence it follows that prevailing winds, whether in northern, temperate, or warm countries, will have considerable influence on the climate, particularly in these last, for there the winds are generally most regular and constant, especially at certain seasons: places experiencing the sea breezes, and the winds which have passed over a dry and well cultivated country, being favourably circumstanced; but those exposed to currents of air from the sources of disease already referred to, being not much more fortunately placed than if they were immediately surrounded by insalubrious localities. In the case of towns, villages, or dwellings, thus situate, ill effects may be partly guarded against by planting double or treble rows of tall trees in such a manner as to intercept the noxious exhalations in their passage from the places in which they are generated. In this way the ancients protected their villas and towns from malaria; and it has been shown in modern times, that the foliage of trees attracts and absorbs these exhalations as they circulate through it, particularly at the season when they are most abundantly extricated from the soil.

12. Maritime places, in warm climates, and the more southerly of temperate countries, whilst they experience in the day-time, during the greater part of the year, regular sea breezes arising from the current of air replacing that which has been rarefied by the heated surface of the earth, are also subjected to land winds during the nights, owing to the less rapid evaporation and greater heat of the surface of the ocean at this time, the rapid radiation of heat from the soil soon reducing the temperature of its surface below that of the ocean in the same latitude. These winds are often fraught with effluvia, which, having been exhaled during the heat of the day into the upper regions of the atmosphere, are at night precipitated to its lower stratum, and are very productive of disease in those exposed to them. The currents of air that during the heat of the day passed from the ocean more or less loaded with moisture, return to it in the night, charged not only with humidity, but also with terrestrial emanations; thus rendering places situate in the vicinity of the sea, and nearly upon the same level, more insalubrious than the elevated districts inland. Numerous places in the East and West Indies, South America, and Africa, furnish illustrations of this principle, as well as various districts in North America, and in the south of Europe, particularly those on the shores of the Mediterranean.

13. *General view of the subject.*—From the foregoing, therefore, it will be seen that the word *climate* embraces not only the temperature of a country, and the phenomena which depend upon the distribution of heat, but all the modifications of the atmosphere by which our organs are sensibly affected, particularly states of humidity, variations of barometric pressure, changes of electric tension, the admixture of gaseous emanations or substances dissolved in the atmospheric moisture, clearness and serenity, and tranquillity as respects both horizontal and vertical currents. All these exert a powerful influence, not only upon the developement and health of the vegetable and animal structures, but also upon the sensations, the intellectual endowments, and the moral emotions of mankind, in the different regions and zones of the world. Comparatively few of these atmospheric changes can be ascertained otherwise than by a long series of attentive observations; and these have been made only at a few parts of the earth's surface; and hence, as remarked by an able writer, though we know with some precision the general circumstances which modify the distribution of heat, we are still imperfectly informed as to the influence of local causes of deviation from the mean state that would be attained if the surface of the earth were perfectly regular, and its power of absorbing and emitting heat and light were every where the same. Europe and Asia are contrasted with each other in respect of many of the circumstances which affect their climate. In a general view, Europe may be regarded as being almost a peninsula, broken, moreover, and intersected by numerous arms of the ocean and inland seas. Owing to the causes already alluded to (§ 11.), the predominating winds are from the west, and these, for the whole of the western portion of this quarter of the globe, are sea winds softened by passing over a mass of water, the temperature of the surface of which, even in the month of January, under the mean parallels of 45 or 50 degrees, does not fall below 48° and 52° of Fahrenheit. Europe has also the advantage of being placed to the north of immense tracts of tropical land, which, by its diurnal radiation, produces effects very different from an equal superficies of ocean. Masses of heated air are constantly rising from the arid surface to the higher regions of the atmosphere, and are impelled towards the colder countries of the north. On the northern side of this quarter, circumstances are unfavourable to the accumulation of extreme cold; for a very small portion of land is placed beyond the polar circle, and the whole northern extremity is separated from the polar ice by an open sea, the temperature of which is very much higher than that of a continental country in the same latitude. The comparatively high temperature of the sea on the north of Europe is chiefly to be ascribed to the direction of the great oceanic valley which separates Europe from America, and the existence of the gulf stream; the intertropical Atlantic waters flowing from the Gulf of Mexico into the polar seas.

14. The circumstances which thus contribute to render the climate of Europe mild, do not exist in respect of Asia, or even of America. Their northern boundaries extend to the winter limit of the polar ice. The north winds, unobstructed by any chain of mountains, blow with unmitigated fury over icy plains extending northward to the pole, and eastward to the point of maximum cold, which, according to Humboldt

and others, seems to be situate near the meridian of Behring's Straits. The refrigerating effects of these winds are not counterbalanced by burning deserts on the southern side of these continents; or, as respects Asia, by any great extent of land placed below the equator; consequently the Asiatic countries situate in the temperate zone, more especially, are not warmed by ascending currents of heated air, such as those which arise from the deserts of Africa, and are so beneficial to Europe. The position of the great mountain chains of Asia, and the elevation of the country, also contribute to diminish the temperature, they presenting a barrier to the warm winds from the equatorial regions. Elevated plains and groups of lofty mountains accumulate and preserve the snow till late in the summer, and give rise to descending currents of air, which cool the circumjacent countries. Asia, moreover, in the whole extent of Europe, has no sea on its western side; consequently the west, or predominating winds, are, for the greater part of this quarter, land winds; and their severity is increased by the great enlargement of the land towards the north. These circumstances occasion remarkable differences in the climates of Asia and the western countries of Europe. The eastern part of the latter, however, nearly assimilates with the western districts of the former; and, with the whole of it, to the north of the 35th degree of latitude, has a climate in which the temperatures of summer and winter are widely different from the mean temperature of the year. At Moscow (lat. 55° 45′), where the mean temperature of the year is only 40° Fah., the mean temperature of the hottest month is 70½°; while at Paris (lat. 48° 50′), 7° farther south, where the mean temperature of the year amounts to 51°, that of the hottest month is only about 65½°. In no part of the world, not even in Italy or Madeira, do finer grapes come to maturity than at Astrakan, on the borders of the Caspian; and yet at the same place, or even still farther south, under the latitude of Avignon and Rimini, the thermometer falls in winter to 18° and 22° below the freezing point. On the western coast of France, in the latitude of 48°, the mean temperature of the year is the same as at Pekin, the latitude of which is only 40°; while the temperature of the winter months is 14½° higher in the former.

15. The mean temperature under the equator is not precisely determined; but Humboldt thinks it does not exceed 80° of Fahrenheit. The greatest summer heats are found in countries contiguous to the tropics. On the Red Sea, for instance, and in Arabia, the thermometer is often seen to rise to 110° at mid-day, and to remain at 94° during the night. A few degrees within the tropics, the sun at midsummer continues for a considerable time to pass daily very near the zenith; and the day, increasing with the latitude, is longer than under the equator; so that the amount of nocturnal radiation is diminished. Among the local causes which contribute to give an excessive temperature to the Arabian peninsula and the north of Africa, the sandy surface almost deprived of vegetation, the constant dryness of the air, the direction of the winds, and the quantity of heat radiated from earthy particles carried about in the atmosphere, are the most prominent.

16. II. Influence of Climate on the Human Constitution. — From what has been already adduced, the action of climate on the human frame must be admitted to be extremely complex; the ultimate result arising chiefly from the combined operation of heat, light, electricity, atmospheric pressure, the various emanations arising from the soil, and the productions, vegetable and animal, constituting the food of man. The human species is, in many respects, moral as well as physical, moulded by the climate and soil which he inhabits; and, by this pliability of his functions, under the influence of atmospheric and other vicissitudes, is the only animal that is truly cosmopolite. In considering the influence of *climate on man*, it will be advantageous to view it, *first*, with reference to extensive communities and races of the species; *secondly*, as respects the nature of the food which different climates provide for the uses of man, and its co-operation with the climate in modifying the human frame, and counteracting the effects of rigorous seasons, and the unfavourable influences to which it is exposed in arctic and tropical regions; and, *thirdly*, as regards the changes produced in individual constitutions after migrating from one climate to another. Neither the limits nor the scope of this work will permit me to consider these subjects in all their relations; I must, therefore, confine myself to such topics as have an evident and important bearing upon practical medicine — in respect either of the causation and nature of disease, or of rational methods of cure.

17. i. Climate in relation to the Varieties of the Species and their prevailing Diseases. — Although man is more readily assimilated with particular climates than any other animal, yet this faculty is not equally possessed by all the varieties of the species and the natives of every latitude. It is more particularly manifested by the inhabitants of temperate climates; probably owing to their greater vital energy, and to their habitual exposure to alternate extremes of temperature and of season. The natives of polar regions on the one hand, and of tropical countries on the other, possess it in a much less remarkable degree; and not only are they speedily cut off by removal from the one climate to the other, but they often suffer greatly from a residence in temperate countries. It should not, however, be overlooked, that man, like many of the individuals below him in the scale of creation, often derives advantage from a change of locality; provided that the change is not made to opposite climates, but to districts of equal or greater salubrity.

18. It has long been a matter of dispute whether the differences, intellectual and physical, presented by the various races of man, have arisen from the continued, slow, and imperceptible operation of climate; or have been originally impressed upon the species. The evidence and arguments connected with this subject fall not within my province. But it is of importance to the practical physician to note what those peculiarities are, that characterise the different races of man; and, whether they be the result of climatorial influence or of original conformation, to consider them in connection with the climates to which we find them more particularly appropriated in our survey of man in his distribution over the globe.

However cursory this survey may be, there are certain facts of the utmost practical importance to every one who entertains philosophic ideas in medicine, which should not be overlooked; namely, that the slow and continued operation of a particular climate actually changes the human frame in many respects to that state which its indigenous inhabitants present; and that the constitution, thus assimilated, is necessarily the best suited to the external influences to which it is exposed, and the food furnished by the soil of which it is the native. There are, however, certain characteristics, especially those which distinguish the Æthiopian and Mongolian varieties, that a succession of ages has not been sufficient to impart to different races which had migrated to the climates they inhabit; and which must, therefore, be imputed to original conformation.

19. *A.* The *effects of great cold*, and of the *privation of solar light*, during nearly two thirds of the year, upon the human frame, are observable in the stunted growth and the weak muscular power of the Samoïed, the Ostiaks, the Esquimaux, the Greenlander, and the Laplander, compared with the inhabitant of temperate climates. In the arctic regions, the human body, like many of the lower animals, and the productions of the vegetable kingdom, rarely reaches that state of developement it presents in temperate countries: the features and stature retain an appearance of boyhood or youth, almost until marks of age appear; the complexion is greyish; the head flat, the face broad, the eyes far apart, and the whole figure squat and unattractive. Female pubescence, however, according to the accounts given by Linnæus, Humboldt, Lyon, Parry, and Franklin, as indicated by the accession of the catamenia, is not delayed beyond the period usual in temperate countries — most probably owing to the premature excitement of the generative organs in the unrestrained intercourse of the sexes, that takes place at an early age. To this cause, also, is to be imputed the circumstance of their females being less prolific than those of temperate climes; whilst, in these races, the instinctive feelings which tend to the preservation of the individual and of the species are sufficiently strong, the intellectual endowments and moral sentiments are remarkably torpid. The benumbing influence of cold, and of the privation of solar light, is also manifested in the functions of the nervous and sanguiferous systems. Diseases generally assume among them an asthenic form; fevers being of a low type, and sthenic inflammations of rare occurrence. As long as the natives of arctic regions remain in their own countries, they are exposed to but few causes of disease besides cold, the scarcity of provisions, occasional excessive repletion, and various contagions. The soil being almost constantly frozen, even during summer, at the depth of a very few feet, deleterious emanations seldom or never issue from it; but infectious maladies, when once introduced, become extremely destructive, and several of them often very prevalent, owing to their low, small, and unventilated dwellings, and their want of personal and domestic cleanliness. When, however, they migrate to more temperate and southerly regions, they are very liable to febrile and sub-inflammatory diseases, arising from increased temperature, the vicissitudes of season, and other novel causes to which they became exposed: whilst their maladies seldom require, their constitutional powers can but ill tolerate, a lowering treatment, or large sanguineous depletions.

20. *B.* Although extreme and continued depression of temperature produces the above effects, more moderate cold, particularly when alternating with a temperate summer heat, promotes the developement of both the body and mind. Countries situate between 45° and 63° of northern latitude are inhabited by the most robust and enduring of our species, in respect of both physical and intellectual powers. It may be stated in general of the northern temperate zone, that the inhabitants of its more southerly countries have made the earliest advances in civilisation, and that those of its middle and more northerly climates have carried the useful arts and sciences to the highest perfection. Within the range of this zone, man presents the greatest diversity of temperament, of constitution, and mental endowment. Muscular frames, plethoric habits of body, and the sanguine temperament, predominate among the natives of the more northerly of temperate climates, particularly as regards Europe and its western countries. Affections of the chest and respiratory organs, inflammations, fevers complicated with inflammations of the lungs or of the brain, and rheumatism, are the most prevalent diseases. Epidemics assume most frequently amongst them a phlogistic character: and vascular depletions are more required, and better borne, in the treatment of their maladies. Climates which are the most variable, as to both the commencement and the course of the different seasons, are, notwithstanding the many disadvantages imputed to them, the most favourable to the advancement of the various bodily and mental powers. The rapid and frequent vicissitudes of weather preclude, as respects the community generally, the regular adoption of means to guard the body against their operation: consequently the frame becomes habituated to their operation, and thereby fortified against the injurious impressions which would be otherwise made by them. That countries thus circumstanced are benefited rather than injured by this state of weather and season, is shown by the robust frames, the mental activity, and the longevity of their inhabitants. The physical and moral history of the British Isles, Denmark, Sweden, and the more continental districts of western Europe, demonstrate this fact. In the eastern countries of this quarter of the globe, as well as in Central Asia and in North America, the seasons being much more regular in their advent and in their course, measures are more regularly and uniformly adopted to moderate the extremes of temperature and the vicissitudes of weather; and these have, in many instances, the effect of enervating the frame, of promoting the extension or prevalence of disease, and of thereby diminishing the mean duration of human life. Of this description is the use of excessively warm clothing, and of stoves, which overheat the air of the apartments, without renewing it so rapidly as is often requisite to the wants of the economy. Hence, whilst the external atmosphere is cold, dry, and invigorating to the healthy frame in a state of activity, the air in-doors is close, warm, and depressing; the frequent alternation from

the one to the other, or the constant residence in the latter, being injurious even to those in health, and causing diseases of the thoracic and abdominal viscera.

21. While the natives of northerly inland countries suffer more especially from the extremes of temperature and of season, and the circumstances which arise out of them, they are less exposed to emanations, arising chiefly from the decomposition of vegetable and animal matter — to those endemic sources of disease that produce so much suffering and mortality in low or level districts, and in more southerly climates, where the atmosphere is moist and warm. The inhabitants of temperate countries considerably elevated above the level of the sea, and of mountainous places, are generally of a spare, firm, and muscular habit of body, and strongly formed; chiefly owing to their active and industrious modes of life, and the pure and light state of the air they breathe. The irritable, sanguine, and nervous temperaments, and quick, irritable, and generous dispositions; predominate among them. Inflammatory, hæmorrhagic, and spasmodic diseases, particularly hæmoptysis, bronchitis, consumption, asthma, inflammations of the lungs and pleura, rheumatism, and disorders of the circulatory organs, are most common. Their females are more virtuous and prolific, and the mean duration of human life longer, than amongst the natives of lower districts and warmer climates.

22. *C.* There are certain peculiarities in the natives of temperate countries, particularly of European countries, that must strike the pathologist as intimately connected with the nature and treatment of their diseases. These are chiefly the complexion of the skin, the large developement of the respiratory, biliary, nervous, and circulating organs, compared with those of the natives of intertropical countries. The skin of the dark races is not only different in colour, but is also considerably modified in texture, so as to enable it to perform a greater extent of function than the more delicately formed skin of the white variety of the species. The thick and dark *rete mucosum* of the former is evidently more suited to the warm, moist, and miasmal climates of the tropics, than that with which the latter variety is provided. The skin of the negro is a much more active organ of depuration than that of the white. It not merely exhales a larger proportion of aqueous fluid and carbonic acid from the blood, but it also elaborates a more unctuous secretion, which, by its abundance and sensible properties, evidently possesses a very considerable influence in counteracting the heating effects of the sun's rays upon the body, and in carrying off the superabundant caloric. Whilst the active functions, aided by the colour, of the skin, thus tend to diminish the heat of the body, and to prevent its excessive increase by the temperature of the climate, those materials that require removal from the blood are eliminated by this surface, which, in the negro especially, performs excreting functions very evidently in aid of those of respiration and of biliary secretion. In the white variety of the species, on the other hand, the functions of the lungs and liver are much more active than in the darker races, changes to a greater extent being performed by respiration in the former than in the latter, as I have proved by experiment. The liver is also larger, and its secretions more copious in the European than in the negro or Mongol.

23. In the inhabitants of northern climates, and elevated or cold countries, the functions of the lungs and kidneys are extremely prominent, and those of the skin and liver much less so; eliminating or depurating actions on the blood being performed chiefly by the former organs. But, in the natives of intertropical climates, the skin assumes, as shown above (§ 22.), a more extensive function, and, by its activity, compensates for the diminished operation of the lungs, liver, and kidneys, generally observed among them, aided, no doubt, by the secretions from the intestinal mucous surface. In temperate countries, the various emunctories of the frame present a degree of activity in strict keeping with this general connection of climate with the developement and activity of these functions. In the warmer districts of temperate climates, and especially in those which are subjected to a dense, moist, and miasmal atmosphere, the changes produced by respiration are diminished, and those effected by the cutaneous and intestinal mucous surfaces are increased. If the natives of such districts belong to the white variety of the species, their cutaneous surface not being constituted so as to enable it to perform the compensating action for which the skin of the darker races is destined, a different organ performs this office, and the liver assumes an increased action, combining and eliminating several of the effete constituents or elements as they accumulate in the circulation, and thereby giving rise to an increased and modified biliary secretion.

24. *D.* If we compare the organisation and functions of the negro (and I may add, of the Mongol) with those of the European, the following general results will appear, and, together with what has been now advanced, will serve as the source of very important pathological and therapeutical inductions: — The circulating organs, the lungs, the liver, the middle and anterior lobes and convolutions of the brain, the muscles, and the bones, excepting those of the head and face, are very evidently smaller, and their functions less prominent, in the former than in the latter variety; whilst, on the other hand, the skin and its functions are much more developed. With the activity of function, conjoined with frequent exposure to the action of numerous excitants, the disposition to, and occurrence of, disorder increase; and, accordingly, diseases of the lungs and circulating organs, of the liver, and of the nervous system, predominate in the white races of man; and chronic affections of the skin, and those acute maladies which chiefly attack this surface and the intestinal mucous membrane, in the dark varieties of the species. Amongst the latter, fevers are not common; and when they occur, they are usually slight, terminate speedily, seldom assume an inflammatory or continued type, often pass off with critical discharges from the skin or bowels, and not infrequently lapse into a state of low or chronic dysentery. The exanthematous diseases generally assume in them a severe and asthenic form, and rapidly spread by infection. Verminous disorders are very common in them; but affections of the brain and its membranes, and of the teeth, are extremely

rare; the cranial contents seldom suffering materially in the course of febrile attacks. The remarkable thickness of the bones of the head, in nearly all these races, protect the membranes and brain from the causes of disorder to which they are liable; and the continued exposure of the head to the action of the sun and air, the absence of mental culture, and their modes of life, by no means dispose these parts to disease. Inflammations, particularly those of a sthenic character, are very rare; and, if vascular excitement attend the early stage of these maladies, it soon exhausts itself and passes into the opposite extreme. Disorders, which consist chiefly of morbidly increased discharges, from deficient tone of the extreme vessels, and those of a spasmodic form, are not uncommon.

25. *E.* The organisation of the dark races of man, chiefly as respects the state of vascular action and tone, the developement of the viscera already referred to (§ 22—24.), their food, modes of life, excessive addiction to venereal indulgence, the continued influence of a moist and miasmal atmosphere, and the characteristic features that their diseases consequently assume, generally preclude the employment of large vascular depletions. During the progress of febrile and exanthematous maladies, critical evacuations from the skin and intestinal mucous surface frequently occur, the latter of which are very apt to assume a colliquative or chronic state, and, if not judiciously controlled, to carry off the patient. Hence the propriety of employing free evacuations of the *prima via*, with warm diaphoretics, at the commencement of their diseases, and of supporting the energies of life in the advanced stages. The circumstances now referred to as modifying the constitution and diseases of the dark races of our species, should never be overlooked when devising plans for treating them. Nor should the fact be neglected, that worms, especially lumbrici, in the intestinal canal, are very frequently connected with the origin of many maladies of remote but related organs. Affections of the stomach, diarrhœa, colicky pains, leucorrhœa, various spasmodic and convulsive disorders, chronic dysentery, &c. very often arise from this cause; and, no more than the cause itself, will ever be permanently removed, in these races especially, by evacuations alone, but by combining them with stimulants, tonics, and antiseptics. Although both the habits and modes of living of the dark races, and the constitution of their digestive organs, require the occasional use of active purgatives, in order to remove the saburra and colluvies which so rapidly collect on the intestinal mucous surface, yet those medicines should generally be combined or alternated with substances which exert a cordial and tonic influence, as their vital energies soon sink under frequent evacuations when deprived of an accustomed or requisite stimulus. (See *Art.* DISEASE.)

26. ii. OF THE FOOD OF MAN IN RELATION TO CLIMATE AND THE CONSTITUTION OF THE VARIETIES OF THE SPECIES. — The intimate relation which subsists between the food of man, and the nature of the soil and climate which he inhabits, and the combined operation of both upon his constitution and the character of his diseases, have seldom been considered in a manner deserving of the subject. Man, although in some measure independent of the nature of the soil or climate in which he lives, is yet, in several points of view, the creature of both. His manifestations, both moral and physical, are moulded by both influences, like the animals which are below him in the scale of creation, although generally in a much less degree. It is the soil that furnishes him food, and the air which he respires derives much of what is noxious to his frame from that source. Whenever, therefore, the natural history and diseases of man come under consideration, they should be viewed in relation to those productions of the soil on which he subsists — with which, in many respects, he may be considered as a fellow product, but holding a superior station, and by which are often caused many of his ailments. As it is beyond the scope of this work to enter fully into the very interesting considerations which this subject involves, I can only point to its more general connections; and I do this more with a view of directing the attention of others to the subject, than of satisfying my own wishes as to its discussion.

27. As the physical and intellectual powers of man enable him to occupy the whole surface of the globe, it follows that he cannot be restricted to any particular kind of food — in other words, he must be naturally omnivorous, as a consequence of his ubiquity. If the wastes of Lapland, the shores of the icy sea, the frozen coasts of Greenland, and the deserts of Terra del Fuego, were destined by nature for the habitations of man, then is he not an herbivorous animal; nor is even a mixed diet necessary for his support. It would be impossible to procure vegetable productions where the earth's surface is almost constantly either frozen or covered with snow. The continual use of animal food is as natural and wholesome to the Esquimaux, as a mixed diet is to an Englishman. The Russians who winter on Nova Zembla, according to Dr. AIKEN, imitate the Samoïeds, and eat raw flesh and drink the blood of the reindeer, in order to preserve their health in these arctic regions. The Greenlander devours, with good appetite, the raw flesh of the whale, or the half frozen and half putrid flesh of seals; and drinks the blood of these latter animals, or regales on dry fish and whale-oil.

29. Within the tropics, man is subjected to the continued operation of a high temperature, which excites the nervous functions and vascular action, notwithstanding the provision with which nature has furnished his integuments in order to moderate the animal heat. This provision, as we have seen, consists chiefly of the dark colour of the *rete mucosum*, which speedily gives off the superfluous heat of the body, and of the great activity of the perspiratory functions (§ 22.). Intertropical countries, particularly such as are low or swampy, while they abound with the productions of the vegetable kingdoms, and with numerous swarms of insects and reptiles, maintain very few of those gregarious animals which serve as food; and thus, we perceive that their inhabitants, unless in elevated and cool situations, as in Abyssinia, Mexico, &c., are obliged, by the scarcity of these animals, to subsist on vegetable productions, and to adopt a system of religion, which, while it tends to prevent the entire destruction of the more useful species, is sufficient

to restrain their numbers within their appropriate means of subsistence, and without encroaching on or impairing the supply of food with which the vegetable creation furnishes man. Hence, in many places of intertropical Africa, the lower animals, whose numbers are few, are occasionally made sacred by the priests for a time; and in other places of this continent animal food is very rarely enjoyed. In Hindostan, the natives are almost debarred from the use of flesh meat; and the cow is made sacred, evidently to prevent the destruction of a species, whose milk furnishes man with one of the chief articles of diet.

29. But nature provides a more suitable aliment to the inhabitants of those climates. The date, the palm tree, the cocoa-nut, the sago tree, the plantain, the sugar-cane, and the banana; the yam, cassava, ground-pea, and other roots; a great variety of refreshing fruits; and, more particularly, the very abundant production of nutritious grains, especially the Indian corn and rice, richly supply the natives of these climates with wholesome food. The general and necessary adoption of a vegetable diet within the tropics, from the exuberance of the vegetable creation, and the comparative scarcity of those gregarious animals chiefly destined for the use of man in cold and temperate regions, is necessary to the existence of the human species in the higher ranges of temperature, and in the more unhealthy districts in hot climates. The adoption of animal diet exclusively, or of too large a proportion of it, disposes the human frame, when exposed to the influence of tropical heat, to those diseases which arise from endemic causes, — viz. the decay of vegetable and animal matters, the exhalations of marshy and absorbent soils, and other emanations accumulated in moist and close situations; and to those which affect the alimentary canal and other abdominal viscera. Various epidemic diseases also often produce their greatest havoc, and assume pestilential characters, amongst those, who, to the predisposition occasioned by a high range of temperature, have superadded that arising from a too full animal diet. It appears to be a salutary law of nature, that, in those climates, where animal food would be detrimental to the human race, there the animals usually destined for the purpose are few in number, and stunted in growth. The localities, indeed, which are the most destructive to man, are also the most inimical to these animals, which, if they were chosen as the chief article of food, would both dispose to disease and increase its fatality. Thus it appears, that the distribution of the classes of animals over the surface of the globe is so apportioned, and certain of their orders and genera so restricted to particular latitudes and climes, as to be subservient to the wants of man, without becoming hurtful, or endangering his existence in countries in many respects unfavourable to his bodily and mental developement.

30. While the vegetable diet, which the hottest and most unhealthy climates furnish, is the least liable to excite the nervous system, or to overload the circulating and secreting organs, or to irritate and inflame the excreting viscera, it serves to promote endurance, and, with the hot spices which grow spontaneously in the same localities, to counteract the contaminating changes produced in the body by the vegeto-animal effluvia to which it is frequently exposed. In both Indies, and in intertropical Africa, the inhabitants of low and moist situations live almost exclusively on rice and maize; with these they consume, as a condiment, a very large quantity of the hottest spices, the stimulating and tonic qualities of which preserve them from the effects of the diminished temperature and terrestrial emanations during, and after, the rainy seasons and monsoons, and in some measure from intestinal worms and other parasitic animals. To these spices, even the feathered creation, and the lower animals, occasionally resort, especially during the unhealthy seasons. Were the inhabitants to live chiefly on animal food, and use the strong fermented liquors made in colder climates, the nervous and vascular systems would be inordinately excited, irritability being thereby soon exhausted; and they would be as much disposed to, and affected by, disease, as unseasoned Europeans, who, partly owing to these causes, so soon become its victims, after having removed to low, moist, and hot situations between the tropics. Nature adapts her productions in every climate to the necessities of man; and appropriates them to his real, but not his imagined wants, — to his state of constitution, as modified by the operation of soil, air, and temperature; and nowhere is this provision more manifest than in warm countries. There, if the causes of disease be most energetic, as they most indisputably are, she has chiefly restricted them to those which proceed directly from the soil and the climate, while she has confined those arising from the nature and the abuse of food within narrow limits; as there man is destined, by the circumstances already alluded to, to live chiefly on a vegetable diet, and is liable only to occasional deficiency of its supply. But even the inflictions which nature thus imposes on the inhabitants of these climates are accompanied by abundant means of preventing their invasion, or arresting their progress. The most unhealthy situations not only abound with suitable means of subsistence, but also present spontaneously the most efficacious prophylactic and curative agents for the diseases that are endemic in them. Thus rice, the banana, the plantain, the juice of the cocoa-nut and of the palm, the oil of the palm-nut, &c., are the most wholesome articles of food in the districts wherein they are most abundant. The low grounds on which these are produced abound with deleterious miasms; and the stagnant water, which there often serves for the necessities of life, contains the ova of insects and animalculæ. While the former occasion agues and remittents, the latter gives rise to diseases of the digestive canal, and to the generation of worms; and both causes combine to produce fevers, diarrhœa, dysentery, cholera, visceral obstruction, &c. In the above localities grow the different species of the *capsicum*, — the principal condiments employed by the natives; and these are also the chief prophylactics and remedies for their constitutions, against the diseases now alluded to. By the side of the palms and the cocoa-nut grow the different species of the tamarind and the croton, which are, respectively, the mildest and most cooling aperient, and the most active cathartic. Thus nature provides an antidote to the bane which is imposed on the inhabitants of

unhealthy warm climates, and, by adopting the indications she presents, they are enabled to exist without suffering much more from disease than the natives of temperate countries, or having the allotted span of human existence much abridged. It is in no small measure owing to his persisting in the diet, beverages, clothing, and modes of living, suited to a cold or temperate climate, and to which he had become accustomed, that the European is liable to disease when he has removed to a hot country. When travelling in the most unhealthy parts of intertropical Africa, in 1817, I met with an Englishman, who had lived there between thirty and forty years, and was then in the enjoyment of health. The circumstance was singular; and, in answer to my enquiries as to his habits, he informed me, that soon after his removal to that pestilential climate his health had continued to suffer, when, after trying various methods without benefit, he had pursued as closely as possible the modes of life of the natives, adopting both their diet and beverages, and from that time he had experienced no serious illness.

31. In countries approaching the poles, where the continued low temperature, and the want of solar light during two thirds of the year, tend to diminish nervous and vascular energy and tone, and to lower the whole circle of vital actions, nature has furnished man with those articles of food which are the best calculated to nourish, to stimulate, and impart vitality to the frame, and thus to enable it to bear up against the rigour of the seasons, and the injurious influence of the climate. Without such food, the inhabitants of arctic regions would fall a prey to diseases of debility, and the higher latitudes would soon become entirely depopulated. In these, as well as in northerly and elevated parts of temperate countries, nature spontaneously provides man with those substances which are the most energetic, both as preventives and as remedies of those diseases which arise from the influence of climate. The various species of pine abound in the coldest regions, and furnish, in numerous forms, the most efficacious internal and external medicines, and even the most wholesome beverages in these maladies. Hæmorrhagic diseases, low fevers, asthenic inflammations, scorbutic and cachectic affections, the extreme effects of cold upon the extremities, &c., are most successfully prevented or treated by the judicious use of terebinthinate preparations. This observation is also applicable to the *arnica montana*, and other alpine plants.

32. The temperate zone, whilst it furnishes in its wide range the greatest diversity of climate — in some localities that of the tropics, in others that of arctic regions — provides man with the greatest abundance of animal and vegetable food: thus enabling him to combine both, or to adopt more or less of either, according to the nature of the seasons, of the climate, and the particular circumstances in which he may be placed. Nature is always provident: she takes sufficient care that each particular district or country shall have within itself, or be capable of producing by requisite labour, those articles of food which are most appropriate to the climate, and thereby the most wholesome to its inhabitants. When commerce or manufactures increase the population of a district beyond the means of sustenance derivable from the soil, and lower animals, in the vicinity, the food which is obtained from a similar climate is generally the most wholesome. Various disorders originate from the introduction, from remote countries, of unsuitable articles of luxury into diet; and not a few arise from the improper mode of preparing food, which would otherwise be wholesome. Thus, the hot spices and the high-seasoned dishes, which, during the tropical rains, would be beneficial to the natives of those climates, who live chiefly on vegetable diet, frequently are productive of disease amongst those who partake too freely of animal food, or the high-feeding inhabitants of commercial cities. The adoption, also, of highly seasoned dishes, with an undue quantity of flesh meat, — undue, because exceeding the wants of the economy, and the circumstances of the climate, — and the use of spirituous and fermented liquors, are fertile sources of disease, particularly fevers and affections of the abdominal viscera, among Europeans residing in warm places or during warm seasons.

33. From these and other considerations the following corollaries may be drawn: — That the climate of a country should, in a great measure, guide man in his selection of food; those productions which are most abundant around him being most appropriate to the circumstances in which he is placed: and that the nature of his food thus conspires with the climate to modify his constitution, whilst it serves to counteract the rigours of season, and the unwholesome influences to which he is constantly exposed in very hot as well as in very cold countries.

34. iii. Of the Effects produced on the Human Constitution by Change from one Climate to another of a very different or opposite Description. — By referring to what has been already advanced respecting the physical relations of climate, and the circumstances more immediately connected with cold and warm countries respectively, and by connecting these with the peculiarities characterising the races of man inhabiting both, we shall readily perceive that a most important revolution will take place in the animal frame from the change, in whichever direction it may be made; and that such revolution will be great in proportion to the suddenness and greatness of the change; it being in either case attended with more or less febrile commotion or other diseased action.

35. 1st. *Of change from a cold or temperate to a warm climate.* — *A.* Keeping in view the following characteristics of a cold and temperate climate — viz. its low temperature, the alternations of season, the pureness of the atmosphere, the more nutritious, invigorating, and stimulating nature of the food, and the effects of warm clothing — and connecting these with the vascular plethora, the active functions of the brain, lungs, liver, and kidneys of its inhabitants, the disturbances which will result when they are subjected to a continued high range of temperature, and to an atmosphere loaded with moisture, and frequently with vegeto-animal effluvia, may be anticipated. It is now fully ascertained that the effects of a high range of temperature, and of moist miasmal air, on the European constitution, are, a diminution of the changes effected by respiration on the blood, an increase of the secreting and excreting functions of the liver and skin, and a decrease of the urinary excretion. When, therefore, the plethoric

European migrates to an intertropical country, the functions of the lungs and the pulmonary exhalation become diminished; the requisite changes are not effected on the blood, notwithstanding the excitement of the nervous and vascular systems by the increased temperature; and the already active and developed liver is irritated, and has its functions augmented, by the increase of those elements in the blood, that the lungs and skin cannot remove from it. Hence proceed febrile attacks, particularly when excited by their appropriate causes; inordinate activity, with a relative frequency of the diseases, of the liver; the secretion of acrid bile; and the disorders especially affecting the alimentary canal and excreting organs. The general adoption of too rich and nourishing food and beverages by those who remove from cold to hot climates, tends greatly to increase these evils, as already explained (§ 30.); and the influence of high temperature and of a vertical sun upon the European head is productive of disease both of it and of the liver. To these effects, the mental cultivation and activity of Europeans somewhat predispose them; whilst their heads are not so well guarded from external influences by the constitution of its integuments and hair, and the thickness of the cranial bones, as those of the negro and Mongol varieties of our species.

36. The obvious indications resulting from these facts are, that natives of cold countries migrating to warm climates should, particularly if the change has been made abruptly, live abstemiously, and promote the functions of those organs which perform the most essential part in excreting effete or injurious elements from the circulation. The head should be kept cool, and protected from the rays of the sun; the surface of the trunk and lower extremities ought to be preserved in a freely perspirable state, so as to take off the load of circulation, and derive from the excited liver. In order to promote the secreting and depurating functions generally, active exercise, short of fatigue, should be taken, without exposure to the causes of disease, particularly those which are endemic. As the maladies which most frequently supervene on change from a cold to a warm climate proceed neither from the increased temperature alone, nor from greater moisture of the air, but from these conjoined with malaria, and not infrequently also with wide ranges or temperature during the twenty-four hours, especially in high and inland localities — with hot days, and cold, raw, and dewy nights, and with a too full and exciting diet and regimen, causing fevers, dysentery, and diseases of the biliary organs — care ought to be taken to avoid those causes, as well as whatever may tend to assist their operation on the frame, and to protect the system against the sudden daily changes by warm clothing at night, &c.

37. *B.* The consideration of the effects produced by *migration, during a state of disease*, from a cold to a warm and moist climate, is of the utmost importance. Keeping in mind its influence upon the healthy frame — chiefly in exciting the functions of the skin and liver, and diminishing those of the lungs — we are led to prescribe it in the treatment of various diseases. In *hæmoptysis*, this change is obviously beneficial, especially as a warm and moist atmosphere, by this mode of operation, lessens the activity of the pulmonic circulation and the disposition to sanguineous exudation from the surfaces of the bronchi. *Bronchitis* and *tubercular phthisis* are also often benefited, and the progress of the latter much delayed, by this state of atmosphere, especially when adopted early. *Chronic rheumatism* is sometimes cured by this change, seemingly owing to its influence in promoting the biliary and cutaneous functions. *Dropsies*, particularly *anasarca* and *hydrothorax*, have been, in a few instances, removed by a change to a warm climate; but whilst a moist state of the air is most serviceable in pulmonary and hæmorrhagic diseases, dry warmth seems more beneficial in dropsies, dyspeptic affections, and hypochondriasis, evidently from its effects in augmenting the insensible perspiration and the pulmonary exhalation, and imparting tone to the capillary circulation. Besides these, *gout*, in its early stages, *dysmenorrhœa*, and *scrofula* in nearly all its forms, are benefited by a change to a warm, or even a mild and dry, atmosphere.

38. 2d. *Of migration from a warm to a cold or temperate climate.* — This subject should be viewed in relation, first, to the change as it affects the dark races of man; and, secondly, as it respects those belonging to the Caucasian variety, who have either been born or acclimated in warm countries. — *A.* If change from a cold to a warm climate is productive of disease and great mortality in the white constitution, the migration of the dark races to a cold or temperate country is not less fatal to them; and whilst the change produces, in the former case, fevers, diseases of the biliary organs, and of the alimentary canal, it occasions, in the latter, tubercular phthisis, and other tubercular affections, with diseases of the bronchi, &c. When the dark races, particularly the negro, and those of the Mongol variety who are natives of intertropical and low countries, migrate to places subjected to a low range of temperature during a great part of the year, the depressing influence of cold upon the nervous system and vital actions of the lungs and skin, gives rise not only to tubercular formations, but also to increased secretion from the internal mucous surfaces, and they are, in the great majority of cases, cut off, in a few months or years, by diseases of the lungs, kidneys, and bowels. Those, however, who change the climate progressively, or who are born in countries of an intermediate temperature, and who are provided with warm clothing and animal or nutritious diet, suffer much less than those who migrate in a more direct manner, even although possessed of these latter advantages. The native African who removes immediately to Europe seldom lives over two winters in it; whilst the negro who has been brought to the West Indies, and subsequently to the southern states of North America, previously to his arrival in more northern countries, and enjoys necessary food and clothing, will often not suffer materially from the change.

39. *B.* Those who have been born of European parents, or been seasoned in warm climates, not infrequently suffer after removal to temperate or cold countries. Even, although the change may have become necessary from chronic affections of the liver or bowels, yet may it for a while aggravate or render more acute hepatic disorder, or superadd to it disease of the lungs; and many

who have experienced only functional disorders of the stomach or liver, or who acquired merely a tendency to them during their residence within the tropics, have been attacked by active disease soon after their return to Europe. Others, also, who have suffered more seriously, have had their complaints aggravated after a short residence in England, although they were benefited during their voyage home. This result of change to a colder climate proceeds not, however, altogether from the temperature or the state of the seasons, but in a great measure from the imprudence of the patient. Frequently, however, a colder atmosphere is prejudicial for a time, by constricting the vessels on the external surface, and determining an increased flow of blood to the large internal viscera, and thereby occasioning congestion and obstruction of those organs which have been weakened by previous disease or the influence of climate. Another frequent consequence of change from a warm to a cold country is a diminution of all the secretions, particularly those of the skin and liver; originating vascular plethora and visceral engorgement. In this state of the vascular system, if the cutaneous or pulmonary surface be subjected to cold, particularly cold combined with moisture, after the circulation has been determined to these parts by hot rooms and crowded assemblies, or if reaction rapidly follow the impression of cold, the great mass of blood is thrown upon the internal viscera, which, if not relieved by a free secretion, become the seat either of congestion or of inflammation. Hence it is that hepatitis, or dysentery, so frequently follows changes from a high to a low temperature. The remarkable liability to diseases of the respiratory organs, observed in those who have returned to Europe after a long residence in warm countries, is evidently owing, in many instances, to pre-existing disorder of the liver, which has extended thence to the lungs, owing either to the increased action of this latter organ upon removal to a colder climate, or to imprudent exposures to cold, or to breathing a very warm and close air immediately upon coming out of a cold and dry atmosphere.

40. In order to counteract these effects of change, warm clothing, particularly of the lower extremities, with the use of flannel next the skin, should be adopted; and exposures to cold and moisture, and the night air be avoided. The diet ought to be light, and of moderate quantity; the strong wines imported into this country abstained from; and, above all, the functions of the bowels and abdominal viscera carefully watched, and promoted whenever they seem to flag. It may be of importance to know the most suitable period of the year to arrive in this country, after the frame has become assimilated, by a long residence, to a warm climate. If an invalid return in winter, the sudden transition from a warm to a cold country may be detrimental; if early in the spring, he is liable to feel the effects of a variable season for some time. The least objectionable period extends from May to September; and if the cold of the winter months be found too severe in the more easterly counties, or in the metropolis, the climate of Devonshire or of Bath may be tried with as great advantage as that of most of the southern parts of continental Europe. Old residents in a warm climate will experience much advantage from residing some time in the more southerly parts of Europe, before passing to England or other countries of the north, more particularly if they use a course of the warm mineral waters of Vichi, Carlsbad, or Ems, in their way.

41. The children born of white parents resident in the more unhealthy countries within the tropics, very generally die at an early age if they be not removed to a colder climate. They commonly sink from the *choleric form of fever* described in a separate article as incidental to infants; or from diarrhœa, dysentery, or diseases of the abdominal secreting viscera, often assuming a remittent form. When, therefore, either of these appears in this class of patients, removal to a temperate climate should be advised when it can be effected; taking care to guard them, by warm clothing, &c., from vicissitudes of temperature for a considerable time after the change, and attending to the first indication of pulmonary or tubercular disease, or disorder of the liver and bowels.

42. III. Of the particular Localities which are beneficial in Disease, or of Climate as a Therapeutical Agent. — In this part of the subject I shall consider, *first*, the different parts of Great Britain which may be suitable places of residence for invalids; *secondly*, those in the south of Europe and the Mediterranean; and, *thirdly*, those in the Atlantic and West Indies.

43. i. *Climate of certain places in England.*— The chief difficulty in this country is to find a mild and sheltered climate for invalids from pulmonary disease; and it is almost exclusively to the south and south-west parts of the island, in the immediate vicinity of the sea, that we must direct our enquiries. The general use of coal fires in all the large towns in Great Britain, owing to the quantity of sulphur this mineral contains, and of sulphuric acid fumes and fuliginous matter generated, renders the air more irritating to the lungs, and increases the risk of a winter residence in these places, to all those who suffer from, or are even liable to, diseases of the respiratory organs. This, together with other considerations — especially the results of observation — renders it imperative on the medical attendant to recommend removal to a more salubrious locality. The mild situations I shall notice are in the south, the south-west, and the west of the island.

44. *A.* The *south coast* is much milder and more moist than the east and inland parts of the island, during the months of November, December, January, February, and March; but from April till October the temperature of the latter is greater. On this part of the coast, *Undercliff*, in the Isle of Wight, *Hastings*, and *Brighton*, have been recommended as winter residences for invalids. *a. Undercliff* is the most sheltered and mild of these places in winter, and its air softer and more humid in summer than either. *b. Hastings* is sheltered, during the winter and spring months, from the north and north-east winds; and, of the various places on this part of the coast, ranks next to Undercliff as a residence for invalids with pulmonary affections, *c. Brighton* is more exposed than the foregoing to the north and north-east winds, and its air is drier, and hence more bracing. It is therefore

more suitable than they to the nervous, the simply debilitated and relaxed, to the dyspeptic, to those affected with chronic bronchitis and asthma attended by greatly increased secretion. Dr. Clark very properly suggests that invalids who select the south coast as their winter residence, should pass the autumn at Brighton, and the winter at Hastings; the climate of the former being mild to the end of December.

45. *B.* The *south-west coast* of the island is very mild in several situations during the winter, and has, therefore, been very generally recommended in diseases of the respiratory organs. Dr. Clark estimates the temperature of its more sheltered localities as being 5° higher than that of London, during the winter months; and the temperature of the south coast as only 2° higher. But I conceive that there are, at least, 6° and 3°, respectively, of difference between these and London and its vicinity. Besides, it is not only the range of temperature that should be considered, but its greater equality, and less rapid vicissitudes, and the increased humidity, and more soothing influence of the air.—*a.* The places on the coast of Devonshire most in repute as residences for the consumptive, are *Torquay*, *Dawlish*, *Sidmouth*, *Exmouth*, and *Salcombe*. Of these, *Torquay* is the best; and, according to the reports of Dr. Clark, Dr. Foote, and of my friend Dr. W. Hutchinson, who has resided in it, superior to all other places in our island in pulmonary cases.

46. *b.* *Penzance* is the principal place in Cornwall recommended for invalids. Its peninsular situation, and south-west position, give it a remarkably soft, humid, and mild atmosphere; and the equality of its temperature, not only throughout the year, but also during the day and night, renders its climate in many respects superior to that of most places in the south of Europe, and brings it next to Madeira. The quantity of rain that falls annually at Penzance is nearly double that which falls in London; the number of rainy days is much greater; and the temperature of the air at night at least 7° higher during the winter months. This mildness, equality, and humidity of climate, is, however, somewhat impaired by its exposed situation, and its liability to high winds.

47. Both the Land's End and the coast of Devonshire, owing to the predominating character of softness, humidity, and equality of climate, exert, along with a soothing, an evidently relaxing effect. Hence this coast is best suited to the irritable and inflammatory states of disorders of the respiratory organs, and such as are characterised by irritation, but little expectoration, and dryness of skin. In cases attended with a copious expectoration, great relaxation of the mucous surfaces and soft solids, and in nervous debilitated persons, this climate will prove injurious. Even in those cases where it is evidently indicated, and actually proves of service, removal will be necessary to a somewhat drier air during the summer; and this should not be deferred longer than June, or undertaken before April or May; the patient generally deriving much benefit by returning the succeeding winter. The observations now made upon the climate of the south-west coast apply to that of *Jersey* and *Guernsey*, to which islands invalids sometimes repair, and occasionally with advantage. South-west winds generally prevail in them during autumn and winter, and cold north-east winds often continue long in the spring. The summer climate of these isles is excellent. Of the two, that of Jersey is preferable.

48. *C.* The *West of England.*—The mean temperature of this part of the island is a little lower than the southern coast, but in March and April it rises somewhat above it. Bath and Bristol are about 3° warmer than London during the months of November and December; but this difference is reduced more than one half during January, February, and March. In this part of the country, the vale of Bristol is the most sheltered and mildest. The climate during the winter is rendered more mild by the vicinity of the ocean, whilst the groups of surrounding mountains attract the clouds and diminish the fall of rain below the current to which its western position would otherwise subject it. Bristol Hot-wells, and the lower parts of Clifton, are the most sheltered spots, and the best suited to consumptive patients; whilst other invalids will find most advantage in the more elevated situations which the latter presents. In general, the climate of this place is perhaps the mildest and driest in the west of England; and, therefore, one of the best winter residences for invalids. It is drier and more bracing than that of the south-west coast, and therefore not so well suited to consumptive cases, and to those affected by irritative action in the respiratory passages and bronchi. For these, the more soft and humid air of Torquay and Penzance is preferable; but, with the return of summer, the consumptive invalid will relinquish the latter for the former with benefit. Clifton and Bath are certainly preferable places of residence to the south-west coast, in cases of protracted dyspepsia, gout, and scrofula, particularly the last occurring in young persons, and relaxed habits. In these affections, the waters of *Bristol Hot-well* will, with regular exercise on horseback or on foot, prove extremely beneficial.

49. The more inland districts of this part of England furnish various places which are salutary to invalids during the summer. *Malvern*, and the surrounding country, with the Malvern waters, are very serviceable in scrofulous and dyspeptic cases; and, for the consumptive and other invalids, various places in Wales, as Abergavenny, Aberystwith, Tenby, Barmouth, &c. will be visited during the season with advantage. Where a course of goat's whey may be considered of advantage, a summer residence in Wales will be preferred. There are various other places which, besides their mineral waters, furnish excellent summer residences for the invalid. Buxton, Matlock, Leamington, Cheltenham, Tunbridge Wells, &c., independently of the use of their respective mineral waters, prove excellent places of residence for those who are debilitated or exhausted, whose mucous surfaces are relaxed, or whose digestive, secreting, and assimilating functions are imperfectly performed, and any of the abdominal viscera congested or obstructed. In these latter circumstances of disease, especially, the appropriate use of the waters of those places, assisted by regular horseback or walking exercise, by suitable medical treatment, and by mental relaxation and amusement, will often prove of

great service. In prescribing the mineral waters of any of those places, due reference should be had to the nature of the climate; and, on the other hand, when directing change of climate, some attention should be paid to the waters which the place may afford; as the appropriate use of the one, whilst the patient is experiencing the influence of the other, will materially promote the end in view.

50. In a very great proportion of cases, where the state of the patient admits of change of locality, much advantage will accrue from passing the autumn on the south coast of the island, as at Brighton, Hastings, or Undercliff, after having passed the summer at the foregoing watering places. In general, when the digestive and generative organs are disordered, frequent change of air, and travelling by easy and short journeys, with gentle exercise, particularly on horseback, agreeable amusement, and regular habits, will prove of marked advantage, and greatly aid medical treatment.

51. ii. *Of the Climate of certain parts in France.* — *A.* The *West* and *South-west of France* furnishes several places, the climate of which possesses the softness and humidity which are requisite in pulmonary diseases. The mean annual temperature of the south-west of France is stated by Dr. J. Clark to be 4° higher than that of the south-west of England; and the climate of both generally agree or disagree with the same diseases. — *a.* That of the south coast of Britany is mild during the winter, and temperate in summer, the mean temperature of this province being about 56½°. Its climate is soft and relaxing; and it is hence suited to dry bronchial irritations, to hæmoptysis, and tubercular cases. Laennec found it very favourable to consumptive patients, and states that the proportion of such in this part of France is very small. In scaly eruptions on the skin, dysmenorrhœa, and in irritable habits of body, this climate will be often of service.

52. *b. Pau,* situated at the base of the Pyrenees, from the account of it given by Dr. Clark and Dr. Playfair, appears to be the best place in the south-west of France for invalids; and yet, in no respects is it superior to the south-west of England in consumptive cases. Its air is still and mild in winter and spring; the chief advantage it offers being the great mildness of its spring. Dr. Clark gives the following comparison: — Its *mean annual* temperature is 4½° higher than that of London, and about 3° higher than that of Penzance; it is about 5° lower than that of Marseilles, Nice, and Rome; and 10° lower than that of Madeira. In *winter,* it is 2° warmer than London, 3° colder than Penzance, 6° colder than Nice and Rome, and 18° colder than Madeira. But in the *spring,* Pau is 6° warmer than London, and 5° warmer than Penzance; only 2½° colder than Marseilles and Rome, and 7° colder than Madeira. The range of temperature between the warmest and coldest months at Pau is 32°; this at London, and likewise at Rome,i s 26°; at Penzance it isonly 18°, and at Madeira 14°. The daily range of temperature at Pau is 7½°; at Penzance it is 6½°; at Nice, 8½°, and at Rome, 11°. Pau is drier and warmer than the south part of England in the spring, and northerly winds are less injurious. One of its chief advantages is its vicinity to the watering-places among the higher Pyrenees, which are often beneficial places of summer residence to those who have passed the winter and spring at Pau.

53. *B.* The *South-east of France.* — The climate of the tract of country extending along the shores of the Mediterranean, from Narbonne and Montpellier to the Var, is warmer and drier, but more exciting, than that of the south-west. It is subject to sudden vicissitudes of temperature, and to cold winds, especially the north-west, or *Mistral.* It is decidedly prejudicial to consumptive patients, especially when the disease has made some progress, and to irritative affections of the stomach, trachea, or larynx; and is serviceable chiefly in diseases of debility and relaxation unattended by inflammatory or hæmorrhagic action.

54. Dr. Clark ranks the principal places on the coast of Provence in the following order, as residences for invalids: — Hyères, Toulon, Marseilles, Montpellier, Aix, Nismes, Avignon. — *a. Hyères* possesses the mildest climate on this part of the coast, being sheltered from the north winds by a range of hills; and its inhabitants being comparatively exempt from pulmonary affections. *b.* At *Marseilles* the climate is dry, variable, and subject to cold irritating winds. It is therefore injurious to consumptive patients; and is one of the places in France where pulmonary diseases are most prevalent. Invalids requiring a dry air, and capable of bearing cold winds, may be benefited by residing here for some time. *c. Montpellier* has obtained a reputation for salubrity to which it has no claims. According to MM. Fournier and Murat, more than a third of the deaths that occur in the hospital of this city are from pulmonary consumption. The prevalence in this part of the country of northerly winds during winter and spring, both accounts for the frequency of pulmonary diseases, and points out its unfitness as a residence for patients thus affected. *d. Aix* is still more exposed than Montpellier to the Mistral and north winds, and pulmonary complaints are very prevalent among its inhabitants.

55. *C. Nice,* although situate on the same line of coast as Provence, enjoys a much milder climate than any part of that province. It is protected by a lofty range of mountains from the north winds; and the daily range of temperature is there less, than at almost any part of the south of Europe. During winter the weather is settled, and the atmosphere clear, the thermometer seldom sinking to the freezing point, excepting at night. At this season, however, as well as in the spring, cold dry winds are not infrequent; and the climate is, upon the whole, dry and exciting. Hence it is not favourable to pulmonary consumption, — the very disease for which it was formerly very improperly recommended. It is likewise unfavourable to irritable or inflammatory states of the larynx, trachea, and bronchi, attended with scanty expectoration, or hæmoptysis. But chronic bronchitis, bronchorrhœa, and humoral asthma, are generally very much benefited by the climate of Nice. It is also serviceable in all cases of debility, torpor, and relaxation of the mucous surfaces; in chronic rheumatism, gout, external scrofula, dyspepsia, and hypochondriasis.

56. iii. *Of the Climate of Italy and Mediterranean.*— *A. Genoa* is not favourably noticed by Dr. Clark as a residence for invalids; but Dr. Johnson, on the authority of Dr. Mojon, speaks of it in more favourable terms. It is best suited to those affected by chronic bronchitis, and dyspeptic and gouty complaints; and to persons of relaxed and phlegmatic habits of body. *Pisa*, *Rome*, and *Naples* are the other places in Italy most frequented by invalids. The climate of Pisa nearly resembles that of Rome, the latter being somewhat warmer and drier in winter. Dr. Clark considers the climate of Rome as one of the best in Italy for consumption, unattended by hæmoptysis. For those, however, who cannot take exercise in the open air, and must confine themselves to sheltered situations, the Lung' Arno in Pisa is the best place of residence to be found in Italy. The climate of Naples is considered by this writer, as well as by M. Lasnyer, more exciting than that of the two foregoing places; and it is more subject to high winds. The diseases which a residence in either of these three cities will benefit, are those above enumerated. Persons who remain in Italy during the summer, will find Lucca, Sienna, and the vicinity of Naples, the coolest situations.

57. *D.* There are various other places on the shores and islands of the Mediterranean, the climates of which are suitable to invalids; but we possess little or no accurate information respecting them. *Malaga* in the south of Spain, *Cagliari* in Sardinia, and some parts on the coast of Sicily, afford a mild winter climate, but the difficulty of reaching them, and of obtaining in them many necessary comforts and conveniences, almost precludes invalids from the northern parts of Europe from visiting them. *Malta* is not open to these objections; but, according to Dr. Hennen, the quantity of dust raised from its arid soil, and suspended in the air, during dry weather, renders it an unsuitable climate for consumptive patients. A considerable number, also, of the inhabitants die of pulmonary diseases. In his work on the medical topography of the islands of the Mediterranean, Dr. Hennen states a fact, which is perfectly in accordance with my observation in warm climates, although doubted by Dr. Clark, viz. that those of the *Ionian Islands, which are decidedly most malarious and remarkable for remittents, have had fewest pulmonary affections amongst the British troops.* In respect of the health of the troops stationed in these islands, this writer states, that, from an average of seven years, phthisis has borne a proportion to other complaints of 1 to 198¼ only. At *Malta*, on an average of eight years, consumption has occurred in the proportion to other maladies of 1 to 93⅓. Including all pulmonic complaints whatever, the proportion to others, as regards the Ionian Isles, has been 1 to 20¾; and, as respects Malta, 1 to 14. Taking into calculation the whole Mediterranean islands, the proportion of pulmonic, to other diseases, has been 1 to 17¼ in the British army.

58. iv. *Climate of the Northern Atlantic.*— Under this head the climates of *Lisbon*, *Cadiz*, *Madeira*, the *Canaries*, the *Azores*, *Bermudas*, and the *Bahamas*, may be arranged; all of which have been recommended to persons requiring a soft and equable climate, during the winter and spring.

59. *A. Madeira* is, of all these places, indisputably the best, as respects both the climate, and the comforts and conveniences within the reach of the invalid. The frequency and excellency, also, of the means of conveyance to and from the island are no small recommendations. From the minute account furnished of the climate of this island, by Drs. Gourlay, Heineken, and Renton, after a long residence in it, and from the effects I have observed in several persons who had resorted to it as a winter's residence, it may be justly concluded, that it is superior to any part of the south of Europe for consumptive cases. Its central ridge of mountains gives it, in summer, a cool land wind; and the north trade winds, at this season, render it temperate and salubrious. During winter and spring, Funchal, and parts near the sea-shore, are the best places of residence; and, during summer, the more elevated situations in the interior are cool and agreeable. The mean annual temperature of Madeira is about 6° higher than the south-east of France and Italy; and the heat throughout the year is much more equably distributed. The winter of the former is 12° warmer than that of the latter, and the summer 5° cooler. At Madeira the extreme annual range is only 14°, whilst it is double this amount at Pisa, Rome, and Naples. In respect also of the progression and steadiness of its temperature, it excels those places. Rain falls at Madeira on 73 days of the year, and at Rome on 117 days, and chiefly during the autumn in the former. The air is also more soft than at Rome.

60. *B.* The *Canaries* possess the next best climate to Madeira. The mean annual temperature, however, of Santa Cruz, the capital of the former, is 71°; whilst that of Funchal, the capital of the latter, is only 65°. The summer temperature of Santa Cruz is 7° warmer than that of Funchal, and the winter temperature 5° warmer. Hence the mean annual range of temperature is greater in the Canaries than in Madeira; which possesses, in other respects, advantages sufficient to recommend it in preference to the former in pulmonary diseases.

61. *C.* The *Western Islands*, or Azores, enjoy a climate nearly approaching to that of Madeira. They are, however, more subject to high raw winds, particularly those from the north and north-west, which are often very cold and harsh; and the temperature of winter is lower, and that of summer higher than in Madeira. The air is also more humid. From a very short visit I made to Madeira and the Azores, — to the former in the spring, and to the latter in winter, — I should conclude the Azores to be much inferior to Madeira as a residence for invalids, chiefly because of the absence of many necessary comforts and conveniences, of their stormy winters, and the infrequency and ineligibility of the opportunities of transport between them and this country. The climate of the *Bermudas* and *Bahamas* presents no advantages sufficient to obtain for them a preference to those already noticed. They are liable to storms, and to harsh northerly winds in winter, from the American coast, whilst their summers are very hot.

62. v. *Climate of the West Indies.*—The mean annual temperature of the West Indies, at the level of the sea, is 79°, 80°, and 81°; and during the

winter months, in some places, about 3°, and in others only 2° lower. The extreme annual range is 20°, and the mean daily range about 6°. This continued high temperature exhausts the energies of invalids; and the clearness of the skies, and great power of the sun, prevent suitable exercise in the open air. A visit to the West Indies of a few months' duration, made either to some of the most healthy islands, or passed chiefly aboard ship, will, however, prove of service in several chronic affections, particularly those referred to above (§ 37.), excepting consumption in its more advanced stages. Persons much disposed to this disease, either hereditarily or by the conformation of the chest, &c., or who are threatened by its early stages, will find a removal to the West Indies one of the prophylactic measures most to be depended upon. When residing some time in an extremely malarious place within the tropics, I observed that the most healthy persons in it were those who were constitutionally disposed to pulmonary disease. But I believe, that the observation often made, is perfectly correct, that removal to an intertropical country, when phthisis is far advanced, will only accelerate its progress. It may also be stated, that severe and protracted catarrhs are very common upon entering between the tropics. In gout, chronic rheumatism, scrofula, and calculous affections, a residence in the West Indies is often productive of advantage.

63. vii. *Of residence on the sea shore and voyaging.*—There are certain topics connected with change of climate often discussed during the course of practice, viz. whether are inland situations, or places on the sea-shore, whose climates are physically alike, most serviceable in pulmonary diseases? and whether or not sea-voyages possess any advantage over a land residence in these complaints. *a.* In respect of the first question, it may be stated, that places on the sea-shore are generally more humid than those inland, and oftener, on this account, preferable in the dry and the hæmorrhagic pulmonary affections; whilst a situation somewhat inland, or not removed above a few miles from the coast, seems somewhat more serviceable in those cases of consumption which are otherwise characterised. But the question has not been satisfactorily determined, and, indeed, is not easy of solution.

64. *b.* With reference to the second question, it may be stated more confidently, that sea-voyaging, in a suitable climate, is preferable to land residence in the early stages of phthisis, and particularly when it is attended by hæmoptysis. This advantage is evidently to be attributed to the influence of the ship's motion on the sanguineous and nervous systems. This opinion was argued for by Dr. Gregory, in his excellent thesis, *De Morbis Cœli Mutatione Medendis*, and has been generally admitted. Cruising in a warm or even temperate latitude, particularly in the Atlantic, is preferable to voyaging, because of its longer duration. Whilst the sun is north of the equator, the climate between the 30th and 50th degree of latitude; and while the sun is south of the equator, that from the 20th to the 35th or 40th degree of north latitude, will be found the most salutary. During winter, voyages between Madeira and the West Indies; and, in summer, between Madeira and this country, in the vessels constantly trading between England and the West Indies, and which generally touch at Madeira, might be undertaken with advantage. These vessels furnish tolerable accommodations, which may be easily improved or adapted to the state of the invalid.

65. *A.* When the winter has been passed in any of the warmer situations noticed above, attention ought to be paid to the time of returning to this country. This should not be earlier than the first, or later than the last week in June. If the invalid have passed the winter in the south of France or in Italy, these places may be left early in May, and he may travel cautiously through Switzerland, avoiding exposure to the evening and morning air. During the journey, warm clothing should be resorted to as soon as the temperature falls so low as to become sensibly cold; and a free circulation in the skin and extremities ought to be carefully preserved.

66. *B.* With respect to the diseases which are benefited by change of climate, it is unnecessary to add any thing at this place, as the climates which seem most serviceable are noticed when discussing the treatment of those diseases in which most advantage is derived from removal to particular climates. The affections for which this treatment may be employed, are *scrofula, tubercular disease of the lungs, hæmorrhage from the lungs*, &c., *chronic bronchitis, asthma, chronic rheumatism, dyspeptic* and *hypochondriacal affections, urinary calculi*, and various *cachectic* and *hydropic affections.* (See *the treatment of these complaints in their respective articles.*)

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COLD.—(Classif. Pathology. *Ætiology* and *Therapeutics*.)

1. Cold is merely a relative term, expressing a sensation produced by the abstraction of heat by any substance of a lower temperature than that of the body or part which feels; consequently this sensation is not always occasioned by the same degree of temperature. Nature has recourse to various means for abstracting animal heat from the body, under circumstances requiring it; and for preventing the dissipation of it, under other circumstances; and the instincts and reason of the animal creation are often evinced in furthering these objects. The dark skin of certain varieties of our species, and the thin hairy covering of many of the lower animals inhabiting hot countries; the fair well-clothed skins, and the thick coverings of wool or fur with which those of cold climates are provided; and the construction of the dwellings, &c. in different and opposite climates; are all provisions intended to accelerate, under certain circumstances, and to delay, the dissipation of animal heat under others.

2. The functions of the living economy can be performed within a certain range of temperature only, for any considerable time. Above or below this range, they will more or less rapidly cease, according to the extent to which the change may be carried in either direction, and the rapidity with which it is effected. Whilst the abstraction of heat is produced more rapidly than it is supplied, either in a part or in the whole body, depression of the vitality takes place co-ordinately with the rapidity of the loss of temperature; but, on the other hand, when the abstraction of heat is altogether prevented by living in a medium of equal or greater temperature, excessive vascular excitement, rapidly exhausting the sensible and irritable properties of the tissues, and thereby terminating human existence, is the consequence. The heat of the human body seldom varies, in health, above 100° or below 96° of Fahrenheit's thermometer; and although man may live in a lower temperature than the zero of this scale, when suitably fed and clothed, owing to the activity of the respiratory and heating functions, yet, in consequence of the nature of these functions, he cannot exist for any considerable time in a mean range of temperature above that of his own body. In no part of the globe is the mean annual range of atmospheric heat within twelve degrees so great as that of the living frame.

3. i. Physiological and Pathological Effects of Cold.—A. *A general view of its effects.* In considering, therefore, the effects of cold upon the body, due reference should be had to the state of the respiratory and heating functions, which are essentially vital, and active in proportion to the greatness of the constitutional powers. The abstraction of caloric, or cold, when carried far, first depresses, and afterwards annihilates, the vital actions of a part, by depriving it of that principle which is necessary to preserve the various tissues composing it in a suitable state for reciprocity of action, and which observation shows to be necessary to the healthy performance of the sensiferous and circulating functions especially. When heat is abstracted to a greater extent than it is supplied, sensibility is diminished or numbed; and circulation, as respects both rapidity and size of the current in the vessels, is lessened. This effect may be produced in a part or extremity to the extent of annihilating these functions in it, whilst in the internal viscera they either remain entire, or are but little changed. When this is the case, the part affected will permanently lose its vitality, if these functions be not soon restored by frictions, and a very gradual admission of heat. A part thus affected by cold is said to be frost-bit,—an accident to which the more exposed parts of the body are liable in very depressed states of temperature. Even friction only may occasion too quick a change of temperature, if it be not made with some substance, as snow, which may prevent the too sudden increase of heat, and the risk of immoderate reaction. When the vital energies are weak, a less degree of cold will depress them than when they are energetic; and, upon its removal, vascular reaction will be less apparent, or even not at all supervene. If cold be not great, or too long applied, relatively to the vital energies, increased action, as evinced by a glowing sensation, follows its impression. When, on the other hand, it is excessive, either in degree or continuance, the depression of vital power, especially the manifestations of this power in the nervous and circulating organs, is co-ordinate, the living animal sinking into a state of torpidity from which it is with great difficulty roused. Thus cold, momentarily or briefly applied, when the constitutional powers are not very much impaired, proves, if not excessive, an excellent invigorating or tonic agent, owing to the re-action which follows; but when acting energetically, or for too long a time relatively to the state of those powers, it will produce one of two effects, according to the circumstances attending it, or following its application: either it will depress the vital actions beyond the power of recovery, the system sinking into a comatose state, or struggling between this state and partial or irregular reaction; or it will be followed by increased or even uncontrollable vascular action, soon exhausting the vital manifestations of the vessels and the irritability of the frame, or of the part principally exposed, and occasioning dissolution of the blood. While the continued action of that degree of cold, which may be endured for a short time, very often produces the former result; the momentary exposure to excessive cold, or the injudicious application of heat in an inappropriate or too rapid a manner, after the more moderate but prolonged action of this agent, is usually followed by the latter. Inflammations are not infrequently induced in this manner in the organs to which cold has been directly applied, as in the case of inflammation of the lungs coming on after passing into a warm apartment

immediately from a cold atmosphere. In other cases, the impression of cold when prolonged, although moderate, may, by diminishing vital action in the parts on which it acts, so determine and increase it in distant or even opposite parts or surfaces, as to give rise to inordinate secretion or vascular action in the latter. Such being the more general effects of cold upon the system, it will be advantageous to examine its mode of operation more closely, in order that we may be enabled to form accurate ideas as to its influence in the causation and removal of disease.

4. *B. Particular effects of cold.* — *a.* The *primary effects* of the abstraction of heat from a part, to the extent of producing a decided sensation of cold, appear to be exerted upon the *nervous system*, whose sensibility and vital manifestations it lowers, and, when excessive, entirely annihilates. These effects are obvious in both the organic and voluntary classes of nerves; and are at first attended by an alteration of their sensibility of a slightly painful kind, often followed by loss of their functions. Thus, cold will occasionally give rise to local paralysis. When an intensely cold substance is applied to a living tissue, the rapid abstraction and passage of its caloric through the living surface intervening between them, cause similar effects to those following the rapid communication of caloric by a heated body, and thereby momentarily excite the nerves and vital turgescence of the intervening parts. Thus, intense cold will produce vesication, inflammation, &c. of the skin.

5. *b.* The action of cold, when slowly or moderately applied, in diminishing *vital turgescence*, the bulk of the tissues, and the activity of the *circulation*, seems coeval with the effects produced by it on the nerves. By this action the small arteries, veins, and secerning pores are constricted, and the communicating canals between the extreme arteries and radicles of the veins are rendered smaller and less pervious. Hence, when cold is applied to the surfaces of the body, the circulation there and in the vicinity is diminished, and the blood is driven thence, and accumulates in the large veins of the internal viscera. Owing partly to this operation, and partly to the sedative effects of cold upon the nervous system, the whole circulation becomes weakened, and congestion of the large vessels and internal erectile tissues takes place. If the impression of cold is only for a short period, the vital energy not being at the time materially deficient, the heart and large vessels are enabled to react upon the load that oppresses them, and an increase of the circulating functions ensues. But when the impression of cold continues, circulation becomes less and less active, with at first slight or inefficient efforts at recovery, and at last ceases entirely.

6. *c. Muscular parts* are very sensibly affected by cold, in consequence of its effects upon the nerves supplying them, and of the diminution of the circulation in them. Nervous energy, therefore, being depressed, and the circulation weak and insufficient, muscular contractions also become weak and tremulous; and the muscles subsequently stiff, or altogether rigid, frequently with cramps or spasms intervening between these states. A share of these extreme effects is, doubtless, owing to the vascular congestion produced on the cerebro-spinal axis, and on the origin of the nerves supplying the muscles. The cramps often occurring after plunging into cold water, or while swimming, are illustrations of the effect on the muscular system of moderate cold suddenly applied to the surface, and of its action thereon, through the medium of the nervous and vascular systems. After the power to make muscular exertion ceases, in consequence of the continuance or increase of cold, remarkable stiffness and rigidity of the voluntary muscles supervene, sometimes extending to the respiratory muscles, and producing asphyxy. In many cases, where cold acts intensely or suddenly upon the surface of the body, rigidity takes place with remarkable celerity, as stated by QUINTUS CURTIUS, and MM. PARAT, MARTIN, and BEAUPRÉ, to have occurred in the expedition of ALEXANDER, and the retreat of NAPOLEON from Moscow. Trismus and tetanus have followed, in some cases, a moderate decrease of temperature, and difficult articulation is not an uncommon effect of this cause.

7. *d.* The influence of cold upon the *respiratory* and *calorific functions* is very manifest. When atmospheric cold is moderate, and sufficient exercise is taken in it, and the cutaneous surface and extremities are sufficiently clothed, then respiration is energetic, the changes produced on the blood are complete, and animal heat is freely generated, and is sufficient to supply the continued loss of it from the surface of the lungs. But when cold depresses the nervous power, owing either to its excess, or to the circumstance of its acting simultaneously upon both the cutaneous and pulmonary surfaces, or to the circulation being unaided by muscular exertion, then respiration becomes laborious, quick, and painful; and the production of animal heat is insufficient to preserve the fluids and soft solids in a suitable state for reciprocal action, rigidity, followed by congelation, first of the extremities, and subsequently of more central parts, taking place. As long as the nervous energy and the circulation are unimpaired, animal heat is freely developed; but it becomes co-ordinately depressed with the failure of these, and returns in a proportionate degree with their restoration. When cold has acted for a considerable time upon the frame, animal heat is either restored with difficulty, or it continues to vacillate and sink with the nervous and circulating functions until death supervenes. It is chiefly during the period which elapses between the exposure to cold, and restoration from its effects, that diseased action commences, or is developed. Too long continuance in a cold bath, wet clothes, and numerous other means of refrigerating the body, will produce a loss of temperature that may never be recovered. Dr. CURRIE found that a man with a temperature of 98°, three hours after cold bathing and exposure to a north wind, had not recovered his natural heat, although warm stimuli, frictions, &c. had been employed. During such states of protracted restoration, various morbid states are apt to originate and to give rise to a train of diseased actions, varying in almost every case with the constitution, temperament, predisposition, and habit of body of the individual. Even after reaction has taken place, some particular organ or part may suffer especially owing to these predisposing circumstances; and inflammation, with effusion, disorganisation, &c. may be the result.

8. *e.* The effects of cold upon the *brain and the organs of sense and voluntary motion*, are similar to those already described. Hearing, sight, touch, &c. become imperfect, the functions of mind impaired, and insensibility, somnolency, delirium, and convulsions supervene. The somnolency, and indifference to the consequences of indulging it, when long exposed to cold, have been well known since the accounts given of the cases of Dr. SOLANDER and Sir J. BANKS, in Terra del Fuego, of MAUPERTUIS in Tornea, and of CAPTAIN PARRY's associates in the north-west expedition. But the fullest description of its effects upon the senses and cerebro-spinal centres is given by BEAUPRÉ. The same degree of cold, according to the state of the system and the extent to which the surface is protected, will cause either delirium of a quiet comatose kind, or raving madness, or convulsions, passing into tetanic rigidity. Great insensibility and somnolency will also often steal upon their victim, without any other mental disturbance; and occasionally they will be preceded by tremors, delirium, and convulsions.

9. *f.* Cold produces very decided effects upon *secreting organs and surfaces.* When it acts directly upon either of these structures, it diminishes or entirely suspends their functions, owing both to its sedative action on the nerves and circulation, and to its constricting influence upon the canals and pores of the part, it thereby lessening vascular turgescence and vital manifestation. Cold air or cold fluids acting upon the external surface interrupt the functions of the skin, particularly if the cold be combined with moisture. A similar effect is produced upon the pulmonary mucous surface, only if the cold be intense, and if it be at the same time humid. As long as the cutaneous surface is protected, and the vital energy of the frame is unsubdued, the exhalation of vapour from the lungs, and the other changes in the blood that take place in this organ, are not materially interrupted until the temperature of the air falls much lower than can be endured by the external surface. When, however, the air is very humid as well as cold, the aqueous exhalation from this organ also is much lessened. The remarkable tolerance of cold by the lungs during exercise and a protected state of the external surface, is evidently owing, 1st, to the circumstance of the quantity of air received at each inspiration being a part only of the whole air contained by them; and, 2d, to the changes in the capacity of the circulating and respired fluids for caloric, by which the respiratory actions are attended. Whilst the nervous and circulating functions are unimpaired by cold, diminution of the cutaneous and pulmonary exhalations is compensated for, and injurious plethora of the vascular system prevented, by a proportionate increase of the secretions from the kidneys and intestinal mucous surface. Owing to this activity of the internal secretions, and centralisation of vital energy, the appetite is also increased — sometimes rendered even ravenous — digestion is accelerated, and the stomach enabled to dispose of substances which would otherwise be rejected from it. When cold acts upon the frame for some time, and is great relatively to the condition of the digestive organs or vital power, a nearly paralytic state of the nerves of the alimentary canal may ensue, giving rise to interrupted secretion, to flatulent dilation of large portions of it, either with or without spastic constriction of other parts, and to painful and anxious suppression of all its functions.

10. C. *Of the effects of cold in various states of the system.* — *a.* It has already been stated that the injurious effects of cold are great in proportion to the depression of vital power at the time of its action. When the surface of the body is warm, or even overheated, but not perspiring, when vascular action is energetic, or the nervous power excited, cold is well and safely borne; but when the body is perspiring freely, and at the same time exhausted, or the depressing mental passions are in operation, it produces a much more intense and rapid effect, not only by obstructing the cutaneous perspiration, but also by occasioning either interruption of the internal secretions, followed by febrile action, or a morbidly increased flow of some one or more of these secretions, according to the state of the body at the time. The experiments, however, of FORDYCE, BLAGDEN, and DOBSON, and the practice of the Russians, show that the free perspiration produced by heated air and the vapour bath, as long as the excitement of the nervous and vascular systems occasioned by these continues, may be checked with impunity, and even give rise to a salutary reaction.

11. *b.* Exposure to cold and wet, in cases of shipwreck, &c., particularly in winter, is productive of bad effects, great in proportion to the rapidity with which evaporation of the moisture from the surface of the body takes place. As the temperature of the sea, in winter, is always higher than that of the air, and is not lowered, as that of the air is, by evaporation from the wet clothes of the person thus exposed, so has it been observed on numerous occasions, and particularly in the instance recorded by Dr. CURRIE, that persons who have remained almost wholly immersed in sea-water have always lived longer than those who were exposed to the refrigerating action either of the wind only, or of the wind assisted by evaporation from the wet surface and clothes. Protracted immersion, also, is not so injurious in salt as in fresh water. This is chiefly owing to the higher temperature of the former than of the latter, and partly, perhaps, to the stimulating effects of the salts dissolved in sea-water on the skin. In cases of shipwreck it is not unusual to find, that those who had taken spirituous liquors to excess during the period of their peril are the first to fall victims to the effects of cold. This, most probably, is owing to the exhaustion consequent upon the excitement produced by spirits; to the fluxion and centralisation of vital power in the parts on which the stimulus directly acts; and chiefly to the circumstance that such excesses cooperate with cold in producing congestion of the vessels within the cranium, and apoplectic lethargy.

12. *c.* During states of morbidly excited vascular action, unattended by free excretion, or a perspiratory state of the skin, the external or internal application of cold is beneficial, by lowering the nervous and vascular excitement to that state which is requisite to a due performance of the secreting and excreting functions. But in order that this effect should be obtained, it will generally be necessary to continue the application of

cold for some time, or frequently to repeat it after short intervals, as reaction usually follows a brief use of it; but as soon as the disposition of the morbidly increased action to recur no longer is evinced, a prolonged application of cold may be injurious by depressing the vital energy so low, that recovery either of the part on which it directly acted, or of the system generally, may be a matter of difficulty. In many of such cases, rigors will follow the too protracted or intense operation of this agent, and be the means of bringing about reaction, which, however, may assume irregular or excessive states, or produce a new or modified train of symptoms.

13. *d.* During the exhaustion following muscular exertion in hot weather, and while the surface is freely perspiring, cold in any way is most intensely and rapidly injurious, particularly when it is applied to the stomach. The ingestion of a large quantity of a cold fluid in this state has been speedily followed by death. This extreme effect has not been satisfactorily explained. That inflammation may be so quickly induced cannot be admitted. It seems more probable that the sudden impression of the cold fluid upon the nerves of the stomach, together with the rapid distension of the organ, paralyses the system of nerves which supplies the digestive organs, and which is evidently that part of animal organisation on which the vital manifestations throughout the frame more immediately depend. Even when cold, owing either to the less bulk of the cooling body, or to the state of the stomach and system at the time, is not quickly or intensely injurious, still it may be productive of injury by favouring the developement of inflammatory action in the stomach or liver, or by interrupting the secreting actions of these and adjoining viscera.

14. *D. Changes observed in cases of death by cold.* — **Quelmalz** found the vessels of the brain turgid with blood, and the large veins and arteries filled by polypous concretions; and he refers the sopor preceding death to congestion of blood in the cerebral vessels, and effusion of serum in the ventricles of the brain. **Rosen** also observed the vessels within the cranium engorged with blood. **Cappel** states that he found the blood and fluids accumulated chiefly in the pectoral and abdominal viscera. Dr. **Kellie** detected, in two cases examined by him, the same appearances as were remarked by **Quelmalz**, **Rosen**, and **Cappel**; and noticed, in addition, a bloodless state of the scalp, engorgement of the sinuses, integrity of the substance of the brain, remarkable redness of the small intestines from turgescence of the blood-vessels, and absence of tympanitic distension.

15. *E. Of cold, or undue abstraction of animal heat, as a cause of disease.* — Cold is either a predisposing or an exciting cause of a very great number of diseases, particularly among the poor, and during the winter and spring seasons, as J. P. **Frank** and Sir G. **Blane** have demonstrated. The injurious effects of this agent on infants and children are great in proportion to the earliness of the age at which they are exposed to it. I believe that more than one half of the deaths, and two thirds of the diseases, that occur among the children of the poor, are more or less caused by it. Cold will produce modified and even opposite effects, according to its intensity and duration. It has already been shown, that, during the integrity of vital power, a brief or moderate impression of cold is an indirect stimulant, and an excellent tonic remedy; whilst a very intense or prolonged action of this agent is a direct depriment of the vital energies, even although the rapid abstraction of much cold may inflame and disorganise the parts through which it is caused to pass. Hence it must be obvious that cold will be either a predisposing or an exciting cause of disease, according to the intensity, duration, and manner of its operation, to the constitution of the person on which it acts, and to the other causes and influences which cooperate with it. The same circumstances will also explain the great diversity of its effects, and its operation in determining the characters and complications of numerous maladies, even after their career has commenced.

16. After what has been advanced respecting the physiological and pathological action of cold, I need not add any further observations on the manner in which it operates in the causation of particular diseases. It will be sufficient to enumerate those which it most frequently produces, either by its unaided operation, or in conjunction with a pre-existing disposition or disorder, and with other morbid influences. Fevers, inflammations of the individual viscera, dropsies of the shut cavities and anasarca; catarrhal and bronchitic affections, hæmorrhages; diarrhœa, dysentery, and diabetes; rheumatism and gout; apoplexy and paralysis; tetanus, and other spasmodic and convulsive maladies; the obstruction of secreting and excreting functions — of the bile, of the urine, of the catamenia, and of the intestinal excretions; scrofulous, scorbutic, and chlorotic complaints, hardening of the cellular tissue and œdema, chilblains, and congestions and obstructions of glandular and secreting parts, are among the most common consequences of this agent. Fevers occasioned by cold alone are generally ephemeral, or of short duration, when no particular organ or function is already in fault; and the reaction — generally ushered in by rigors — is of a salutary tendency when kept within due bounds: but cold favours directly and indirectly the spread of typhoid infection; and its action on the frame during the progress of all continued and exanthematous fevers is very often injurious, unless judiciously regulated and employed, and is productive of many of the dangerous complications which frequently arise in their course, as well as of the local affections that appear during or after convalescence from them. Such is more remarkably the case in respect of the exanthematous fevers. Dropsical and hæmorrhagic effusions, although obviously depending, in many cases, on pre-existing organic change, yet often, even in these instances, have been determined by this agent. The greater prevalence also of dropsies, particularly after the exanthemata, in cold than in warm climates; and the paucity of pulmonary, hæmorrhagic, and diabetic complaints in hot countries, ought not to be overlooked. The frequency of dysenteric, tetanic, and spasmodic affections in warm climates is no argument against their production by cold, inasmuch as they there arise chiefly from a relatively great depression of temperature. The

influence of cold in occasioning apoplexy and paralysis, particularly in aged persons, has been long admitted and satisfactorily proved by Wepfer, Zacutus, Cullen, Fothergill, Marcard, Penada, Walther, Thilenius, Weber, and others; and scrofula is almost entirely a disease of cold and moist countries.

17. *F. Circumstances often favouring or determining the injurious action of cold.*—*a. Weakness of constitution* favours the injurious action of cold upon the frame. Infants, convalescents from disease, and aged persons, are more injuriously affected by cold than those in whom the nervous, circulating, and respiratory functions are fully developed and unexhausted, and who are thereby enabled to generate vital heat to supply the loss of it going forward on all the exposed surfaces. *b. Exhaustion by excesses* is one of the most common predisposing states to the injurious operation of cold. The violent or fatal effects of a cold bath at a moment of exhaustion by muscular labour have been well known, at least since the time of Alexander the Great, who nearly perished from this imprudence. The exhaustion consequent upon venereal excesses renders the system remarkably sensible of depressions of temperature, as well as disposes it, in an uncommon degree, to the ill effects usually resulting therefrom. The same remark applies to the depression consequent upon the excitement of spirituous liquors. The habitual indulgence in warm apartments, and sleeping in close chambers, with too great a quantity of clothes on the bed, are very injurious, especially to females. *c.* The *internal determination of the fluids* accompanying certain diseases, as chronic bronchitis and diarrhœa, chronic inflammations of the viscera, cachectic affections, &c., and even that attendant upon a full meal, or the occasional or repeated indulgence in exciting beverages, or the operation of cathartic medicines, favour the injurious operation of cold upon the frame, particularly in delicate constitutions.

18. ii. Treatment of the ill Effects of Cold. —*A. Means of prevention and counteraction. a.* Vascular and mental excitement, and physical and moral courage, are among the most powerful aids to the *resistance of cold*. To these should be added, when within reach, warm woollen or fur clothing; exercise; warm diluents, as tea, coffee, chocolate; gently stimulating cordials and tonics, and warm nutritious diet. All vinous and spirituous excitants are injurious when used against intense or prolonged cold, as they occasion internal fluxion and exhaustion. If resorted to at all, they should only be taken in small proportions, and in large quantities of hot diluents. This opinion is founded on repeated observation, and agrees with that advanced by Dr. Clendinning, who has paid much attention to this subject. According to the experience and practice of northern nations, and of those in warm countries who use either no clothing, or but little, the anointing of the cutaneous surface with oleaginous substances tends greatly to retard the refrigeration of the body.

19. *b.* When cold has *produced incipient ill effects* in the frame, indicated by horripilation, trembling, rigors, &c., a warm bed; hot diluents; stimulating diaphoretics, especially large doses of the spiritus æther. nitricus (from ʒj. to ʒiij. for a dose), either alone, or with the nitrate of potash and camphor; the repeated exhibition of ammonia, camphor, and opium — the last in small quantities; the warm or vapour bath, followed by friction of the surface; warm spices and cordials, are among the most certain means of restoration. It should be kept in recollection, that the sooner we succeed in counteracting the directly sedative effects of cold, the less violent will be the consequent reaction, and the less injury will ultimately result to the economy. As soon as reaction begins to appear, the treatment should be modified; and the means used to determine to the skin should be of a less stimulating kind; as the preparations of antimony and ipecacuanha; nitre, with camphor, and either of these substances; Dover's or James's powders, &c. &c. Whenever cold has caused shiverings or rigors, with pains in the head, back, and limbs, free reaction not having yet supervened, we may be satisfied that this state of system is associated with interrupted secretion and excretion; and that a quick restoration of these functions should be attempted. Therefore, if there be no symptom to forbid it, an emetic, followed by warm diluents, and the warm bath, and these by a cathartic medicine, should be prescribed, in order to restore a salutary reaction, and the suppressed secreting and excreting functions. In cases presenting the *extreme effects* of either very intense or prolonged cold, the means of restoration should be very gentle at first, and very gradually increased, as the chief danger to be feared proceeds from excessive reaction — excessive as respects the depressed state of vital power upon which it supervenes — and the rapidity with which inordinate action exhausts the remaining irritability and vitality of the frame. The means found most successful in restoring a frost-bit limb, viz. a very gradual increase of temperature and cautious admission of stimuli, are required in such circumstances.

20. *B. The injurious effects from cold fluids taken into the stomach*, when the body is perspiring and exhausted, require instant aid. These effects somewhat resemble those proceeding from an injury sustained upon the epigastric region; and consist of quick, laborious, or gasping respiration, remarkable weakness and irregularity of the pulse, great collapse and pallor of the countenance and surface, rapid loss of the animal heat, vertigo, with dimness of vision, loss of hearing, &c., and general torpor, followed by coma and death — the one rapidly succeeding the other. In such cases, warm diluents, with ammonia, camphor, and opium; cordial diaphoretics, frictions of the limbs and surface generally with stimulating embrocations; hot fomentations, sinapisms, and cataplasms of Cayenne pepper to the epigastrium, and especially animal warmth applied to the surface, particularly the anterior surface of the trunk, are the chief means of recovery. The remedy much employed in foreign countries in cases of external injury on the epigastrium is obviously appropriate in such cases, viz. the application to this region of one of the lower animals the instant that it is killed and opened, and before it is skinned, or has lost any of its warmth.

21. iii. Of the remedial Operation of Cold. —It does not come within the scope of this work to enter fully into the therapeutical application of cold; but I will very succinctly notice the subject

at this place. *A.* As respects the *effect* we wish to procure from it, cold is employed, 1st, in a slight degree, or for a short period, in order to produce its indirectly tonic influence; 2d, in a greater amount relatively to the state of the system, to procure its directly sedative operation, without inducing in any considerable degree its consecutive or indirect effect; and, 3d, to obtain its astringent or constrictive influence on circulating canals and vessels. *B.* As to the *mode* of using it in order to produce either of these effects, much importance ought to be attached. It may be directed, 1st, to a part or the whole of the *external surface*—*a.* by sponging with, or the employment of a douche, or the affusion of a continuous stream of, cold water locally, or using a cooling lotion; *b.* by affusing over all the body some cold or tepid fluid, or by sponging the surface generally with it; *c.* by immersion in a cold or tepid bath: 2d, to the *internal surfaces*—*a.* by respiring a cool or even cold air; *b.* by the ingestion of cold liquids; and, *c.* by the injection of cold or tepid fluids into excreting canals or passages.

22. It is obvious, from what has been advanced, that the *mode* of using cold will determine its therapeutic *effects*, not absolutely however, but only relatively to the state of the system at the time, and the nature and stage of the complaint in which it is prescribed. Thus, cold air, the cold affusion, shower bath, douche, and plunge bath, will produce either an astringent, or a tonic, or a sedative operation, according to the length of time either of them is employed without remission; a brief or momentary use of either, whether directed to a part only, or to the whole, of the surface, being followed by its indirect or tonic action; and a prolonged use, by a more or less permanent sedative effect. In the treatment of diseases of debility, or states of depression, we require the former operation, and, suiting the *mode* of applying the remedy to the nature of the affection, resort to it momentarily, and repeat it frequently. In maladies attended with excitement, interrupted secretion, &c., we desire the latter effect, and prolong the application till we are satisfied as to the extent to which we have obtained it. In congestion and hæmorrhages we wish to obtain the astringent or constrictive operation of cold, and therefore resort to it in a sudden or impulsive manner, as in affusion, douche, or aspersion; and as this particular effect of cold appears to be connected, and to commence, with its sedative action, and to terminate with, or to be overcome by, the consecutive reaction, according as it may supervene, so are we guided in determining the degree and duration of the cold to be employed, in order to astringe congested or bleeding parts. In the appropriation of each of the *modes* of using this remedy, by which very opposite effects are thus to be obtained, the practitioner is guided by considerations arising out of its operation upon the various systems and organs of the body, by its effects directly exerted on the seat of its application, and by its sympathetic action upon parts remote from thence, and upon internal viscera. It is, therefore, obvious that much advantage in practice will accrue from our entertaining correct ideas as to its action upon internal organs, when applied to a part or the whole of the external surface. I have already stated, that cold—whether cold air or cold water—constricts the whole cutaneous surface, and determines the flow of blood into the large trunks from the smaller canals and vessels (§ 5.); and that when directed for a short time, moderate reaction is usually brought about by this internal determination of the circulating fluid, and consequent excitation of the centres of nervous and circulating functions. This mode of operation must never be overlooked when employing cold as a remedy. The only question connected with it is, whether this constriction of the vessels near the external surface is limited to it, or extends sympathetically to internal parts. It is obvious, that, when the circulating fluid is propelled from one part, it must be determined to some other; but, whether does it accumulate in the large vessels, or retire both to them and to other surfaces? Pathological facts clearly show that the latter is most commonly the case. GIANNINI has, however, argued that the fluids are not driven upon the centre, but that constriction also takes place in internal viscera. That such an effect arises from the sudden and momentary shock produced by cold on the surface, and contributes to bring about the consecutive increased action, may be admitted, especially if it be employed locally, or in the vicinity of a congested or relaxed part; but when its action is of any considerable duration, or is directed to an extensive surface, the internal viscera must necessarily experience a proportionate increase of the circulating fluid. Thus, the brief affusion of a stream of cold water on the head, in cases of congestion of the encephalon, will tend to constrict the congested vessels, and remove the morbid condition, whilst a more general or prolonged application of cold will actually produce the very state, which this local use of it, in a sudden and momentary manner, is so efficient in removing.

23. In many cases, as in the excitement of fevers and acute inflammations, when the skin is hot and dry, we employ either local or general cold, with the simple view of abstracting a portion of the increased heat, which, owing to inordinate vascular action, and to the interruption of the perspiring and cooling function, becomes a morbid stimulus, and thus perpetuates the cause that originates it. It is obvious that cold, when judiciously employed in such cases, will even favour transpiration, and will lower excitement to that state which is compatible with a return of the secreting functions; but so much pathological knowledge and experienced discrimination are required to the advantageous or even safe employment of it, that no surprise can exist as to the disuse into which the practice has fallen. When the stage of excitement of continued and exanthematous fevers has been either imperfectly developed, or is about subsiding into collapse; when internal viscera are weakened and congested, and the skin is about regaining its interrupted function, the employment of cold in any way is attended by great risk, more especially when applied to the surface generally.

24. The good effects of cold applied to the head, in those diseases accompanied with an excited circulation in it, have induced various authors to recommend a similar practice in acute inflammations of the thoracic and abdominal viscera. There can be no doubt that the strictly local application of cold, as near as possible to

the organ affected, can be attended with no danger, particularly when the inflammation is acute, and chiefly attacks serous surfaces; and it may be in some instances productive of benefit; but we are still in want of faithfully observed facts to illustrate the effects of this treatment in a satisfactory manner. In hæmorrhagic affections, a judicious use of cold is often of great service — as the cold affusion or aspersion, the shower-bath, and cold sponging, in epistaxis and hæmoptysis; iced fluids taken into the stomach in hæmatemesis; enemata, and injections per vaginam, of cold liquids, in hæmorrhage from the bowels, menorrhagia, and flooding after delivery. Dr. **Drake**, of New York, has recently recommended very cold air to be respired in inflammations of the respiratory organs; but, from the admitted influence of cold air in increasing the activity of the respiratory functions, and, consequently, the phlogistic disposition of the circulation, it appears to me a practice of doubtful efficacy.

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COLIC.

— Der. and Syn. from *κῶλον*, *Colon*. Κωλικὸν ἄλγημα, Gr. *Colica*, *Passio Colica*, *Dolor Colicus*, *Enteralgia*, *Colicodynia*, *Tormina*, Auct. Var. *Colique*, Fr. *Das Bauchgrimmen*, *die Kolik*, Germ. *Dolori Colici*, Ital. *Belly-Ach*, Eng.

Classif. 1. *Class*, Nervous Diseases; 3. *Order*, Spasmodic Affections (*Cullen*). 1. *Class*, Diseases of Digestion; 1. *Order*, Affecting the Alimentary Canal (*Good*). I. Class, I. Order (*Author*, in *Preface*).

1. Defin. *Severe griping pains in the bowels, with costiveness, and often with vomiting.*

2. Colic was formerly considered as seated chiefly, if not entirely, in the colon; but many writers of the last three centuries have applied the term to acute pains of the bowels, attended by costiveness, and unaccompanied by fever, arising either from a primary affection of them, or from disease of some other viscus in their immediate vicinity, with which they are connected, and often sympathetically affected, through the medium of the ganglial nerves.

3. The first mention made of the disease, by the denomination *Colicus Dolor*, is to be found in **Celsus** and **Pliny**; and, according to **Sennert** and **Tronchin**, the same name was used by **Themison** and **Philon**, physicians of the Augustine age, when, as **Sprengel** justly supposes, colic must, from the manners of that period, have been a common complaint. But, although the term colic appears not to have been in use, it cannot be supposed that such affections were before unknown. It is more probable that they were included under the general appellation of abdominal pains, in use from the time of Hippocrates. The greater number of modern writers have divided the disease into certain species or varieties, according to the presumed nature of its exciting causes and pathological states. **Sauvages** presents us, accordingly, with no less than 22 varieties. Dr. **Cullen** arranges the *idiopathic* states of the colic into, 1st, The *Spasmodic*, either with stercoraceous vomiting, or with inflammation superadded; 2d, The *Colic of Poitou*; 3d, Colic from continued constipation; 4th, From acrid matters in the bowels; 5th, From retention of the meconium; 6th, From stricture of the bowels; and, 7th, From the obstruction occasioned by calculous formations. Dr. **Good** adopts a nearly similar division to the foregoing, preserving the 1st, 2d, 3d, and 6th varieties; and substituting for the others, Colic from Surfeit, and Colic from the generation of Flatulence — *C. Cibaria* and *C. Flatulenta*. M. **Pariset** gives the following varieties: — the flatulent; the stercoraceous; the bilious; the inflammatory; the hæmorrhoidal; the menstrual; the spasmodic; the metastatic; from calculous and other hard bodies; the verminous; from organic changes in the bowels; and from lead. M. **Chomel** divides the disease into nearly the same varieties, and adds to them that arising from acerb or acid fruits, and fermented liquors, or *Colique Végétale*. The only additional arrangement of the forms of colic, which deserves being noticed, has been given by **Schmidtmann**, as follows: — *A*. Inflammatory colic; *B*. Sanguineous or plethoric colic; *C*. From substances passing through or lodged in the bowels; *D*. From the metastasis or repression of other diseases; *E*. Flatulent colic; and *F*. Nervous colic. Each of these comprises several varieties, according to the exciting and proximate causes.

4. Colic, according to the extended acceptation of the word, arises from so many causes, and presents so many morbid relations, that a satisfactory arrangement of its different states is by no means an easy matter. I shall, however, attempt to group into distinct species those forms of the disease which resemble each other most nearly, or which arise from intimately related causes, noticing the peculiarities or modifications presented by the principal varieties. Those forms of colic which chiefly, or more immediately, depend upon a morbid state of the

intestinal canal will come *first* under consideration; and *next*, those which are symptomatic of, or complicated with, other diseases. In treating of the former, those states which are the most simple, and apparently consist of functional disturbance of the bowels, will be first noticed, and subsequently those which proceed from more complicated or organic causes. As I agree with Burseri, Cullen, Good, Abercrombie, Monro, and others, that *ileus* is often either an aggravated state, or advanced stage, of colic, or a consequence of organic or other causes affecting the calibre or canal of some part of the small or large intestines, I shall treat of it at this place, and after the more simple or less dangerous forms of colic have been discussed.

5. I. Colic chiefly and primarily from functional Disorders of the Bowels.

i. *Simple Colic.* Syn. *Colica Convulsiva*, Bonet; *C. Spasmodica*, Hoffmann; *C. Flatulenta*, Good, &c.; *C. Nerveuse*, Chomel; *C. Nervosa, et C. Spasmodica*, Schmidtmann.

Classif. I. Class, I. Order (*Author*).

Defin. *Acute pain in the bowels, with occasional partial remissions, flatulent distension, or spasmodic contractions, or both, at the same time, relieved by pressure and the expulsion of flatus.*

6. There appear to be three morbid conditions of the intestinal canal, which more or less exist in the simplest as well as in the most severe and complicated forms of colic, and which evidently depend upon depressed vital power of the digestive canal: 1st, Morbidly increased sensibility and irritability of some part or the whole of the bowels; 2d, Irregular distension and spasmodic constriction of different parts of their canal; and, 3d, More or less copious generation of flatus in their tract, occasioning great distension and irregular reaction of the muscular tunics — the second morbid condition adduced. According as either of these states predominates above the others, the attack assumes a *nervous*, a *spasmodic*, or a *flatulent* character; and it has thus acquired these specific appellations from different authors.

7. *A.* The *nervous* form of the complaint occurs most commonly in females, and in persons of a nervous and irritable temperament, passing a sedentary or indolent life, and of a costive habit of body; sometimes without any evident cause, but often after inattention to the state of the bowels, exposure to cold, or some mental emotion or excitement. The attack is usually sudden, and the pain is felt in one or more places in the abdomen, but shifts its place frequently, and is exacerbated at irregular intervals. The face is pale and anxious; the abdomen is irregularly contracted, and pressure of it often affords slight relief. During the severity of the pains, a cold perspiration is forced out on the surface, and leipothymia, or sinking, is frequently complained of. The bowels are constipated, and borborygmi are constant. The duration of the attack is usually short — from one to several hours; and it generally terminates favourably; but repeated returns of the affection are very common, upon errors of diet, and from mental inquietude.

8. *B.* The more *flatulent* form of colic presents greater distension of the abdomen, the expulsion of flatus giving ease. The distension and pain are often traced along the course of the colon, and are most complained of in the situation of the sigmoid flexure and cæcum. The quantity of flatus generated is often very great, and it evidently proceeds chiefly from irritation of the mucous surface of the bowels, giving rise to the separation of a gaseous fluid from the blood by the vessels of this surface; the matters retained in the prima via being insufficient to furnish, by their decomposition, — granting that they undergo this change, — so great a quantity of flatus as is generally voided. Owing to the irritation produced by the flatus, the bowels are inordinately distended in one part, and irregularly constricted in another; the part which was contracted, losing its tone, and becoming, after a time, greatly distended, and the distended portion experiencing, at intervals, irregular spasmodic constrictions. Thus the retained flatus is propelled from one part to the other, occasioning griping, shifting pains, and rumbling noises, or borborygmi, of the abdomen. The bowels are always constipated; and when evacuations are procured, they chiefly consist of hard lumps, and are accompanied with the escape of much flatus; the secreting functions of the bowels being evidently impeded. This modification of the complaint, as well as the preceding, is frequent in hysterical females, and persons of indolent habits, living much on vegetable diet, whose intestinal and biliary secretions are scanty, acrid, or otherwise vitiated; and their digestive functions weakened by indulgences.

9. *C.* The more *spasmodic* form of colic is in many cases merely a somewhat aggravated state of the preceding; the extremely painful spasmodic constriction predominating above the flatulent distension, and extending more or less to the abdominal muscles, giving rise to severe and irregular contractions, often with retraction, of the abdominal parietes. Whilst the two preceding varieties are very seldom attended by sickness or vomiting, unless in the severest states, this variety is frequently accompanied with this symptom; and, in its worst forms, vomiting, upon taking substances into the stomach, is very general. Constipation is also very obstinate; injudicious attempts at relieving it often increasing the vomiting, and converting simple colic into either enteritis or simple ileus. This form of colic often attacks those of spare habits of body, of the hypochondriacal and bilious temperaments, who live chiefly on coarse vegetable food, and are addicted to fermented or spirituous liquors.

10. ii. *Colic from the injurious Nature or Quantity of the Ingesta.* — *C. Accidentalis*, Willis and Cullen; *C. Végétale*, Chomel; *C. Cibaria*, Good.

Defin. *Severe twisting, griping pains in the abdomen, with vomiting, and rigid contractions of the abdominal parietes, followed, in some cases, by griping alvine evacuations, and looseness.*

11. *A.* This species of colic presents various modifications, according to the nature of the offending cause; and it has been accordingly differently described and named. Its states vary greatly in severity, according to the nature of the ingesta occasioning it, whether those of a solid or fluid kind. It may be here remarked, that the colic of Poitou, or *colica Pictonum* (which name has been very generally confounded with *colica pictorum*, or painters' colic), and the form of the

disease endemic in some other countries, although in many respects the same as lead or painters' colic, are evidently partly occasioned by the crude wines, new spirits, and the acerb and acid nature of the liquors in common use, as well as by lead, which is sometimes dissolved in them. (See *Lead Colic*, § 26.) Citesius, Piso, Cardan, Sennert, Wepfer, and many recent authors, have imputed the endemic of *Poitou*, *Madrid*, and other places, entirely to the nature of the ingesta, into many of which mineral substances could in no way enter. The evidence furnished by their writings, and in the treatises of Grashuis and Tronchin, and my own experience, favour the opinion that acid and acerb liquors are often concerned in the production of colic, without the aid of lead; to which, however, the most severe cases, and those accompanied with paralysis, are attributable, as shown by Sir G. Baker. Dr. Bateman doubts the power of these ingesta, independently of their impregnation with lead, to produce the disease. His opinion is, nevertheless, opposed by the fact, that a large proportion of the cases of colic which occur in districts where acid and spirituous liquors are much used, is not attended by the paralytic and other symptoms characteristic of lead colic, and that many of them run on to dysentery. Whether or not the colic stated by Kæmpfer to prevail in Japan, owing to the use of fermented beverages prepared from rice, depended on the presence of lead, cannot be ascertained. I had means of knowing that the colic so prevalent among the natives of Africa is clearly owing to the excessive use, particularly when over-heated, fatigued, or covered by perspiration, of the acid beverages prepared from the juice of the palm and other trees, and in the making of which no sort of metal utensil, or of glazed pottery, is at all employed. Linnæus imputes the prevalence of the complaint among the Laplanders to the use of stagnant water, containing small worms, &c. In various parts of the north of Europe, where butter-milk whey, and vegetable infusions, are fermented into very acid liquors, and used for common drink, most severe attacks of colic follow their ingestion in a cold state, particularly when the body is perspiring. Dr. Chisholm attributed the prevalence of colic in Devonshire to the abuse of cider in summer and autumn, by the labourers, when busily engaged in the hay and corn harvest — the cold acerb cider inducing a spasmodic state of the bowels in persons overheated by laborious exertion.

12. *B.* Various articles of food will occasionally disagree from some peculiar idiosyncracy, the articles themselves not being injurious. Such is sometimes the case, when a person, who has been living sparingly, indulges in a too full meal, or partakes of a substance to which the stomach, the functions of which are perhaps weak, is unaccustomed. Pork, cooked very soon after being killed, particularly if used as an article of diet in warm climates, is very apt to produce attacks of colic, followed by griping evacuations from the bowels. A similar effect often is induced by blown or tainted meat, mildewed wheat or rye, and by cold, acerb, indigestible, or unwholesome fruits, as cucumber, melon, &c. The injudicious use of cold griping purgatives, as senna, &c., will often, if not properly combined with other medicines, occasion this state of colic in hypochondrial, bilious, or phlegmatic habits.

13. Most severe effects often follow the ingestion of poisonous fish, muscles, lobsters, mushrooms, &c., and of the minute fungi sometimes formed on smoked meat and sausages, or on cheese. But the colic which is produced in these cases is the least dangerous part of the mischief; the affection of the nervous and vascular systems being often of still greater importance. Instead, therefore, of considering the effects of these substances as varieties of colic, as Dr. Good has done, I have viewed the disorder of the stomach and bowels as a part only of the circle of morbid actions they occasion, and have therefore treated of them in the article Poisons.

14. The presence of *arsenic* in wines, or the fumes of this metal; preparations of *antimony*, *copper*, or *zinc*; and the accidental solution of these, or conversion of them into a salt by substances about to be received into the stomach; are often productive of disorder, of which colic is one of the most prominent features, generally attended by vomiting, and sometimes followed by looseness, or by tenesmus and dysenteric symptoms. Lead colic is very often occasioned by the ingestion of the metal in some state or other by the mouth, and should therefore be treated of at this place, but the peculiarities of this variety require for it a separate consideration. Many substances occasion, when taken in hurtful quantities, effects of which colic is among the most prominent; but which, as they present certain diversities, are described in a separate article. (See Poisons.)

15. *C. Infants*, especially from birth to the termination of teething, and occasionally older children, are very liable to this form of colic. The state of the mother's milk, arising from the want of health, or manner of living, the irritation connected with dentition, too early feeding, too much or inappropriate food, acidity of the *prima via* resulting therefrom, and want of attention to the bowels, are the most common causes of this complaint among infants. In children it is often produced by acerb or unripe fruit, and by cold. In very young subjects it is characterised by more or less flatulence, screaming, tossing of the arms, and forcible drawing up of the lower extremities upon the abdomen, with vomiting, costive bowels, and greenish, offensive, and acid evacuations; followed by looseness; or free evacuations attended by tormina.

16. iii. *Colic from a morbid State of the Secretions poured into the Bowels, and Retention of the Excretions.* — *Colica Atrabiliaris*, Meyserey; *C. Biliosa*, Hoffmann; *C. Stercorea*, Ettmuller, Sauvages, and Cullen; *C. Pituitosa*, Sennert, Fernel, &c.; *C. Stercorale, et C. Bilieuse*, Pariset; *C. Constipata*, Good; *C. Biliosa, et C. Stercoracea*, Schmidtmann; *Hepatic Ileus*, Musgrave; *Colica Madridensis, et C. Hispaniensis*, Auct. Var. *Dry Belly-Ache.*

Defin. *Severe griping pain, with porraceous or bilious vomitings, constipation, or scanty evacuations, and often with hiccup, tension of the abdomen, and restlessness, the motions procured presenting various morbid appearances.*

17. This species of colic has been differently described, and named as above, according to the views entertained respecting its nature. We

have seen that the *first* variety of the disease consists of various morbid states, chiefly characterised by deficient function and altered sensibility of the bowels, &c.; and that the *second* variety is principally occasioned by the nature and quantity of the ingesta. The variety which I next have to consider comprises certain forms of disorder arising mainly from the morbid condition of the secretions and fæcal matters contained in the bowels, but aided by other causes; and it may be divided into, *a*. The colic of infants, caused by retained meconium; *b*. Colic arising from accumulated fæcal matters in the bowels; and, *c*. From the irritation of morbid secretions poured into the intestines from the liver, &c.

18. *A*. The colic which is owing to the retention of the meconium (*C. Meconialis*, **Sauvages** and **Good**,) in new-born infants, is chiefly met with in those who have either not been sufficiently early put to the mother's breast; or who have been suckled by a nurse, or brought up by hand. The milk which is first secreted, possesses purgative qualities, intended by Nature to promote the expulsion of the secretions, which had accumulated in the prima via during the latter period of fœtal life; and when the infant enjoys not this requisite kind both of nourishment and medicine, the meconium is retained, becomes viscid, acid, and irritating to the bowels, occasioning costiveness, distension, screaming, drawing up of the lower extremities, sickness, &c.

19. *B*. It is evident that the retention in the cæcum and cells of the colon, of those excrementitious matters which require to be thrown off from the bowels, will be productive of more or less disorder. Such retention usually occurs very early, and in advanced life; in those who pass an indolent existence, or are engaged in sedentary occupations; in persons whose bowels are torpid from debility or exhausted sensibility; in females who are pregnant, or who are of an advanced age; and in men who have old herniæ. It is often preceded by indigestion, cardialgia, constipation of the bowels, and fulness about the cæcum, the sigmoid flexure, and occasionally the whole course of the colon. In many cases, large accumulations in the **Cæcum** or **Colon** (see these articles), may be detected by manual examination. Sickness and vomiting, however, seldom come on until abdominal griping pain has been for some time complained of, and the stomach has been irritated by acrid purgatives. Later in the complaint, the abdomen becomes tense, tumid, and painful on pressure; the pulse accelerated; and the tongue, which was from the commencement loaded at the root, more foul or furred. This form of the disease is very apt to terminate in dysentery, enteritis, or ileus.

20. *C*. The form of colic which occurs, and even prevails, in some of the West India islands, has often been confounded with lead colic, from the supposition that the new rum drunk in these islands contains lead in solution. Mr. **Quier**, Dr. **Chisholm**, and Dr. **Thomson**, who resided long in the West Indies, state that this disease is not so common as formerly in these islands, owing to the improvement in morals, and the use of warmer clothing; and that nothing is more erroneous than attributing it to the poison of lead. These physicians refer it to the intemperate use of spirits, and to alternations of heat and cold. Mr. **Quier** and Dr. **Musgrave**, who have given a very detailed account of this complaint, as they observed it in Jamaica and Antigua, where it is of frequent occurrence, state positively that lead is not concerned in its production. From the history they have given of this endemic colic of the West Indies; and from the descriptions of the colic, which is perhaps the most common disease in Madrid and several provinces of Spain, furnished by MM. **Pascal** and **Marquand**, who treated many hundred cases of it in the French army that occupied Spain during the peninsular war, and in 1824 — all which accounts are now before me; I conclude that the colic of Spain and that of the West Indies depend upon the same causes — evidently of an endemic kind; are characterised by similar symptoms; run the same course, evince similar lesions, and are cured by the same treatment. Indeed, I have seldom met descriptions of any disease so much alike as those furnished by Dr. **Musgrave** and by M. **Marquand**, who himself had the complaint, the causes and treatment of which he has so ably investigated. After examining the causes to which writers, particularly **Hoffmann** and **Thiery**, and others copying them, have imputed this affection, viz. to lead and metallic substances dissolved by acid wines, &c., M. **Marquand** states those to which the natives attribute it; namely, the use of vegetable acids and unripe indigestible fruits; large draughts of wine and water, and of much milk; and insufficient clothing on the trunk of the body and abdominal regions. But these causes, he remarks, are in operation in many places of Spain and Portugal where colic is rare, and therefore some endemic cause not yet discovered must be in operation. M. **Larrey** imputes it to atmospheric vicissitudes and acid beverages, and designates it "*Colique bilieuse rheumatismale*," MM. **Aulagnier**, **Libron**, and **Jacob**, who have had extensive experience of this disease in Spain, concur with M. **Marquand** in denying the influence of lead in producing it; and think that its causes are not yet fully ascertained. The negative information furnished by these writers, the character of the symptoms, and particularly the appearance of the evacuations, would lead me to infer that, in both the colic of Spain and the colic of the West Indies, endemic causes, — especially those which proceed from the soil, and produce intermittent and remittent fevers, — impede the functions of the liver and intestinal surface, and occasion an accumulation in the hepatic ducts, gall-bladder, and prima via, of acrid or otherwise morbid secretions, which, owing to their irritation, or to concurrent or determining causes, give rise to a series of painful and diseased actions, and imperfect or abortive attempts at their evacuation. The symptoms referrible to the liver — its congestion — the signs of irritation about the duodenum, the vitiated dark appearance of the stools, and the relief obtained from free alvine evacuations, are proofs of this position.

21. *Symptoms*. — The patient generally experiences premonitory symptoms before the accession of the attack. These consist of dull and pressing pains in the whole course of the colon, but particularly in its arch; loss of appetite; irritability of temper; and difficulty in evacuating the bowels, which, however, *are not costive*. The patient has often several evacuations in the course of the

day, but in small quantity, and with much flatus; and he experiences less distress in bed than when he is up. The tongue is moist, and loaded only at the root; and there is much thirst. These symptoms usually continue two or three days: about the third, the patient has no longer any desire to go to stool, and evacuates no more flatus; but the pain becomes more severe, and more fixed and constant at the epigastrium, with a twisting pain at the umbilicus: the countenance is pale, and expressive of pain and anxiety; the pulse is slow, small, regular, and constricted, but not febrile; the skin is dry, but not hot; and the urine is scanty, but not otherwise unnatural. The patient often sits with his arms crossed over, and pressed upon, the abdomen, and the trunk bent forwards. If he be in bed, the thighs are pressed up upon the belly. Along with these symptoms, and generally soon after the accession of constipation, porraceous or bilious vomitings come on, commonly in small quantities, mixed with glairy matters, or those last taken into the stomach, and accompanied with hiccup. There is no sleep, but a continued restlessness: the pain is now nearly constant, and most severe, particularly about the epigastrium and umbilicus, and is not ameliorated by any position. As the malady proceeds, the thirst increases; and the fluids taken generally aggravate the hiccup, and are soon thrown off. The eyes are sometimes slightly yellow, and the whole surface rather sallow. The patient is distressed by the continued severity of the pain, the hiccup, and the want of sleep; wandering and delirium comes on, sometimes with deafness, epileptic convulsions, and rarely with fæculent vomiting; these latter symptoms generally portending a fatal result.

22. This disease, left to itself, usually runs its course in eight or ten days, and rarely extends beyond the fifteenth. Pain or uneasiness in the right hyponchondrium is often felt some time before the attack, and occasionally not until the advanced progress of it. In some cases, the pain and vomiting cease, upon the free spontaneous excretion of flatus, with dark, hard motions: but occasionally they return after a short time, and black atrabilious matter is thrown off the stomach. The discharge from the bowels is generally very morbid, offensive, and of a dark, blackish, or deep green colour. In other cases, where the patient has been neglected or improperly treated, chronic debility, with marasmus, and, more rarely, paralysis, supervenes, and usually terminates fatally. The abdomen is seldom much retracted, excepting about the umbilicus; but, at the last or fatal stage of the disease, it is much distended. The bowels usually resist the action of the most powerful purgatives at its advanced period, and injections are thrown up or retained with difficulty.

23. *Prognosis.* — *a.* A *favourable* issue is indicated by free evacuations, followed by amelioration of the abdominal pain and vomiting, by the circumstance of the pulse remaining below 100 beats in the minute, and the non-supervention or subsidence of hiccup. *b.* An *unfavourable* result is preceded by more or less tenderness, tension, and tumefaction of the abdomen; by a pulse above 100; by obstinate constipation, and immediate return of the injections; by the severity and continuance of singultus; by dryness of the tongue, and increased restlessness and tossing.

24. *Dissection* has thrown little light on the nature of the disease. M. Marquand, whose experience was extensive, considers that whatever change of structure is observed, is merely a contingent circumstance, or accidental complication. M. Pascal states, as the result of the examinations he made of six fatal cases, that little or no lesion was observed in any part of the alimentary canal, excepting slight redness of the mucous surface of the duodenum: the gall-bladder was loaded with thick bile; but the other viscera were natural. He further states, that he found the sympathetic ganglia injected. A perusal, however, of his description of the appearances presented by them, impresses me with the belief that what he considered to be unusual vascularity, was not more than they always present in the healthy state.

25. iv. *Colic from the Poison of Lead.* — Syn. *Colica Saturnina, C. Pictorum, C. Pictonum,* Auct. Var. *C. Rhachialgia* (ῥαχιάλγια, *Spine-Ach*), Astruc, Good; *C. du Poitou, C. de Plomb, C. Metallique, Rachialgie Metallique,* Auct. Gall. *Bleicolik, Trocken Colick,* Germ. *Devonshire Colic, Painters' Colic, Lead Colic, &c.*

Defin. *Dull remitting pain, becoming constant and violent, extending to the back and upper and lower extremities; vomiting, obstinate constipation, often followed by paralysis.*

26. I have already noticed the fact of this disease being often confounded both with the form of colic produced by acid and acerb ingesta (§ 11.), and with that depending upon a morbid state of the secretions poured into the intestinal canal (§ 20.). Lead colic chiefly attacks house-painters and plumbers, workers in the different preparations of lead, glaziers of earthenware, miners, ornamental and water-painters, gilders, and rarely chemists and printers. It is very probable that the colic so prevalent in Devonshire, Poitou, and, according to Tronchin and Wanstroostwyck, in Haarlem and Amsterdam, arises in some instances from a portion of lead contained in acid beverages, and possibly from the water used for domestic purposes; but that the endemic colic of the West Indies and Spain is occasioned by lead, as many suppose, has been disproved, as we have seen, by the more accurate observations of modern enquirers, especially directed to this point. Lead colic arises not only from the introduction of the mineral into the system along with the ingesta, but also from its oxides being allowed to remain in contact with the surface of the body; as in the case of workers in lead, as shown by Lentin, Brambilla, Sir G. Baker, and Dr. Reynolds; and from the volatilised fumes of lead floating in the air, in recently painted apartments, as observed by Percival, Henckel, Gardanne, Badeley, and Good. It is extremely probable that lead produces a more injurious action upon some constitutions than upon others; and that its oxides and sub-salts are more injurious than its super-acetate. The most quickly, and sometimes the most powerfully, injurious operation of lead is when its oxide is mixed principally with turpentine, for the purposes of house-

painting. This spirit carries along with it, during its volatilisation, a portion of the oxide, and thus poisons the respired air, thereby affecting the respiratory nerves and even the blood itself. Soon after Sir G. **Baker**'s investigation of the effects of lead, and of the substances which either contained, or might by possibility contain it, was made public, every thing which came in contact with lead in any form was viewed with suspicion. Dr. **Percival** first demonstrated the folly of these apprehensions; and although the water which supplies a million and a half of persons in this metropolis passes through leaden pipes, and is long retained in leaden cisterns, which are often allowed to become foul, yet, I believe, that no case of lead colic occurs from this cause, excepting in those who are affected by lead in a different and manifest manner. Dr. **Bateman** never met with a case in London which could not be traced to this source; and I certainly never did, notwithstanding the readiness with which the effects of lead are produced in some persons. Although lead is thus the efficient cause of the complaint, it is not always the only cause. Thus, the acid beverages or spirits in which the food is taken may determine its effects; or an attack may be induced, in a person imbued with the lead poison, by improper ingesta, spirituous liquors, exposure to cold, and by sulphureous waters, or sulphureted medicines, and cold griping purgatives. Cases have been recorded by Dr. **Wall** and Sir G. **Baker**, where the external medical use of the preparations of lead occasioned the disease, but such are of rare occurrence.

27. *Symptoms.* — Lead colic usually commences with obscure pain of the abdomen, which becomes, at first, at intervals, so severe, that the patient screams, tosses himself about, and vainly seeks a posture that will lessen his sufferings. Some lie for a while on the abdomen, and others press upon or rub this part with the hand. The pain is generally greatest at the pit of the stomach, and as the disease proceeds, extends to the back, upwards to the arms, and downwards to the loins, thighs, and legs. A twisting pain is also generally felt about the navel, which is at first drawn inwards; and cutting pains shoot at times with great violence to both hypochondria and iliac fossæ, and through the abdominal muscles. The voluntary muscles often become so sore that they cannot bear the slightest pressure; and the pain frequently alternates between the stomach and bowels and the external muscles. Sickness and constipation are early symptoms, — the matter thrown off the stomach consisting of a slimy fluid, either with or without acrid deranged bile, which is continually being secreted, accumulates, irritates, and is evacuated. To these are generally added bitter eructations, hiccup, severe headach, pains of the wrists, hands, ancles, soles of the feet, &c.; and frequently of the shoulders and neck. These symptoms are aggravated during the night, depriving the patient of a moment's repose. The pulse is not, at first, affected — sometimes in no measure throughout the disease; in many cases it is below the usual standard, and in others quicker and weaker, more rarely fuller or stronger. The tongue is pale, moist, and soft, without erection of the papillæ. The skin is commonly soft and moist; it is rarely hot. The urine is various, but more frequently copious than otherwise. Costiveness continues as the disease advances; sometimes a griping disposition to stool occurs; and if any fæces are passed, they are scybalous, hard, resemble sheep's dung, and are mixed with a dirty watery fluid containing a dark slime, and occasionally a little blood. M. **Merat** analysed the matters evacuated, but could not detect any lead in them. The abdomen is insensible to pressure; in some instances rigid and knotted; but in the latter stage often distended and slightly painful, chiefly from the distension of the bowels, and affection of the muscles. In the cases which have occurred in my practice, distension of the abdomen was as frequent as retraction, owing evidently to inflation and fæcal engorgement of the colon, the course of which could be distinctly traced under the abdominal parietes. M. **Andral** has also met with a similar state of this cavity. In some cases I have remarked considerable retraction around the umbilicus, while all the rest of the abdomen in the course of the colon was greatly distended. Dr. **Munro** states that the sphincters of the bladder and rectum are sometimes so contracted that the urine and fæces cannot be voided. I have observed this chiefly as respects the sphincter ani — a clyster pipe being with difficulty introduced. If the complaint be not soon ameliorated, the pains of the back, loins, and limbs become more violent, and are attended by extreme weakness, tremulousness, and even partial or complete paralysis, particularly of the extensor muscles. In some cases, dyspnœa, palpitations, and a short dry cough, are complained of, seemingly owing to the pressure of the inflated colon upon the diaphragm; and occasionally epilepsy, coma, or even apoplexy, supervenes.

28. *Duration, Complications, and Prognosis.* — *A.* The *duration* of the attack varies from two or three to twenty-five days. M. **Ranque** found that, out of 147 cases, 129 recovered between the second and the thirteenth day of treatment, and the remainder before the twenty-sixth day. But relapses, or rather returns, of the complaint are most common. I have met with instances of a ninth and tenth attack; and more numerous seizures have occurred in the practice of others. In more unfavourable cases, the disease continues for weeks, or even months, with occasional intermissions; but such may be viewed as a succession of attacks, and occur chiefly in drunken workers in lead — addiction to spirits aggravating and reproducing the effects of lead on the system.

29. *B.* This disease is sometimes *complicated* with epilepsy; more frequently with palsy, in which it often terminates; and rarely with inflammation of some one of the abdominal viscera, and with mania or delirium.

30. *C.* The *prognosis* is *favourable* when the symptoms are mild, or are ameliorated by treatment; but it should be given with caution and reservation when the attack is very severe, is attended by hiccup, by obstinate and continued vomiting, by tremulousness, and by distension of the abdomen. It should be *unfavourable,* if complications (§ 29.) appear in its course; or if deafness, blindness, fæcal vomiting, and symptoms of ileus, supervene.

31. *Appearances observed on dissection.* — Lead colic is most commonly fatal from the complications that occur in its course. In its

simple state it seldom terminates in death. The examinations made by Senac, Astruc, and Bordieu, furnish nothing satisfactory. Stoll observed the gall-bladder loaded with dark bile: Sir G. Baker describes the bowels as being perfectly natural throughout, and the muscles pale and wasted. De Haen states, that he found contractions of the colon and cæcum in all the cases he opened. M. Merat examined seven cases, which he says presented the same appearances as those described by De Haen; whilst M. Andral details six cases, in all of which no such contractions were observed, nor any other morbid change of the alimentary canal. M. Louis, also, found no alteration in the bowels. Most of those who die of this disease are carried off in epileptic convulsions, or have had paralytic symptoms. The state of the cerebro-spinal axis is hence deserving of examination. M. Andral, however, states, that he detected no lesion of the brain, nor of the spinal chord, nor of the voluntary nerves. A case I had an opportunity of examining confirms the observations of Sir G. Baker and Andral.*

32. II. Colic arising most frequently from Change of Structure or relative Position of the Bowels. — Classif. IV. Class, I. Order (*Author*).

i. *Colic from Mechanical Obstruction of the Canal of the Bowel.* — Syn. *C. Calculosa et C. Scirrhosa*, Bonet, Chomel, Lamotte; *C. Constricta*, Good.

Defin. *Costive, flatulent state of the bowels, attended by passing colicky pains, relieved by liquid, difficult motions, and often accompanied by a sensation of constriction; tumour or difficulty in a particular part of the abdomen.*

33. Considerable mechanical difficulty is often experienced for some time before a severe attack of colic or ileus takes place. A patient, whom I have long attended for slight colic pains, and irregular state of the bowels, without full or satisfactory evacuations, states, that a sensation of soreness in the situation of the arch, and of difficult passage to the left flexure of the colon, with painful distension about the cæcum and right side, are often felt shortly before an evacuation. Dr. Monro remarks that stricture of the bowels in its early stage occasions costiveness, alternating with diarrhœa and colic pains. If the obstruction be low in the bowels, solid fæces are either not passed, or they are of small quantity and slender calibre. These strictures are most commonly met with in the colon; and their situation, in some cases, may be inferred from tho sensations of the patient, and the symptoms observed in examining the abdomen: they are fully described in the article on *Morbid Structures of the* Digestive Canal. (See also arts. Cæcum, and Intestines.) When colic is owing to the presence of concretions, stones of fruit, &c. in the bowels, distinct hardness, or even tumour, is sometimes felt; but, in many instances, no such change can be detected, although the patient generally refers to some part of the abdomen as presenting a fixed pain, or obstacle to the functions of the intestines. (See art. Concretions — *Intestinal*.) In all cases of colic pains arising from the above pathological states, great distension and tenderness of the abdomen often speedily come on, partly owing to inordinate dilatation of that portion of the canal above the obstruction. Sickness also at stomach, and vomitings, generally precede or follow these symptoms, with restlessness and distress; and the complaint soon assumes all the characters of ileus, unless the retained matters pass the obstacle, or the obstructing body itself be propelled downwards and evacuated, as is often the case in respect of biliary and other concretions. When colic proceeds from incipient mechanical obstacles in the intestinal canal, the symptoms are less violent; but they are of frequent recurrence, until the obstruction is removed, or they increase so as to produce inflammation of the bowels or ileus.

34. ii. *Colic, with complete Obstruction of the Bowels, and Stercoraceous Vomiting, Ileus, Volvulus* — Syn. Εἰλέος (from εἰλέω, I constringe), Hipp. Εἰλέον (from εἰλέω, volvo, I roll about — hence, volvulus), Aretæus. Χωροδαψος (from χορδὴ, a chord, and ἄπτω, I kill), Galen. *Morbus tenui Intestini*, Celsus. *Acutum Tormentum*, Cœl. Aurel. *Iliaca Passio, Iliacus Morbus, Chordapsus, Miserere, Dolor Ileus Spasmodicus*, Auct. Var. *Volvulus*, Baillou. *Ileus Verus*, Sydenham. *Ileus Spasmodicus*, Sauvages. *Colica Ileus*, Good. *Passion Iliaque*, Fr. *Darmgicht*, Germ. *Volvolo-passione Iliaca*, Ital. *Iliac Passion*, Eng.

Defin. *Violent griping pain, obstinate constipation, with retraction of the navel, and spasms of the abdominal muscles, tension, tenderness and distension of the abdomen ultimately supervening, and generally with stercoraceous vomitings.*

35. Galen, and after him, Van Swieten, viewed ileus as merely a form of inflammation of the bowels. Others, particularly Sauvages, Barthez, Cullen, Pinel, and Alibert, ascribed to it chiefly a nervous or spasmodic character. Many writers of the last century have divided it into idiopathic and symptomatic; whilst M. Raige Delorme, and others, have disputed its idiopathic nature, and particularly its nervous origin, and have considered it, as it, doubtless, most frequently is, a consequence of mechanical obstruction, inflammation, or some pre-existing disease. There can, however, be no doubt, although many of the cases observed may have been merely severe instances of colic, in which the proper symptoms of ileus had not come on, that it sometimes occurs as a simple

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* Mr. Byam and myself recently examined the body of a painter, who died at the age of 78. He had been a very strong man, and in constant employment all his life up to a few days before his death. He died of hæmatemesis, from disease of a branch of the coronary artery of the stomach. The substance of the heart was soft and flabby. The small and large intestines were sound; the liver was studded with collections of a pultaceous semifluid matter, of a greyish white colour, contained in very thin cysts, from the size of a hazel nut to a walnut, the portions of liver surrounding them being softened and of a dark red colour. The top of the anterior mediastinum, and space behind the top of the sternum, contained an immense mass, nearly the size of the closed hand, of enlarged glands, of a cheesy consistence and appearance; and a similar change of the absorbent glands existed behind the arch of the aorta, the superior cava, &c., extending in the form of a long cushion down the vertebræ into the abdomen. The small arch of the stomach, the pylorus, and commencement of the duodenum, were remarkably thickened, from the deposition of adventitious matter, the thickened mass nearly approaching the characters of scirrhus. The coats of the arteries of the stomach were diseased, and contained atheromatous matter.

and idiopathic disease, as Barthez, Maxwell, and Dr. Abercrombie have demonstrated; and that dissections of fatal cases sometimes present no morbid change sufficient to explain the symptoms or to account for the result. In the cases recorded by Barthez and Maxwell fæculent vomiting, and the discharge by the mouth of matter thrown into the colon, are described to have occurred, and yet recovery took place. In many instances, perhaps the majority, ileus supervenes on one or other of the forms of colic already described; or, in other words, certain pathological states commence with symptoms, which, in the *tout ensemble*, constitute some one of the forms of colic described, and terminate in fully developed ileus. Such terminations are most common in the second, third, and fourth varieties of colic. But in rare instances, ileus comes on suddenly, with the most violent abdominal pain and vomiting, the patient tossing about in the utmost agony, the other symptoms of the disease rapidly appearing, and most frequently terminating fatally.[*]

36. *History.* — Ileus is either preceded by constipation and colicky pains, or it is a more intense form of colic from the commencement, the symptoms differing only in degree. Early in the disease, constipation; twisting and violent pain about the umbilicus, sometimes not aggravated by, but even alleviated by pressure; constant retchings; absence of fever, and a pulse not exceeding, or even below, the natural standard, are the usual signs. If relief be not soon procured, the abdomen enlarges, and becomes tense, tender, and tympanitic; the countenance is anxious and collapsed; fæculent matters are ejected by the mouth; the pulse becomes frequent, small, and constricted, the thirst urgent; and violent tormina, with ineffectual attempts at evacuation of the bowels, hiccup, failure of the mental energies and vital powers, with cold, clammy, and partial sweats, cold extremities, cold, sunk features, leipothymia, and sinkings, supervene. In many cases, inflammatory symptoms appear early in the course of the malady, and pass rapidly into those indicating the commencement of grangrene. The state of the tongue is different in different cases, and stages of the complaint. It is occasionally not materially changed. Often the disease is referrible at its commencement to no particular region of the abdomen; but as frequently the patient refers his sufferings to a particular part, — sometimes to the ileo-cæcal region, occasionally to the situation of the sigmoid flexure of the colon; in some cases, in the course of the right or transverse colon; in others, above or about the umbilicus, or low in the iliac and pubic regions. In all such cases, we may suspect mechanical obstruction arising from some one or other of the following causes, which have been repeatedly discovered on dissection: —

37. *Changes observed in fatal cases.* — 1. Great distension, as if from paralysis of the muscular coat of a large portion of the small intestines, without inflammation or any other change. 2. Dilatation, with a chord-like contraction, in either the small intestines, or in the large; more frequently the latter. 3. Dilatation, with inflammation, lividity, and exudation of lymph on the serous surface. 4. This latter state, conjoined with gangrene, and either with or without exudation, occurring in the small or large intestines; more frequently in the former. 5. These changes combined with contractions, — occasionally only one, often more, the intervening parts being dilated, — in some part of the bowels. 6. Unnatural convolutions, twists, loops, or knots, in some part of the small intestines. 7. Various convolutions, or duplicatures, or twistings in the large bowel, with an appearance of elongation owing to relaxation or paralysis of the longitudinal bands of muscular fibres. 8. These latter, conjoined with recent or old cellular adhesions of the opposing serous surfaces of the duplicated portions. 9. One or more introsusceptions; the introsuscepted portion being either in a downward or upward direction, sometimes uninflamed, as in infants and children; frequently inflamed, adherent by lymph, or gangrenous, particularly in adults; and occurring in any part of the intestinal tube. 10. Old adhesions of one part of the small or large intestines to another, or to the parietes of the abdomen, or to the omentum, or some other viscus, without obstruction of the canal. 11. Similar adhesions occurring in reduced or old herniæ, or in herniæ for which an operation had been performed and the bowel returned. 12. Filamentous or cellular bands confining or encircling a portion of intestine, sometimes after reduction of hernia, occasionally in a large and irreducible hernia, and even where no hernia had existed (Garthshore, Moreau, Moscati, Walther, Abercrombie, myself, and others). 13. Adhesions of the appendix of the cæcum to some part, after passing over or around, and strangulating a portion of intestine. (See art. Cæcum.) 14. Strangulation of a portion of one side of the intestine in the femoral arch, without producing any tumour, and without obliterating, or even sensibly diminishing the canal of the bowel.[*] 15. Various states and forms of internal strangulation, often produced by old adhesions formed between opposing portions of the serous surface, more commonly low in, or about the middle of the abdomen, — by portions of omentum, — by rents in the omentum through which a portion of intestine had passed, and by various adhesions, obstructions, and changes in the position of parts of the bowels. 16. Strangulation in the mesentery, owing to partial adhesions (Swammerdam). 17. Various states of contraction in the small and

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[*] Professor ——, of Berlin, during his visit to London, was attacked the day after dining with a party of scientific men, when he sat with his back to a large fire. I was called to him, and found him in the utmost agony, with a pulse of natural frequency; his abdomen tense, tympanitic, and subsequently tender to the touch. What he vomited at first consisted of half digested substances; subsequently it was mixed with matters which had apparently come from the upper part of the small intestines. Calomel and opium were administered, and oleaginous enemata repeatedly thrown up. A flexible bougie was introduced its whole length, and large glysters were injected without difficulty; but the latter were returned soon after without any effect. The abdomen increased in size; mental distress and debility became extreme; the matters rejected by the mouth were more obviously fæculent; hiccup and leipothymia appeared, and he died in two days. An examination was not permitted. The characters of the attack suggested the idea of a paralysed state of the bowels, with inverted action of their upper portion, gradually extending downwards. The origin of the sufferings was not referred to any particular part of the abdomen, nor had any obstruction been previously complained of.

[*] This occurred in a female servant of the author, who was seized with ileus, without any antecedent disorder.

large intestines from organic changes in their coats, more particularly about the cæcum, sigmoid flexure of the colon and rectum, as scirrhus, fungus, soft cancer, &c. (De Haen, Rhan, Hodges, Thomann, Howship, Annesley, Abercrombie, Travers, &c.). 18. Internal polypous or malignant excrescences, or external diverticula (Portal, Cloquet, Copland Hutchison, &c.). 19. Obstructions of the canal of some part by biliary and intestinal concretions, stones of fruit, bones, indurated fæces, and balls of worms. 20. The pressure of encysted or other tumours, abscesses, &c. in the pancreas, kidneys, omentum, uterus, ovaria[*], or between these latter and the rectum. 21. And lastly, The circumstance of ileus being produced by herniæ, both of the more common kinds, and of those that are uncommon, as hernia of the ischiatic notch, diaphragmatic hernia, &c., should not be overlooked. Of these, and even of other internal changes productive of ileus, numerous instances are to be found in the works to which I have referred at the end of this article, at the places pointed out. (See also arts. Cæcum, Colon, Constipation, Digestive Canal, Intestines, &c.)

38. *Of Volvulus, or Ileus arising from intus-susception.*—*a.* The invagination of one or more portions of intestine is not infrequently met with in post mortem examinations; and on some occasions its existence may be known during the life of the patient. The number of intus-suscepted portions may vary from one to ten; the greater number being most frequently met with in children, amongst whom invagination is also most common. In this class of patients it is frequently unconnected with any marks of inflammation; and, from the healthy appearance of the part thus affected, and the facility with which the invaginated portion is replaced, it seems probable that intus-susception has taken place, either very shortly before, or at the period of death. In the majority of instances it is an accidental consequence of pre-existing disease, most frequently of the intestinal canal, arising from an irregular action of the muscular tunics, occasioned by irritation of the mucous surface. Thus worms have been found in or near the invaginated part: and in adults it is generally observed in connection with inflammatory action of some one of the intestinal surfaces; and as a consequence of dysentery and chronic diarrhœa, particularly the dysentery of warm climates; a considerable number of the dissections which Mr. Annesley made in this disease in the East Indies presenting one or more invaginations, commonly in the small intestines. I have also not infrequently found it in fatal cases of inflammation of the brain, or its membranes, in children. Although generally a fatal occurrence, intus-susception is not necessarily such. I believe that it sometimes occurs in infants, without being produced or followed by inflammation; gives rise to symptoms of ileus, or merely to slight colic; and, either with or without the aid of medicine, sometimes is restored to its natural position. In adults, however, even when it occurs without pre-existing inflammation, it almost always causes the most acute inflammatory action, often terminating in the accretion of parts, or in gangrene, chiefly owing to the strangulation of the invaginated part. Many cases, however, terminate fatally before sphacelation takes place; whilst in others, gangrene occurs during life, and the invaginated part passes off by stool; union of the opposing extremities of intestine formed by the separation of the dead invaginated part, and the ultimate recovery of the patient sometimes being the result.

39. One of the most common causes of invagination of the intestines is the inappropriate use of drastic purgatives. In all the cases of invagination observed after death from dysentery, that I have perused, purgatives had been unsparingly and unnecessarily exhibited. M. J. Cloquet has published a case, wherein a female died of enteritis consequent upon invagination of about fourteen inches of the ileum, occasioned by a polypous excrescence arising from the mucous surface, and which, having been pushed onwards by the peristaltic action of the intestine, had dragged the part to which it was attached along with it. Costiveness is often a prelude to this change, hardened fæces, &c., producing local irritation. Intus-susceptions are most frequently downwards, and but rarely upwards. Dr. Monro thinks that an inverted action of the bowels is requisite to the production of the latter. They are most common at the termination of the ileum in the caput cæcum. The quantity of intestine that passes within the other varies from one to thirty inches, or even more. In an infant, to the examination of which I accompanied Mr. Alcock, nearly the latter extent, including the ileum, cæcum, and ascending colon, was invaginated. In some rare instances, the ileum, cæcum, ascending and transverse colon, passes into the sigmoid flexure, or even as low as the rectum; or the cæcum and colon only (Whately, Monro, &c.). I have met with two or three such cases in infants and children. In rarer instances, a portion of the colon and ileum has passed out at the anus.

40. *Diagnosis.*—Is it possible to distinguish volvulus or ileus owing to intus-susception, from colic or ileus arising from other pathological states? I think that symptoms may present themselves, which will, in some instances, lead the observing practitioner to infer the existence of invagination. The sudden invasion of the symptoms of severe colic or ileus after a violent straining at stool; and, subsequently, the constant desire to go to stool, attempts at evacuation being accompanied with violent tormina and tenesmus, and either unattended by evacuation, or followed by the discharge of a little bloody mucus, and these by symptoms of enteritis; are amongst the most constant concomitants of invagination. In some instances, also, the sudden occurrence of an elongated tumour, in addition to these symptoms, and before abdominal distension comes on, will further guide the opinion; particularly if the invagination be extensive, and seated in the cæcum or course of the colon. Much will, however, depend upon the precision and tact with which an examination of the abdomen is made. In all such cases, the rectum should be examined by

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[*] A lady, to whom I was called, had inflammation of the uterus, and an abscess formed between the upper part of the vagina and rectum, pressing upon the latter so as to prevent the evacuation of the bowels and injection of glysters. Colic, followed by ileus, took place. During an attempt to throw up an enema, by passing a male catheter up the rectum, the abscess burst into the rectum, and a large quantity of pure pus, followed by copious fæculent motions, came away, when all the dangerous symptoms disappeared.

the finger; and the extent to which enemata may be thrown up observed as an additional means of information; for whenever the intus-susception is in the colon, as much fluid cannot be thrown up as in health. Hiccup and a small irregular pulse characterise the advanced disease, and indicate the existence of inflammatory action in the invaginated bowel. When a portion of intestine is discharged by stool (as is rarely the case, the patient even recovering and enjoying health afterwards), there can be doubt of the nature of the malady. Dr. Monro mentions an instance of double intus-susception, or intus-susception of the invaginated part, communicated to him by Mr. A. Burns. I once met with such an occurrence in a child a few months old.

41. III. Of the Sympathetic and Complicated Forms of Colic; or, Colic owing to morbid States of associated Viscera.—Colic, in one or other of the forms already described, but most commonly in its first or simple state (§ 5. *et seq.*), is not infrequently caused by some other disease. Many of the authors of the last two centuries, and several contemporary Continental writers, have treated of colic when thus originating or associated as essential forms of the complaint. Although obviously only a symptom, or, at most, a part, of an important and often extensive disease, it is not the less deserving of notice when thus associated. It cannot be a matter of surprise, when we consider the relations subsisting between the different abdominal viscera, by means of the ganglial system of nerves distributed to them and influencing their functions, that disease of one of these will often change the sensibility and functions of the alimentary canal, with which it is more or less intimately connected in respect both of organisation and function. As it is useful to be aware of the various morbid associations of colic, I shall notice such as are most commonly met with in practice, with reference to the authorities who have considered them as distinct forms of the disease.

42. *A.* Sennert, Kindler, Walter, Detharding, Bonz, Tissot, Sauvages, and Schmidtmann, have noticed an *inflammatory colic*; which, however, in no respect differs from inflammation of the bowels either in an acute, sub-acute, or chronic form. Colic often rapidly passes into enteritis, and occasionally into dysentery; and, chiefly from this circumstance, together with the more phlogistic nature of the attack, and the abdominal tenderness, Cullen and Good also have distinguished a variety of the disease by the term inflammatory. In many cases, also, of chronic, sub-acute, or septic peritonitis, the muscular tunics of the intestines are paralysed, and their canal distended by flatus; the colicky symptoms predominating over and masking the inflammatory action. Hence chronic peritonitis has been often confounded with colic, as I demonstrated in a memoir on that disease published many years ago: but, in such cases, the colic is merely a symptom.

43. *B.* Hoffmann and Schmidtmann have distinguished a species of colic by the term *plethorica* or *sanguinea*, comprising under it the varieties arising — *a.* from pregnancy; *b.* from difficult or suppressed menstruation (the *Colica Menstrualis* of various writers); *c.* from suppression of the lochia; *d.* from congestion or inflammation of the uterus (*C. Uterina*, Auct. var.); and *e.* from hæmorrhoids (*C. Hæmorrhoidalis* of Alberti, Hoffmann, Nezel, Ranoë, and Rave). That colic is often associated with these affections, or is occasioned by them, there can be no doubt; but it is unnecessary to dignify these varied states of disorder, by arranging them as distinct forms of this disease. It is sufficient to notice them, so as to inform the inexperienced practitioner as to their occasional occurrence, and the importance of attending to the connection in practice; more particularly as they require a modified treatment for their removal.

44. *C.* Colic also frequently is an attendant upon acute, sub-acute, and chronic diseases of the *liver, gall-bladder,* and *ducts;* and, more especially, upon the *passage of gall-stones through the common duct.* In such cases, the colic is not infrequently associated with *jaundice.* This connection of the complaint has been fully illustrated by Baillou, Vogel, Lieutaud, Prochaska, Soemmerring, Wandeler, Witting, Conradi, &c. and should not be overlooked. (See art. Concretions — *Biliary.*) In such cases, the fixed pain in the right epigastrium and hypochondrium, extending to the back, and right shoulder-blade or shoulder, in addition to the abdominal colicky pains, vomiting, and costiveness, with or without jaundice, will assist the diagnosis. Some authors have likewise noticed the connection between colic and *disease of the pancreas.* That the latter will sometimes occasion the former cannot be doubted: but the difficulty of ascertaining the connection during life is great; more particularly as functional disorder of the duodenum, so generally present in almost all cases of colic, is readily mistaken for disease of the pancreas. (See arts. Duodenum, and Pancreas.)

45. *D.* The occasional dependence of colicky affections upon *inflammation or other morbid states of the kidney,* and upon the *irritation of calculi* in this organ, *its pelvis,* or ureter, has been long known. Such complications have occurred to every practitioner, and have been particularly noticed by Horstius, Martius, Piso, Freytag, and Cruchet: they are most frequently met with in gouty and dyspeptic subjects, and persons advanced in life.

46. *E. a.* The frequent and obvious connection of colicky affections with *worms,* particularly in children and young persons, requires no further remark than that, although the former is merely a symptom of the latter, both obviously originate in debility of the digestive functions. *b.* The occurrence of colic in the *gouty* and *rheumatic diathesis,* during the more erratic and irregular forms of these affections, and after the disappearance or retrocession of them from an external part, has been so often observed, that many systematic writers have particularised a *Colica Arthritica* (Hoffmann, Musgrave, Stoll, Bang, Brandis, Reich, Schmidtmann, &c.), and a *C. Rheumatica* (Haller, Stoll, Eyerel, Lentin, Ranoë, Thorn, &c.). *c.* The frequent appearance, also, of this affection in hysterical females, or associated with *hysteria,* is well known, and chiefly deserving of notice as respects the treatment: the intimate connection of both disorders with morbid sensibility of the organic nerves, and increased mobility of muscular parts

influenced by them, and the not infrequent dependence of them both on congestion of the uterine organs, are too obvious to require illustration. *d*. Flatulent colic is often consequent upon, and complicated with, *asthma* and *bronchorrhœa;* owing to the impeded function of respiration in these diseases, and the discharge of gaseous fluids from the blood by the digestive mucous surface; and, when it occurs in such cases, it aggravates the original complaint. *e*. The only other complication of colic, which may be mentioned, is its occurrence with, or even after the disappearance of, *eruptive complaints,* and in connection with *scorbutic and chronic affections* of the skin. This association has been noticed by Haller, Sigaud la Fond, Schmidtmann, and others; and has been termed by some writers, *Colica Metastatica*. It is probable that, in such cases, a sub-acute or chronic inflammation of some part of the intestines takes place consecutively of the primary affection, the colic being merely a symptom of the inflammatory state. But we should recollect that, in all affections of the skin, the digestive mucous surface is more or less irritated or otherwise affected, and the allied functions disordered; and that an increase of such disorders may both change the state of the cutaneous eruption, and give rise to severe colic.

47. General Remarks on the Pathology of Colic and Ileus. — *A. The remote causes of colic.* Many of these have been particularised when describing the different forms of the disease; a few only require to be enumerated. The more common of these are cold applied to the abdomen, loins, or feet; exposing the back to the strong heat of a fire; acrid, cold, indigestible esculents; cold fluids taken when the body is overheated; solid bodies accidentally or otherwise taken, that admit not of solution or change by the juices in the prima via; irritating or poisonous substances, and the injudicious use of acrid or drastic purgatives, particularly hellebore, scammony, and colocynth: the violent passions and emotions of the mind, as terror, anger, &c. (See § 12. *et cet.*)

48. *B. Remarks as to diagnosis and prognosis.* — An important point connected with the nature of the disease, and one which Dr. Abercrombie appears to have fully made out, is the fact of its sometimes being fatal with no other morbid appearance than great and uniform distension of the bowels. *a*. There can be no doubt that this state will of itself — without any inflammatory action — give rise to tenderness and tension of the abdomen, and thus simulate inflammation, with which, however, it is very often accompanied; and into which sudden distension of the bowels is very apt to terminate. *b*. Although *ileus* is generally the result of obstruction of the canal of the bowels, it is not necessarily so: for in fatal cases of both Madrid and lead colic, as well as in several of ileus itself recorded by Dr. Abercrombie and other authors already referred to, no obstruction was found on dissection. The cases recorded by Barthez and Maxwell also show the propriety of not losing sight of this fact in the treatment of the disease. *c*. Sudden cessation of pain, and sinking of the vital energies, are not necessarily evidence of the accession of gangrene; for they have occurred in fatal cases of colic and ileus, where no inflammatory action and no gangrene were detected; and, in some few instances, recovery has followed; and, on the other hand, as Dr. Abercrombie has remarked, extensive gangrene has been observed in cases where the pain was violent to the last. These facts confirm an opinion which I had given many years since, that the symptoms often referred to internal gangrene do not prove its accession, but the exhaustion of vital power, and of the sensibility of the organic nervous system; and that a great proportion of the instances of sphacelation found upon dissection did not exist previous to dissolution, but accompanied or followed the fatal issue. *d*. The pulse is often a most fallacious guide in every form of colic and ileus· fatal cases sometimes occur, in which the pulse, till within a few hours of dissolution, does not rise above the natural frequency; and in some cases in which there is no inflammatory action, the pulse is frequent throughout. *e*. Although fæculent evacuations are amongst the most favourable indications in the disease, they are not to be implicitly relied upon; for, when the disease is in the small intestines, much fæculent matter may have accumulated in the cæcum and colon, which may be brought away by injections without the affected part being benefited. The subsidence of the more urgent symptoms after the discharge of fæculent motions is the only sure ground of a favourable prognosis. *f*. Though the organic changes I have enumerated (§ 37.), often produce colic or ileus, they do not necessarily do so; for gradual exhaustion of the organic functions, and of life itself, without colic, may be the result. They may also exist for a long time without sensibly interrupting the functions of the bowels, until some concurrent or determining cause occurs, and suddenly developes the disease in its worst forms. *g*. The existence of spasm in some part of the intestines, so much insisted upon by writers as the cause of various states of simple, Madrid, and lead colic, as well as of volvulus, is evidently of less frequent occurrence than is supposed. Although I would by no means disallow its existence, and cannot admit, with Dr. Abercrombie, that the cord-like constriction of a portion of intestines frequently observed is its natural state, as in the case of the urinary bladder, yet it must be admitted that several symptoms, which have usually been referred to spasm, are actually owing to flatulent dilatation. Spasmodic constriction, however, evidently exists; for, independently of the occasional detection, after death, of a more constricted state of a part of a bowel than can be considered natural, we cannot explain various phenomena connected with colic and volvulus without its aid. Besides, its existence is supported by analogical evidence; for it is a principle in the human economy, that all membranous, and, *à fortiori,* all muscular, canals contract spasmodically or inordinately upon irritation of their internal surfaces. *h*. In lead colic, the last or more dangerous symptoms, whether of the complete form of ileus or not, are certainly more unequivocally attended with inordinate distension, particularly of the colon, than with constriction, even although the *sphincter ani* may be at the time spasmodically contracted. *i*. From the foregoing facts, the reader may infer that the diagnosis between colic and inflammation cannot be stated with

precision, as there is no one symptom that can be relied upon, — for inflammation with its consequences may exist, and yet the abdomen may not be painful on pressure. But it is from the manner of their association, and, still more, upon numerous minute circumstances, — some not admitting of satisfactory description, others of only casual occurrence, — and upon the age, employment, constitution, and habits of the patient, as well as from the operation of remedies, that we are to form our inferences both as to the diagnosis, and as to the result.

49. Treatment of the different Species and Varieties of Colic. — I. Of the Colic depending chiefly on functional Disorder. As soon as a practitioner sees a patient in colic, his first object is to ascertain whether or not there be strangulated or incarcerated hernia, or either tension, tumefaction, or retraction, of the abdomen, or circumscribed tumour or hardness in any part of it, or in its immediate vicinity. By the knowledge thus acquired, as well as by the information he may derive as to the cause and history of the complaint, he will be much assisted in devising an appropriate mode of cure.

50. i. *Treatment of the simple forms of colic* (§ 5.). — We have seen that these states of colic chiefly depend upon debility, or deficient vital energy of the alimentary canal, giving rise to altered sensibility of the organic nerves supplying it, to imperfect or irregular action of its muscular coat, and to interrupted or morbid secretion from its mucous surface and associated viscera. These states of disorder are to be removed, 1st, by anodynes combined with stimulants and cordials, which will generally calm the more urgent symptoms; 2d, by purgatives and enemata directed so as to excite the secretions, and evacuate retained excretions; and, 3d, by gentle tonics and cordials, in order to remove debility and promote the digestive actions; all the causes likely to reproduce the disease being carefully avoided.

51. *A.* Such stimulants as are most antispasmodic, and carminative in their action, judiciously combined with anodynes, and assisted in their operation by frictions of the abdomen with suitable sedative liniments, or by fomentations, may be first employed. Formulæ 178. 187. 211. 377. 835. in the Appendix, or the following, will generally remove the painful symptoms: —

No. 133. ℞ Aq. Menth. Virid. ʒx.; Spirit. Pimentæ (vel Sp. Anisi) ʒj.; Tinct. Hyoscyami ʒss.; Confect. Opii gr. x. M. Fiat Haustus statim sumendus. *Or,*

No. 134. ℞ Aq. Pimentæ ʒx.; Tinct. Camphor. Comp. ʒss.; Spirit. Myrysticæ, Spir. Carui, āā ʒss.; Confect. Aromat. gr. x. Fiat Haustus statim capiendus, et pro re nata repetendus.

No. 135. ℞ Camphoræ rasæ ʒj; tere cum Ol. Amygdal. ℥ss., et adde Ol. Lini ℥j.; Tinct. Opii ʒij.; Ol. Rosmarini ʒss. M. Fiat Linimentum, cum quo illinatur abdomen assiduè urgente flatu aut dolore.

If the simple colic evince *nervous* or *hysterical* characters, the preparations of valerian, the spirit. ammon. fœtid., &c. may be given or added to the above. If these afford not immediate relief, it will be more judicious to have recourse to laxative, oleaginous, and antispasmodic enemata, than to persist in their exhibition. Any of the formulæ in the Appendix suitable to the circumstances of the case may be directed; or the warm balsams, assafœtida, the terebinthinates, the oil or extract of rue, and infusion of valerian, may be employed in this manner, along with the oleum olivæ, or oleum lini, or any demulcent decoction. When the complaint assumes the *flatulent form*, the warm spices, or their oils, triturated with magnesia or sugar, may be prescribed, or added to the above formulæ.

52. *B.* Having relieved the more urgent symptoms in this way, — an indication the more requisite in the *spasmodic state* (§ 9.) of simple colic, and often requiring a freer use of the narcotics and antispasmodics than is specified above, — it will be necessary to act upon the bowels by purgatives given by the mouth. In most cases, a full dose of calomel, or of blue pill, is least likely to offend the stomach, whilst it is the most beneficial in its operation upon the suspended secretions: it will be advantageously followed in a few hours by a dose of castor oil, with a few drops of tinct. opii. or tinct. hyoscyami; or by the decoctum aloës comp. with the subcarbonate of soda, the tinct. of hyoscyamus and compound tincture of cardamoms, either of which may be repeated, if necessary, and its operation promoted by the enemata already particularised.

53. *C.* Having evacuated the bowels, the next object is to restore the energy of the digestive organs, and to promote the abdominal secretions. This may be done by a course of mineral waters, as the Harrogate, the Tunbridge, the Bath, the chalybeate Cheltenham waters, or the artificial waters of Pyrmont, Carlsbad, Ems, &c., and by a judicious combination of gentle tonics with laxatives and the alkaline carbonates, according to the peculiarities of the case; the blue pill, or Plummer's pill, with soap, being also occasionally given at bed-time. Sydenham recommended the Peruvian balsam, to restore the digestive functions, and prevent a return of the disorder; and certainly there are few substances better suited for the purpose than it, when judiciously exhibited, or combined with other medicines.

54. If we find the foregoing means fail of affording very marked relief, we should suspect either some degree of latent inflammatory action or a disposition of the complaint to pass into this state; and unfortunately inflammation of the bowels may proceed to a dangerous extent, without either the state of the skin, or of the pulse — without any febrile symptom — indicating its existence. This topic should not be overlooked by the young practitioner. Morgagni, Riverius, Simson, De Haen, Burseri, Schmidtmann, and Abercrombie, have demonstrated — and my experience has frequently confirmed their observations — not only that enteritis will often assume, during the greater part of its progress, all the symptoms of simple colic, but that the complaint may run its course, until the sudden cessation of the painful symptoms, without any evident cause, furnishes the first evidence both of pre-existing inflammation and of incipient gangrene. On this and other accounts, therefore, we should endeavour, in all the states of this variety of colic, to ascertain the existence or non-existence of inflammatory action, or even vascular erithism in some part of the alimentary canal. If this disorder exist, the tongue will generally be red at its point or sides, and furred or loaded in the middle; the urine will be small in quantity, or high coloured; cardialgia will sometimes be complained of; and if tenderness on pressure be felt,

it will either be independent of any marked distension of the abdomen, or it will be attended with tension and fulness, anxiety, a dark or dusky appearance about the eyes and mouth, and with thirst. Under these circumstances especially, and in the more severe attacks, particularly in the spasmodic, occurring in persons previously in health, *blood-letting* should not be omitted; and even in doubtful cases, blood may be taken either from the arm, or from the abdomen by cupping or leeches, followed by fomentations and poultices,—if there be tumefaction, by the warm turpentine fomentation and injection. Heating carminatives and antispasmodics will be injurious in all such cases, whether vomiting be present or not; and too active endeavours to procure alvine evacuations by means of purgatives given by the mouth may increase the disorder. I have derived more advantage in these cases from small and repeated doses of the subcarbonate of soda, or the sub-borate of soda, with nitre, in camphor mixture or some aromatic water —from the use of enemata and gentle frictions of the surface of the abdomen with a rubefacient liniment (F. 311. 313.)—than from purgatives. In a few cases I have given the hydrocyanic acid, either in full doses of the oleum ricini, or in the oleum amygdal. dulcis. When judiciously prescribed, this powerful sedative has a most beneficial effect in restoring the digestive functions after the attack is removed. The hydrargyrum cum creta, or the blue pill, with taraxacum, hyoscyamus, or extract of hop, may also be given after the action of the bowels is restored.

55. ii. *Treatment of colic from injurious ingesta, &c.* (§ 10.)—*a.* The state of disorder proceeding from cold acid beverages will generally be soon removed by antacids, combined with narcotics, as ammonia, soda, magnesia, &c. given with opium, or hyoscyamus, and with cordials or carminatives (F. 179. 347, 348.); enemata and frictions of the abdomen, as already recommended (§ 51.) may be also employed, according to the circumstances of the case. *b.* When the affection is occasioned by cold, acerb, or indigestible fruit or food, it will generally be necessary to commence the treatment by an active warm emetic; and afterwards cordials, cardiacs, and enemata (§ 51, 52.), may be prescribed. *c.* If the complaint be produced by fish, Cayenne pepper is an almost unfailing antidote. *d.* If it be occasioned by smoked or tainted meat, or other esculents that have disagreed with the digestive organs, emetics, and afterwards cordials, warm aromatics, and stimulating clysters, with frictions of the abdomen, are among the most successful means. *e.* Colic sometimes is a consequence of indigestion, and of acidity or sordes in the digestive tube, often occasioned by too much or indigestible food; it then requires a combination of antacids with aperients or purgatives, as the compound decoction of aloes, or the compound infusions of gentian and senna, with soda and ammonia. After the urgent symptoms are removed, the digestive functions should be strengthened and promoted by gentle tonics and deobstruent laxatives (F. 214. 218. 362. 872.). Richter recommends for this purpose equal parts of assafœtida and the *fel tauri inspissatum*, especially in the form of the complaint proceeding from acidity.

56. The *colic of infants* has been stated to proceed chiefly from acidity of the *primæ viæ* occasioned by the quality or quantity of the ingesta (§ 15.). The sub-carbonates of the alkalies, magnesia, and the preparations of chalk or lime, with carminatives and cordials, are therefore required. (See F. 616. 633.) A combination of magnesia with the oxide of zinc is prescribed by Richter. Magnesia, soda, or ammomonia, in the aqua fœniculi dulcis or aq. anisi, and afterwards a dose of fresh castor oil; the semicupium, and, if it be requisite, an emollient or oleaginous enema, to which a little extractum rutæ, olei anisi, or tincture of assafœtida, has been added, will generally remove all disorder. If, however, these do not soon give relief, the enema should be repeated, and the abdomen rubbed with an antispasmodic liniment (§ 51, ℞ 135.). If the complaint occur about the period of dentition, the gums ought to be examined, and scarified, if any fulness or redness be remarked in them. If these means fail, those recommended in the section on *volvulus* (§ 77. *et seq.*) must be put in practice.

57. iii. *Treatment of colic from morbid secretion, &c.*—*A.* The *colic occurring in new-born infants*, from retention of the meconium, is generally soon removed by a dose of castor oil; and, if it fail, by an oleaginous clyster, or by one containing a tea-spoonful of honey and another of common salt, assisted by the semicupium, and the means stated above (§ 56.). *B.* Colic from *accumulation of fæcal matters* (§ 19.), or from constipation of the bowels, obviously requires purgatives and oleaginous or saponaceous injections. Stoll prescribed emetics in this form of the complaint, and was followed in the practice by Sims and Hosack; Riverius gave rhubarb and the turpentines; and Baglivi and Sydenham advised cathartics and anodynes in oleaginous emulsions. The preparations of sulphur, in doses sufficient to act on the bowels, have been praised by Agricola and Rave; and frictions and bandages of the abdomen have been recommended by many eminent writers. In this form of the disease, more advantage will be obtained from the repeated exhibition of medicines of a simply relaxing operation (see F. 82. 96. 430.), assisted by large oleaginous and saponaceous injections in the manner recommended by Dr. Maxwell (see § 77.), than by cathartics, which may irritate or inflame the upper parts of the digestive canal, before they can reach or affect the parts where obstruction exists. Spirits of turpentine, with olive or castor oil, when perfectly diffused and suspended in a suitable vehicle, are extremely efficacious in this state of disorder. An ounce of the spirits, with two or three of either of these oils, in about sixteen or twenty-four ounces of a mucilaginous decoction, should be slowly but steadily thrown up by means of the enema apparatus, the pipe of which may be provided with a guard, to prevent the regurgitation of the fluid. In order to facilitate the passage of this enema along the colon, the patient may be placed in bed, with the pelvis considerably elevated, and friction of the abdomen may be employed during and after the injection of it. If there be no nausea, the following may be taken, and repeated in six or eight hours, if it be requisite:—

No. 136. ℞ Potassæ Supertart. in pulv. ʒss.—ʒij.;

Magnes. Calcinat. ʒss.; Confect. Sennæ et Syrup. Zingiberis āā ʒij.; Olei Anisi ♏ iij. M. Fiat Electuarium.

If nausea be complained of, a full dose of calomel only may be exhibited; and, after a few hours, the above electuary given, and the injection repeated; or the treatment recommended in the article Constipation may be adopted. If tenderness and tension of the abdomen, with hard, constricted, oppressed, or quick pulse, be present, inflammation should be suspected, particularly if vomiting also exist. In this case blood-letting must be practised, and the disease treated in all respects as stated in the articles on *Inflammation of the* Intestines and Peritoneum.

58. *C. The West Indian and Madrid colics* (§ 20.).—*a.* Dr. Musgrave, whose experience of *West India colic* has been extensive, recommends ten or fifteen grains of calomel to be exhibited immediately, and afterwards five grains combined with a cathartic. He likewise advises a dose of a purgative mixture to be given in the intervals, if the stomach will retain it. The intentions this physician proposes are to evacuate the bowels, and to affect the system with mercury. As soon as the mouth becomes affected, the calomel should be omitted, and alvine discharges promoted. When the spasmodic action of the bowels is severe, and signs of vascular excitement appear, blood-letting ought to be practised; this evacuation tending both to relax the bowels, and to promote the absorption of the calomel. In addition to these means, the warm bath, and terebinthinate enemata, should be employed.

59. *b.* The *Madrid colic* (§ 20.). — M. Marquand states that an emetic given at the very commencement of the attack is sometimes of use, by evacuating retained bile; but that it may be prejudicial, particularly if exhibited in an advanced period of the complaint. He recommends, as the safest and most successful practice, 1st, to calm existing irritation by opiates; and, 2d, to restore alvine evacuations. He prescribes a grain of opium every three hours till relief is obtained, which is usually the case after the third or fourth dose. He afterwards exhibits purgatives, and promotes their operation by glysters, which generally bring away copious blackish and offensive stools. The Spanish physicians have commonly recourse to the oleum ricini as a purgative in this complaint, but M. Marquand prefers scammony and jalap, as being, in his judgment, more certain and quick in their operation. This treatment is the same as that long since recommended by Mr. Quier, in the dry belly-ache of the West Indies.

60. iv. *Treatment of lead colic* (§ 25.). — In this variety of the complaint, as well as in those forms which have received the denomination of Madrid, West Indian, or hepatic colic, the hepatic ducts and gall-bladder are obviously obstructed or loaded by morbid bile; the irritation caused by which most probably occasions spasm of the common duct, duodenum, and parts in the vicinity, in the early stages of the disease. Very different, and even opposite, modes of treatment have been recommended in lead colic. *a. Blood-letting* has been directed by Calmette, Astruc, Christison, and Gregory; whilst other writers, as Dubois and Dufresne, have considered it either unnecessary or injurious. I have prescribed it in some cases with manifest advantage, the state of vascular action evidently indicating the propriety of resorting to it; but, in others that I have seen, it obviously would have been injurious. When the face is flushed, the skin hot, and the pulse full or accelerated, it is both safe and requisite. *b.* The use of *opium* has the support of the ablest writers on the disease — of Grashuis, Riedlin, Stoll, Schlegel, Reynolds, Baker, Adair, Eyerel, Warren, Wolff, De Haen, and Gendron; but they are not agreed as to the period of exhibiting it. Sir G. Baker commenced with purgatives, whilst De Haen, Darwin, Warren, and Bateman began with opium, and gave purgatives afterwards. Dr. Pemberton advised a combination of both — of laudanum with castor oil. It appears to me preferable to combine the first dose or two of opium with calomel, as recommended by Burger, particularly if the functions of the liver be obviously affected, as they often are, and if the stomach be irritable, as it generally is in the advanced state of the disease. But the dose of calomel should be large (from 10 to 20 grains), and not repeated oftener than once or twice. This combination will frequently of itself open the bowels; but whether it does so or not, *purgatives* ought to be exhibited, and their operation promoted.

61. *c.* As to the propriety of having recourse to this class of medicines, there is no difference of opinion, however much sentiments may vary as to the choice which should be made of them. Grashius, Mosely, Fischer, Friese, and Odier prefer the *oleum ricini*. Burger advises it to be given with manna; Eyerel, after blood-letting, with emollients and opium; and Tissot in clysters. Several writers prefer the combination of antispasmodics and sedatives with purgatives, on the supposition that the obstruction of the bowels attendant on the disease arises from spasm in some part of them. But, as Dr. Cheyne and Dr. Abercrombie have justly contended, it is quite as much owing to distension, from a paralytic state of the muscular coat, that the obstruction occurs, as to spasmodic constriction. According to this view, little benefit can result, as respects the operation of cathartics, from combining them with antispasmodic anodynes, unless with such as may stimulate the intestinal canal; and, in fact, such seems to be the result of observation. Some writers, conceiving that lead colic may arise from the presence of the acetate or the oxide of lead in the prima via, have recommended the *sulphate of magnesia* with the view of forming an insoluble sulphate of lead. The experiments and views of Orfila, Good, and Dr. Paris, seem to favour the employment of this sulphate as well as the sulphate of alumina, exhibited with an excess of acid, or in the compound infusion of roses; and certainly unequivocal benefit results from the practice. But whether that benefit arises from reducing the lead to an insoluble salt, or from the operation of the sulphates in exciting the action of the partially paralysed muscular coat of the bowels, and thereby enabling them to expel retained matters of a morbid or noxious description, cannot readily be determined. We have no evidence of the existence of lead in the prima via to an extent that admits of detection, nor has the formation of a sulphate of lead been demonstrated. I am

therefore inclined to adopt the other mode of explaining the operation of these salts. I have found the *croton oil* an excellent purgative in this disease, particularly when it is added to either *castor oil* or the oil of *turpentine*, or to both. I have in one or two cases caused the croton oil to be rubbed over the abdomen in this species of colic, with the hopes that it might act upon the bowels; but I did not obtain this effect. The quick irritation of the skin, however, that it produced, evidently proved salutary. *Sulphur* and its preparations, as well as sulphureous waters, have been prescribed by LUZURIAGA in the Madrid colic, in which they are obviously beneficial; and subsequent writers, particularly GARNETT and HAHNEMANN, proceeding on the erroneous opinion that the Madrid colic is identical with lead colic, have recommended them also in the latter: but, as ORFILA has expressly stated, they are most dangerous remedies in true lead colic. A case demonstrative of this fact occurred in my practice many years ago, and was published in the *London Medical Repository* for October 1822. The deleterious effects are there ascribed to the absorption of sulphur, which was taken by the patient, contrary to my advice, in order to counteract the habitually costive state of his bowels.

62. *d.* The *sulphate of alumina* has been given by some modern physicians, with the view already stated (§ 61.); but with many its exhibition has been altogether empirical. GRASHUIS, QUARIN, ADAIR, FISCHER, SCHLEGEL, LINDT, PERCIVAL, MICHAELIS, GEBEL, and SOMMER favour the use of it, either alone or with mucilaginous and narcotic medicines. I believe that its efficacy is much enhanced by giving it with camphor, opium, and demulcents. SCHMIDTMANN details a case, in which the exhibition of two or three doses of alum produced a most copious operation on the bowels, after the most active purgatives had been given by the mouth and *per anum* without any effect. When residing on the Continent in 1818 and 1819, I saw many cases treated by this substance, given in doses of from a scruple to two drachms in gum-water, or with camphor and opium. M. KAPELER, in his hospital, into which many cases of the disease are admitted, employed scarcely any other medicine than alum dissolved in mucilaginous decoctions, assisting its action by oleaginous clysters. The worst cases, — those with paralysis, loss of sight and hearing, violent cephalalgia, tremors of the muscles and limbs, &c. were restored in a much shorter time by this than by any other treatment, and with much less disposition to relapse, or to pass into a paralytic state. I have employed alum with uniform success in several cases, and combined it with camphor, Cayenne peper, and occasionally with opium; and have always found that, when given in sufficient quantity, — from two to four or five drachms in the twenty-four hours, and assisted by oleaginous clysters, — it will open the bowels more certainly than any other medicine. M. GENDRIN has recently given alum in fifty-eight cases of this disease, all of which recovered in from three to five days. He has also found that a drachm, or a drachm and a half, of *sulphuric acid* in the twenty-four hours, taken in three or four pints of water, is equally prompt and efficacious. The *sulphate of zinc* was recommended by Dr. MOSELY, seemingly from considering its operation analogous to that of alum; and the sulphate of copper was mentioned by HARRISON.

63. *e. Mercury* has been very generally prescribed in this complaint, particularly by CLARK, HUNTER, WARREN, BISS, BURGER, CLUTTERBUCK, and others; but with very different views. Some have given it simply as a chologogue purgative; and others with the intention of preventing the accession of paralytic symptoms; although it is by no means obvious how it can have this latter effect, since these symptoms seldom originate in structural change in any part of the cerebro-spinal axis, when they occur during or after lead colic. Those who have prescribed the preparations of mercury with this latter view, as CLARK, WARREN, and BISS, have pushed it to the production of salivation; but, although I admit that salivation will speedily alleviate the abdominal symptoms, yet I am of opinion that it will rather favour than prevent the accession of paralysis, the more especially as I have observed this affection to follow, notwithstanding the salivation which had been produced with the hopes of preventing it.

64. *f.* Besides the foregoing means, various others have been recommended by writers on the disease. Dr. ROBERTS has detailed two cases in which the *nitrate of silver* was internally exhibited with apparent benefit. *Tobacco* in various forms has also been prescribed. BARTHOLINUS was the first to employ this plant in the treatment of colic, by directing its smoke to be thrown up the rectum – one of the safest and most beneficial modes of using tobacco internally. Dr. GRAVES has derived much benefit from compresses, moistened with a strong decoction of it, applied over the abdomen; and from croton oil internally, assisted by clysters. *Emetics* have been recommended by some writers; but they are required only after lead has been taken in poisonous doses, or at the commencement of the attack, when the biliary organs are loaded by vitiated bile. They, however, form a principal part of the treatment usually adopted in the Parisian hospitals. *Cold* and *warm baths* have both been mentioned by writers as being sometimes of service; but I consider the former attended by some risk, and the latter seldom required, although occasionally palliating the more painful symptoms. The propriety of having recourse to *external irritation* in this disease has been admitted by many of the writers already referred to, and *blisters* and various other means of a similar kind have been adopted. In several cases I have, however, found more advantage from one of the liniments above recommended; or, if an irritating effect was desired in a short time, I have obtained it from either increasing the more irritating ingredients contained in these liniments, or applying a cloth moistened with one of them closely to the abdomen. The *hot turpentine fomentation*, or a few drops of croton oil rubbed on the surface of the belly, will have a similar effect; but the former of these, accompanied with suitable internal medicine, is the most rapidly efficacious.

65. *g.* The great number of cases of this disease admitted into the hospitals "*La Charité*" at Paris, and "*Hotel Dieu*" at Orleans, naturally

attracts attention to the plans of cure which are there adopted; but at neither of them is the treatment so simple or so quickly beneficial as that adopted by M. **KAPELER**, and already stated. At La Charité the treatment consists chiefly of emetics, purgatives, sudorifics, and opiates; and at several of the French hospitals large local depletions are also employed. But the whole plan of cure is generally complex and distressing to the patient. M. **RANQUE**, of the "*Hôtel-Dieu*" at Orleans, states, that of about 150 cases he treated, he did not lose one. He commences with the semicupium; and afterwards applies on the abdomen and loins a large plaster, consisting chiefly of diachylon, conium plaster, camphor, and tartarised antimony. This is allowed to remain until pustules come out, and the pained parts are rubbed with a liniment, the active ingredient in which is the extract of belladonna dissolved in sulphuric ether. He next administers, once or twice daily, an enema with four ounces of olive or almond oil, and twenty drops of the ætherial tincture of belladonna in the linseed decoction; and prescribes, when the sufferings are severe, small doses of the same tincture to be taken at the same time in a demulcent mixture. This treatment is persisted in for three or four days; and if considerable relief has not been obtained at the end of this time, castor oil is given in small and repeated doses, the anodyne liniment is assiduously employed, and the plaster on the loins and abdomen is renewed, with an increased quantity of camphor and tartarised anatomy. Although this plan of cure appears to be very successful, yet relapses are very frequent after it.

66. *h.* The *treatment adopted by the Author* in lead colic is directed with the views, 1st, of relieving the sufferings of the patient; 2d, of evacuating the retained secretions, which are always remarkably morbid, and apparently the cause of the phenomena constituting the fully developed disease; and, 3d, of imparting energy to the weakened nerves, and parts that they supply. In fulfilling these intentions, the practitioner is often placed in a practical dilemma, from the circumstance of the medicine, which is most to be depended upon in relieving some of the most urgent symptoms, and enabling the liver to throw off the load of morbid secretions which oppress it, having the effect, in some constitutions especially, of increasing the exhaustion of nervous power, and the tremors and paralysis attendant on the worst forms of the complaint. *Calomel*, in a large dose, either alone or with *opium*, has an excellent effect in allaying the distressing irritability of stomach, and carrying the biliary and other morbid secretions downwards: but if it be repeated in such quantity oftener than once, or if free evacuations be not procured soon after its administration, it is apt to affect the mouth, and to prolong the period of convalescence. I have, therefore, endeavoured to procure from it a soothing effect on the stomach, along with its chologogue operation, guarding against its secondary action on the system; and have prescribed from ten to twenty grains in a bolus, with about ten grains of *camphor*, and sometimes with two of opium. This will generally allay the retchings, and enable the stomach to retain the medicine next to be given. About three or four hours after the above has been taken, a draught, consisting of half an ounce each of *castor oil* and *oil of turpentine*, with one or two drops of *croton oil*, on the surface of aqua pimentæ, is administered, and its operation on the bowels promoted by a clyster composed of about four ounces of *olive oil*, or two of castor oil, one of turpentine, half an ounce of *sulphate of magnesia*, and from ten to twenty ounces of the decoction of linseed, or of marshmallows. This enema should be steadily thrown up by the improved apparatus. Whilst this treatment is proceeding, a *liniment* may be assiduously rubbed on the abdomen, and on the limbs, if much pain be felt in them; or a piece of flannel charged with one of these liniments (F. 297. 307., &c.) may be closely applied over the belly. If these means procure evacuations, recovery will soon follow; but if the draught be thrown off the stomach, or the injection be returned without effect, they should nevertheless be repeated. If the abdomen be much distended, and painful on pressure, the hot turpentine fomentation ought to be applied, as long as the patient can endure it, instead of the liniment. These measures will seldom fail of procuring most copious evacuations, which should be promoted by sulphate of magnesia, and spiritus æther. sulph. comp. in the compound infusion of roses; and by oleaginous clysters with camphor or assafœtida, and oil of linseed. After two or three doses of sulphate of magnesia have been given, the following draught may be exhibited, and repeated frequently; the action of the bowels being promoted by the enema.

No. 137. ℞ Camphoræ rasæ gr. iij.—vj.; tere cum Mucilag. Acaciæ ℥ ss., et Aq. Pimentæ ℥ j.; Sulph. Alumin. pulver. ʒ ss.; Spirit. Anisi ʒ j.; Syrup. Croci ʒ ss. Misce. Fiat Haustus, quartâ vel quintâ quâque horâ sumendus, prius agitata phiala.

No. 138. ℞ Terebinth. Venet. vel Commun. ʒ vj.—℥ j.; Tinct. Assafœtidæ ʒ ss (vel Ol. Anisi ʒ j.); Olei Olivæ ℥ iij.; tere cum Vitel. Ovi, et adde Decocti Malvæ ℥ xvj., in quo prius soluta erat Sulphatis Magnesiæ ʒ ss.—℥ j., et fiat Enema.

67. *i.* The *treatment of convalescence* from lead colic is of much importance, particularly when attended with tremors, epilepsy, severe cephalalgia, or paralysis. At first the *alum* and *camphor* should be given for two or three days; and the action of the bowels promoted by oleaginous enemata; the loins and abdomen being rubbed, night and morning, with one of the liniments already recommended. As there is a great tendency of the disease to return, particularly when the patient follows the occupation which occasioned it, the strictest attention should always be paid to the state of the bowels, and the sulphates of magnesia and alumina, with compound infusion of roses, and some aromatic spirit, be taken frequently; and, upon the first indication of obstruction, recourse should be had to oleaginous clysters.

68. *k.* In order *to remove the sequelæ* of the disease, particularly the *paralysis*, the patient should be allowed a generous diet, with exercise in the open air; and *strychnine*, or the extract of *nux vomica*, with the aloes and myrrh pill, or F. 541. 565. may be taken twice or thrice daily. The palsy arising from the poison of lead is much benefited by this active medicine, as well as by frictions with stimulating substances, by electricity, and the use of splints along the fore-arm and hand. as recommended by Dr. **PEMBERTON**. The Bath waters are very serviceable in promoting perfect

recovery, and preventing a relapse: with these views, the balsams, particularly the Canadian and Peruvian, may also be taken, with the sulphates of alumina and quinine, or with tonic extracts, camphor, &c.; and, under every circumstance, the digestive organs should be strengthened and the action of the bowels promoted by tonics combined with aperients and antispasmodics. I have obtained marked advantage from strychnine thus combined, as well as from several of the gum resins, as ammoniacum, myrrh, assafœtida, and galbanum, particularly when, besides the reduced nervous and muscular power, the digestive funcions still continued to suffer. (For the *prophylactic treatment* of this disease, see the article Arts and Employments, § 17—30.)

69. II. Treatment of Colic caused chiefly by Change of Structure or Position. — i. *Of colic from constriction of the bowels.* This state of disease will not be benefited by purgatives or carminatives; but a judicious choice and combination of aperients will often be of service. In all cases of this description, due examination *per anum* should be instituted; and as stricture frequently occurs at the upper part of the rectum and lower part of the sigmoid flexure of the colon, a very long flexible bougie should be carefully introduced, as recommended by Dr. Willan. When we have reason to suspect the existence of stricture in any part of the colon, the use of mucilaginous, saponaceous, or oleaginous enemata* should be long persisted in; but the patient ought to be very careful not to employ any oil that is not perfectly sweet. At the same time, the action of the bowels may be promoted by an electuary composed of equal parts of the supertartrate of potash and sub-borate of soda, with confection of senna and common treacle, or either the inspissated juice of the sambucus, or simple syrup. I have seen advantage derived from a plaster, consisting of the emplastrum picis comp., the emplast. ammoniaci cum hydrargyro, and either the extract. belladonnæ or the extr. conii, kept long applied over the abdomen. When the stricture appears to be low in the colon, and yet beyond the reach of a bougie, *suppositories*, with either of these extracts and the lead plaster, will be productive of some relief; and when it can be reached by a bougie, the occasional introduction of one will often permanently remedy the disease.

70. Most of the cases of this complaint that I have seen, have occurred in persons who had long been in the habit of having recourse to purgatives, consisting chiefly of calomel and colocynth, or the compound extract of the latter — substances which have a remarkable effect in irritating the internal surface of the colon and rectum, and constricting their muscular tunics. It is obvious that a frequent repetition of these medicines, unless their effects be counteracted by emollient clysters, will at last give rise to inflammatory thickening of the parietes of the bowel, and constriction of its canal. In most of these cases, also, there exists inflammatory action of the internal surface of the constricted part, and of its vicinity. Hence the advantage usually derived from a cooling regimen, a spare or farinaceous diet, and cooling gentle laxatives, assisted by soothing and demulcent clysters, as the following: —

No. 139. ℞ Semin. Fœnicul. dulc., Semin. Anisi, ãã contus. ʒss; Fol. Malvæ et Flor. Anthem. ãã ʒvj; Aquæ Oj ss. Coque ad Oj; dein exprime, et adde liq. expresso Olei Olivæ, vel Ol. Lini, ℥iij; Potassæ Tartar. et Sub-boratis Sodæ ãã ʒj.—ʒij. Misce et fiat Enema, pro re nata injiciendum.

No. 140. ℞ Extr. Hyoscyami ℈ij.; Camphoræ rasæ gr. vj.—x.; Sodæ Sub-carbon. vel Sub-boratis ʒjss.—ʒijss.; Potassæ Nitratis ʒss.; tere cum Mucilag. Acaciæ ℥vj, et adde Decoct. Papaveris ℥x.—xx. Misce et fiat Enema.

No. 141. ℞ Extr. Belladonnæ gr. iij.—vj.; tere cum Decoct. Cydoniæ (vel Decoct. Althææ, vel Dec. Hordei Comp.) ℥xij.—xvj.; et adde Potassæ Sub-carbon. ʒj.; Potassæ Nitratis ℈j. Misce pro Enemate.

71. ii. *Treatment of Ileus.*—The importance of ascertaining, previously to the adoption of a plan of treatment in this state of the disease, the existence of hernia, has been already noticed; but the young practitioner should be aware that hernia may exist without the patient being aware of it; and the real state of the case may be mistaken, owing to the absence of any tumour, so very small a portion of the side of the bowel being strangulated as not even to obstruct its canal. I have twice or thrice — once in one of my servants — met with such cases, in consultation with eminent surgeons, where the exact state of parts was inferred, and a successful treatment pursued. There are certain forms of the disease which may be briefly characterised, as they require a very different treatment: — 1st, Great distension of the abdomen, with diffuse, but not acute tenderness; obstinate costiveness; retchings, particularly when substances are taken into the stomach; anxiety, and general uneasiness: 2d, The above symptoms, with fixed and severe pain, and great tenderness, felt in a defined part of the abdomen, often about the region of the cæcum: 3d, Violent attacks of tormina, occurring in paroxysms, like the strong impulse downwards from the action of a drastic purge, — the action proceeding to a certain point — there stopping, and becoming inverted, — followed by vomiting, which soon becomes feculent (Abercrombie): and, 4th, Where the symptoms of the third state are accompanied with tenesmus, and the discharge of a small quantity of bloody water or mucus, sometimes with indistinct or elongated tumour, and the other signs already described (§ 40.) as indicating invagination of the bowels.

72. In the *first* of these the bowels are evidently distended and inactive; — in the *second*, they are probably in a similar state, owing to obstruction, stricture, or strangulation, with inflammation, most frequently in the vicinity of the cæcum and its appendix; — in the *third*, there are more evident signs of stricture or strangulation; but this may also be an advanced stage of the second; — and in the *fourth*, the symptoms are more strictly referrible to invagination; although this may also exist in the third of these states.

73. *A.* It is evident that the *first* of these states will very frequently be much benefited by *purgatives*, particularly by a large dose of calomel (from 10 to 20 grains), which will, either alone or with camphor and hyoscyamus, allay the morbid action of the stomach, and move the bowels, particularly if it be assisted by the hot turpentine fomentation or epithem (§ 54.), and by enemata (§ 57. 66. 70.). In cases where a full dose of calomel only has been given, a dose of castor oil, with ten or fifteen drops of laudanum, may follow it in one or two hours; and an injection with three times the quantity of the same medicines may afterwards be thrown up. In some instances

equal quantities of castor oil and turpentine may be given soon after the calomel. After the irritability of the stomach has subsided, the action of the bowels may be promoted by small doses, frequently repeated, of the purified *extract of aloes*, with hyoscyamus, and a small quantity of extract of gentian, which will promote its action. Gallesky states that he has found recently expressed *linseed oil*, in the dose of a large spoonful, with a few drops of the oil of aniseed, given every hour or two hours, extremely beneficial. If the first dose of calomel neither opens the bowels nor allays the action of the stomach, it may be combined with from one and a half to three grains of pure opium. This will, in most instances, settle the stomach and open the bowels, particularly if it be soon followed by the fomentation and enema already advised.

74. *B.* The tendency of colic to lapse into a latent or obscure state of inflammation has already been noticed (§ 54.); and this tendency is the greater, the more nearly the disease approaches to ileus from its commencement. As colic in every form is more especially an affection of the muscular coats of the bowel, and as inflammation, when it supervenes, as it so frequently does, upon colic, seems to attack this part especially, and to terminate then more rapidly in gangrene than when it originates in either the mucous or peritoneal coats, so it becomes necessary to have a prompt recourse to *blood-letting*, particularly when rigors have occurred, and the pulse is oppressed or constricted, and the habit of body plethoric or muscular. In such cases, blood-letting should be full and decided, and, if necessary repeated; but it ought not to be trusted to alone, or even mainly; for if carried too far, or employed too largely, or even at all in some cases and states of constitution, or too late in the disease, it may hasten a fatal termination. It is beneficial chiefly in the *second* and *third* states of the malady, especially when resorted to early, and followed by local depletion, by calomel and opium, the warm turpentine fomentation on the abdomen, and subsequently by clysters (F. 144. 146, 147.). I believe, however, that in many cases, particularly those commencing as flatulent colic, blood-letting carried to the utmost extent will not of itself prevent either gangrene from taking place, or fæculent vomiting from coming on. For in these, and in the *first* state above specified, the muscular and other coats seem to lose their vitality, without almost any other mark of pre-existing inflammation, that I could observe in some cases on dissection, than change of colour. And yet, when duly employed, particularly early in the other states of the disease, blood-letting will often give decided and immediate relief, and be quickly followed by free evacuations and speedy recovery.

75. *C. Opiates and other anodynes* are most important remedies in nearly all the states of the disease, but especially in the *second* and *third* particularised. The propriety of premising general or local blood-letting, or both, when it is clearly indicated, and the advantages of combining opium or hyoscyanus, at first with a large dose of calomel, or camphor, or both, have been adverted to. These remedies will often of themselves produce free evacuations; but in the states of ileus now mentioned, *purgatives* given by the mouth, unless of the mildest kind, or combined as above (§ 52.), and exhibited subsequently to the above remedies, are seldom of service. Appropriate enemata, however, should not be omitted.

76. *D.* The *tobacco injection* is one of the most generally adopted remedies in this disease, and one which has received the warm sanction of Dr. Abercrombie. This able physician recommends it with judicious caution, and directs at first only fifteen grains of the tobacco to be infused for ten minutes in six ounces of boiling water; the quantity to be increased to twenty grains, and repeated after an hour, if no effect be produced. I believe that, when thus employed, early in the disease, and in persons previously of sound vital power, this will often be of service, or at least not detrimental. But I have seen several cases wherein this powerful substance, even when no more than half a drachm had been infused for fifteen minutes in a pint of water, produced the most distressing effects; and in one case, where it was given in opposition to my opinion, which was in favour of a terebinthinate injection, death followed its administration before three minutes had expired, — evidently from its sedative operation in an advanced state of disease. I have seen many cases in which it had been administered, and, unless under the circumstances in which I have stated it to be admissible, or when stimuli are given at the same time by the mouth, I believe that it favours a fatal termination, by exhausting the vital power of the alimentary canal, and disposing inflammatory action to terminate in gangrene. The introduction of *tobacco smoke* into the large bowels appears a much safer and more efficacious practice, and to be appropriate to a greater number of the many morbid states of which ileus is an effect.

77. *E.* Various *other kinds of injection* have been recommended; and some of them are more deserving of confidence in the treatment of ileus than almost any other remedy. I have already mentioned several (§66.70.), and referred to others in the Appendix (F.140, 141.150.), on which very considerable reliance may be placed. Dr. Maxwell has found large injections of *warm linseed oil* — from two to four pints — steadily and slowly thrown up, regurgitation being prevented by pressing the guard of the pipe against the anus, remarkably successful, after fæculent vomiting had come on, and the usual means had failed. He recommends, in such cases, the patient to be placed on the right side, with the pelvis elevated above the rest of the body, the premature return of the injection being prevented by firmly pressing a ball of linen against the anus. He directs this clyster to be repeated every three or four hours, until relief is obtained; and, when much exhaustion is present, with the addition of laudanum. This physician likewise advises, in cases where the existence of intus-susception is suspected, the *inflation of the intestines by air*, and adduces cases in which it was followed by copious evacuations; but it seems doubtful whether or not invagination existed in any of them. This practice, first recommended by Hippocrates, afterwards insisted on by Alexander of Tralles, Zacutus Lusitanus, and Riverius, and mentioned by Sagar, and some other systematic writers, is certainly deserving of trial where we have reason to suspect invagination or internal strangulation.

In most cases, however, inflation with *tobacco smoke* appears preferable; but, as QUARIN remarks, it should be frequently repeated, and its effects carefully watched. Although the infusion of tobacco has been chosen for injection by VICAT, FOWLER, CAMPET, CONRADI, HUFELAND, and ABERCROMBIE, yet I agree with SYDENHAM, DE HAEN, SAGAR, QUARIN, and many others, in considering the smoke superior to the infusion; the former being adopted by some merely on account of the greater facility of conveying it into the bowels, and without reference to the very different operation of these two modes of employing this powerful medicine. But in cases where inflation by air or tobacco smoke is adopted, purgative injections should speedily follow, as directed by HIPPOCRATES, if evacuations have not taken place; for the smoke may even pass out by the mouth, and yet copious motions may not otherwise be procured. Besides these means, *yeast* has been administered as an injection in warm small beer, with the intention of evolving its fixed air in the bowels, and thereby extricating any unnatural convolution or slight invagination that may have been formed. *Sulphuric æther* has likewise been thrown into the large bowels, with the expectation that its fumes would operate in a similar manner. *Antimonial wine*, and the *powder* or *infusion* of *ipecacuanha* have been prescribed in enemata, with the view of relaxing spasm, in cases where it is presumed to be the chief cause of obstruction; whilst the infusion of poppies and of chamomile flowers, various anodyne, saponaceous, laxative, and oleaginous injections (§ 57. 66.), have also been directed with the views already stated.

78. *F. Baths, &c.* — *Tepid* or *warm baths* are sometimes useful adjuvants in the early stages of the disease, and are generally recommended. *Cold fluids* taken into the stomach, and thrown into the large bowels, in considerable quantities, und *cold epithems* constantly applied on the abdomen, have been prescribed by BUREAU*, MARET, RANOE, STEIDELE, DARWIN, CONRADI, BALDINGER, SMITH, and ABERCROMBIE. The dashing of cold water over the lower extremities and abdomen of the patient, whilst he is kept in a standing posture, has likewise been directed by several physicians; but this practice, although occasionally of service, seems less successful than the judicious application of cold to the surface of the abdomen itself. When this cavity is distended, tense, painful on pressure, particularly in a circumscribed portion, with increased temperature of its surface, the cold douche, or the application of cloths moistened with vinegar and water, will often prove of advantage. Dr. BRANDIS, of Copenhagen, states that he has employed iced drinks, and cloths wetted with iced water to the abdomen, in ten cases with success; and that in some instances the practice requires to be persevered in for a long time, and assisted by antispasmodic and laxative enemata, and by opiates with stimulants and tonics taken internally.

79. *G.* When signs of depression of the vital energy manifest themselves in the advanced stage of the disease, *stimulants* are required, and, if judiciously selected and combined, their exhibition will sometimes be rapidly followed by amendment. Wherever the lowering measures already noticed are followed by increase of the symptoms, particularly vomiting and restlessness, or by sinking of the nervous power or of animal heat on the surface of the trunk, antispasmodic stimulants and tonics should be conjoined, according to circumstances, with certain of the measures described above. Purgative tinctures are sometimes of service in this state, particularly the tinctures of aloes, with liquor potassæ, and tinct. hyoscyami; and the tincture of senna, with spirit. ammon. succinati and spirit. anisi, in large or often repeated doses. Notwithstanding constant or even fæculent vomiting in this stage, advantage will sometimes be derived from a full dose of *unrectified oil of turpentine* (from ʒ iv.—x.), taken on the surface of aqua pimentæ, to which either spirit. anisi, tinct. cardamom. co., or tinct. capsici, has been added. I have seen the vomiting cease, and the distension of the abdomen rapidly subside, immediately after this draught, which should be repeated if the former has been thrown off. A full dose of common oil of turpentine, taken by the mouth, has a singular effect in constricting, and, as it were, drawing the small intestines close to the root of the mesentery; so that, in cases where I have given it, and in which hernia had chanced to exist, the hernial sac has become quite empty soon after its exhibition. May not the advantage obtained by it occasionally arise from the disentanglement of a constricted or imprisoned portion of intestine by this mode of operation, as well as from its influence in restoring the action of the paralysed and dilated coats of the bowel in other cases? In many states of inflammatory action, particularly those attended with exhausted tone of the capillaries and depressed vital power, it is one of the most active means we possess of preventing gangrene or effusion, and of restoring the natural action of the vessels.

80. *H.* In some cases, after depletions have been carried far, or in nervous and irritable habits, the inverted action of the stomach and upper part of the alimentary canal appears to continue in consequence of the vital exhaustion and irritability of parts; but, if these states were put a stop to for a while, and the powers of life supported, the natural action of the bowels — respecting the immediate restoration of which the patient is often injuriously harassed — would generally at last return. Under such circumstances, pills consisting of the *oxide of bismuth*, *camphor*, and *opium*, frequently repeated; or of the first of these, and extract of *hop*, or of *henbane*, or the *hydrocyanic acid*, in the recent oleum amygdal. dulcis, or oleum olivæ, in moderate but rather frequent doses, and occasionally with an aromatic spirit or distilled water; will often prove of service, particularly when aided by the external means about to be recommended. When thus exhibited, the prussic acid has a restorative effect; and it is still further beneficial when associated with suitable stimulants, as camphor, æther, &c. In a few instances I have inferred, from the situation of the pain, and other symptoms, that the disorder originated in the duodenum or jejunum; and in these especially, the oxide of

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* Mr. BUREAU recommends the use, and gives a plate descriptive, of a simple hydraulic apparatus for injections, the same in all respects as one lately introduced into this country from France, under the name of clysmaduct, but which is suited only to the injection of water.

bismuth and the prussic acid have been of considerable benefit. The *ammoniated tincture of guaiacum*, with *paregoric elixir*, in full doses, and given in milk, or in the recent oil of almonds or of olives, or in linseed oil, has also occasionally proved of advantage. The *acetate of morphine* is sometimes of service in allaying the distress, anxiety, and irritability of the stomach and diaphragm; but it should be prescribed in an aromatic spirit, and in a dose which will secure its anodyne effect without sinking the vital energies. I have used the following with marked advantage, repeating the dose every two hours until an effect was produced: —

No. 142. ℞ Acetatis Morphinæ gr. iv.; Spirit. Myristicæ et Spirit. Pimentæ āā ʒj.; Spirit. Camphoræ et Tinct. Benzoini Comp. āā ℥ ss. Solve. Capiat ʒj. ad ʒij. in Saccharum, vel Syrupum, vel Olea supra memorata.

81. *I.* The *ingestion of crude mercury*, or of *globules of lead*, to the extent of one or two pounds, has been recommended in ileus by several authors, particularly in that state of the malady which presents the symptoms indicating invagination of a portion of intestine. Sydenham, Schenck, Belloste, Paré, Panzani, Hoffmann, Sagar, Quarin, Nevinson, Darwin, Abercrombie, and many others, have noticed this practice; some of them, as Sydenham and Quarin, in doubtful terms — others more favourably. M. Rolland has detailed the history of a case, wherein, other means having failed, he gave about 10 ounces of crude mercury, which, after a short time, occasioned a sensation of change in the position of some part within the abdomen, instantly followed by relief. Similar instances have been recorded by Dr. Uwins and Dr. Belluci. I have never tried this metal; but, many years ago, I saw a patient—a female between twenty and thirty, — relieved from all the characteristic symptoms of this state of the disease by the ingestion of about two pounds of common shot, which also has been recommended in volvulus, by many of the best medical writers of the three last centuries, and by some of them in preference to quicksilver. Large blood-lettings, the tepid bath, and various other means (§ 54. 77.), should generally precede the ingestion of lead or quicksilver.

82. *K.* Various *external means* besides those already noticed, have been recommended in ileus. Sagar[*] states, that he was cured of volvulus, by having the abdomen, at the commencement of the attack, kneaded like dough, with oiled hands, — a plan instituted evidently with the view of disentangling a displaced portion of bowel. Aretæus, and Paul of Ægina, directed *cupping* on the abdomen. Celsus advised *dry cupping* on both the loins and abdomen; but little advantage can be expected from this latter measure, unless it be performed by one capacious vessel, as is, I believe, occasionally done in some northern continental countries. Quarin states, that in an extreme case, all other means having failed, and the pulse being small and irregular, the extremities cold, the countenance sunk, with hiccup, &c., he had recourse to dry cupping, using for the purpose porcelain bowls. Relief soon followed, and the bowels were copiously evacuated, their action having been assisted by enemata of infusion of chamomile flowers and tartarised soda.

83. *L.* Dr. Abercrombie expresses himself in favour of *large blisters* on the abdomen; but much more certain and immediate relief — often within ten minutes after its application — is derived from the hot *spirit of turpentine fomentation*, placed over the whole abdomen. Where there is little or no tenderness of this cavity, I have, however, preferred inunction of its surface with one of the liniments above directed (§ 51.); keeping subsequently a cold turpentine epithem applied. Forbes, Wilmer, and Baldinger also advocate the use of blisters on the abdomen; but Meier prefers placing them on the insides of the thighs. The recommendation of Sydenham, to keep a young dog constantly applied to the abdomen, will appear to many a singular remedy; but the views with which he prescribed it are by no means devoid of reason.

84. *M.* Numerous writers antecedent to the time of Quarin, and subsequently, have recommended *an incision* to be made *through the parietes of the abdomen*, and the internally strangulated, or the invaginated, portion of bowel extricated through it. Nuck has recorded a case where this operation was performed with success. Van Swieten objects to it, the uncertainty of the existence of volvulus or internal strangulation. But, in several cases of invagination which I have seen, and in a great many I have perused — almost all those, the history of which has been fully detailed — the symptoms described (§ 40.) as characterising this state were present, particularly the tormina, followed by desire of evacuation, and tenesmus, with the discharge of a little bloody mucus or water; the oblong tumour, in a part of the abdomen, admitting of being recognised at some period of the disease; have been superadded to the other symptoms of ileus, and pointed out its precise nature. In two cases I felt inclined to have had the operation performed; and, indeed, suggested it. The diagnosis was found correct on examination after death. A case is given by Dr. Fuschius, in Hufeland's *Journal* for February, 1825, almost identical with one of these, and characterised by the above diagnostic symptoms, in which he resorted to this operation over the place to which the patient referred the sensation of obstruction, and where an obscure oblong tumour, in the situation of the ascending colon, was detected. An invagination of the colon was removed, and the patient perfectly recovered. The reader need not be informed that ileus very commonly proceeds from strangulated hernia, and sometimes persists from adhesions, &c. after the displaced bowel has been returned. The propriety of having an early recourse to the operation after we fail in returning the protruded intestine is here very obvious.

85. *N. During, and subsequent to, convalescence* from ileus, the patient should wear flannel next tho skin, and promote the functions of the stomach and bowels by vegetable bitters combined with gentle aperients, and the sub-carbonates of the alkalies. The bulky and flatulent vegetables ought to be avoided, and the extremities and surface of the abdomen and loins kept equably warm. The utmost attention should be paid to diet; all

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[*] "Olim *Crisii* incidi in hunc morbum (volvulum) ego; Hungarus Sartor accitus me restituit intra tres horas methodo sequenti: impositum me supinum prato, inunctisve oleo olivarum manibus suis depsebat prout pistores pastam panis subtiliter incipiens successive semper fortius totum abdomen meum." (p. 320.)

indigestible substances, and acid or acerb beverages, carefully avoided.

86. III. TREATMENT OF SYMPTOMATIC OR COMPLICATED COLIC. — *A*. The means of cure in most cases of this description should be directed to the diseased viscus, by which the functions of the alimentary canal are affected. *a*. Those colicky symptoms which are produced by irritation, or the passage of *gall-stones* through the common bile-duct, and by the obstruction occasioned by *concretions* in the intestines, will generally be relieved by nearly the same treatment as that recommended in this article; but whatever difference should exist, is detailed in the article on CONCRETIONS. *b*. The colic which is symptomatic of *worms* in the intestines requires, if the attack be severe, the internal and external means already recommended to allay the urgent symptoms; but after this is accomplished, the remedies resorted to for the cure of verminous disorders should be employed. (See art. WORMS.)

87. *B*. The occurrence of colic from *affections of the kidneys*, particularly from calculi in their pelvis or ureters, should not be overlooked by the practitioner; nor should he forget that it is sometimes consequent upon *aneurism of the abdominal aorta*, and of *tumours* formed *in the mesentery*, or in the omentum. *a*. In the first of these pathological states, much relief will be afforded by the alkaline sub-carbonates, with opiates or sedatives, and followed by oleaginous purgatives and enemata, in addition to whatever depletory or other measures the circumstances of the case will point out. The use of liniments with camphor, soap, and opium, rubbed on the abdomen and loins, will also give much relief. *b*. In colic depending upon the latter organic changes, little beyond palliating the urgent symptoms by the remedies now mentioned, can be expected.

88. *C*. *Flatulent* colic, generally of a prolonged description, and often not easily removed, at least in a permanent manner, sometimes occurs in the course of *asthma* and *bronchorrhœa*, owing apparently to the interrupted functions of the mucous surface of the lungs; the evolution of gaseous fluids, from the blood being impeded on this surface, but supervening vicariously on that of the alimentary canal. In such cases, after the bowels have been freely evacuated, carminatives combined with ipecacuanha and hyoscyamus; the infusion of valerian, with prussic acid, and spirit. anisi; powders of magnesia, oxide of bismuth or of zinc, and ipecacuanha; sulphate of zinc, with myrrh, camphor, and opium or hyoscyamus; and camphor mixture, with extract of belladonna, spiritus ætheris sulphur. comp. and spirit. menthæ; are among the means which will afford the greatest relief.

89. *D*. There are few more common complications than *hysteria* and *colic*; but the treatment varies not materially from that now stated. *a*. In such cases, the functions of the uterus require strict attention; for morbid sensibility, and even vascular excitement, both of this viscus and of the ovaria, are often present. The treatment too commonly adopted in this state of complication, although it may give immediate but temporary relief, not infrequently perpetuates the pathological state, of which both hysteria and colic are merely symptoms. Instead of employing medicines which excite both the digestive mucous surface and the generative organs, in these cases, cooling and soothing remedies are much more appropriate to them, such as those above enumerated (§ 87.); local depletions, nitrate of potash, sub-carbonate of soda, extract of hop, cooling aperients, vegetable tonics, exercise in the open air, &c. *b*. When the complaint is symptomatic of difficult menstruation (§ 43.), general or local blood-letting may be resorted to in the plethoric subject: but in the weak or hysterical, camphor, ammonia, soda, &c. with hyoscyamus; or the acetate of morphine or laudanum given in some aromatic spirit, the ammoniated tincture of guaiacum in linseed tea, the preparations of rue and of juniper, and the treatment detailed in the article on the *Disorders* of MENSTRUATION, will generally give speedy relief. *c*. Colicky pains sometimes occur during *pregnancy*: in such cases, cooling aperients, with antispasmodics and opiates or other anodynes, and preceded by sanguineous depletion, if congestion or plethora exist, will remove all disorder. *d*. Severe attacks of colic are not uncommon upon *suppression* of the *menses* or of the *lochia*. If a tendency to inflammatory action manifests itself, and especially if the patient be plethoric or robust, general or local depletion should be practised; a dose of a mixture composed of a decoction of the radix rubiæ, tincture and syrup of saffron, and as much borax as it will dissolve, should be given every two hours; the volatile liniment with camphor and opium ought to be rubbed on the abdomen; and, afterwards, a fomentation with the decoction of poppy-heads, &c. applied to the same situation. SCHMIDTMANN advises a cataplasm, consisting of marshmallows, henbane, bruised linseed, and poppy-heads, to be placed warm on the abdomen; and the steam of hot water to be conveyed to the pudenda. *e*. If colic proceed from *congestion* or *inflammatory irritation* of the *uterus* or *ovaria*, local depletions; diaphoretics, and refrigerants, combined with sedatives; aperients, with cooling emollient enemata, and low diet, are the most appropriate remedies.

90. *E*. Colicky complaints are not infrequently referrible to *congestion* and *irregular vascular action* in the *liver*, *pancreas*, or *spleen*; or, if not arising from such disorders, are associated with them, owing to deficient energy of the organic nervous system; and, consequently, to imperfect performance of the abdominal functions generally. *a*. In cases of this kind, local depletions, followed by purgatives, exerting a chologogue and deobstruent action, external irritation, and, subsequently, by vegetable tonics, laxatives, regular exercise, and a course of the Leamington, Harrogate, Buxton, or Cheltenham, mineral waters, or the artificial waters of Carlsbad, Spa, Ems, &c., according to the circumstances of the case, will generally remove all disorder. Impeded circulation through the portal system, is more or less concerned in the causation of colic pains in these cases; the return of blood through the mesenteric and hæmorrhoidal veins deranging the contractile actions of the intestines, and giving rise, in many cases, particularly those in which this pathological state obtains, to the additional association of hæmorrhoidal affections, which, if neglected, may terminate in anal fistulæ. *b*. It is not un-

common to find a severe attack of colic usher in *hæmorrhoidal discharges:* the impeded circulation through the portal vessels, and the consequent fits of colic, being both relieved by the consecutive hæmorrhage from the hæmorrhoidal veins and mucous surface of the rectum. In almost all such cases, in addition to the congestion and associated disorder of the assistant chylopoietic viscera, there are more or less vascular plethora, impeded secretion generally, and deficient energy of the organic nervous system, — a complicated state of disorder evidently requiring local depletions from the region of the liver, or, as Continental practitioners very reasonably prefer, from the vicinity of the anus, with the remedies above stated, and assisted by regular exercise, gentle tonics, aperients, and a regulated diet and regimen. From this it will not appear singular that very dangerous attacks of colic, or even of ileus, will sometimes occur after the operation for hæmorrhoids or anal fistulæ, or other morbid states of the rectum, when performed, as they sometimes are, without previous medical treatment of a kind appropriate to the state of internal disease. *c.* The complication of colic with either acute or chronic *jaundice* is evidently referrible, either to the passage of gall-stones (§ 86.), or to the pathological state of the liver now noticed, or to inflammatory action in the duodenum or biliary ducts, or, lastly, to congestion of bile in the hepatic ducts, or in the gall-bladder. When symptoms of local plethora or congestion can be detected, cupping, and the rest of the treatment now directed, will be serviceable. (See Jaundice — *Treatment of.*)

91. *F.* When the colic arises from atonic, misplaced, or erratic *gout*, large doses of the subcarbonates of the alkalies, or magnesia, with camphor or ammonia, are required, followed by bloodletting, if the pulse, habit of body, and strength of the patient admit of it; by calomel, with camphor and hyoscyamus, or opium, at bed-time; by active cathartics, conjoined with stimulants and restoratives, as long as the alvine evacuations indicate the propriety of their exhibition; by purgative and antispasmodic injections, and by rubefacients and sinapisms to the lower extremities. After morbid secretions and retained fæces are evacuated, colchicum may then be given with ammonia, or with camphor and magnesia. But *arthritic colic* occurs most frequently in aged persons, or in those with exhausted constitutions, in whom, instead of evacuations, beyond the expulsion of morbid secretions, active stimulants, — as large doses of camphor and ammonia, or of guaiacum and ammonia, — with warm spices, Cayenne pepper, and sometimes combined with opium or aconitum, and assisted by sinapisms, are indispensably requisite.

92. *G.* If colic supervene on the disappearance or suppression of *rheumatism* from the joints or aponeurosis, or the repulsion of *chronic eruptions*, local depletions, followed by camphorated liniments and fomentations; warm turpentine epithems applied on the abdomen; calomel, with antimonial preparations, or with ipecacuanha and opium; warm vapour and fumigating baths; the sub-carbonates of the alkalies, sulphur, the compound decoction of sarsaparilla, or the decoction of dulcamara; blisters, tartarised antimonial plasters or ointments, saponaceous and oleaginous enemata; and sinapisms to the extremities or parts primarily affected; constitute the chief means of cure. The frequency, and, in two of the forms of the disease especially, the danger, of the complaint now discussed have induced me to be more circumstantial in the account of its pathology and treatment than may appear requisite to many: but I am convinced that the experienced practitioner will not be of the number; but will find cause to regret, with myself, upon reviewing his knowledge, that his information on the subject is not greater than his means of observation have yet afforded him, or my labours can possibly assist him in obtaining.

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Those who wish to be acquainted more fully with the opinions of the writers of the fifteenth, sixteenth, and seventeenth centuries, as to *Ileus* and *Colic*, will find them detailed at considerable length in BONET'S *Polyalthes*, &c. fol. vol. i. p. 500. *et seq.*; in his *Mercurius*, fol. p. 115.; and in MANGET'S *Bibliotheca Medico Practica*, fol. vol. i. p. 575. Although I have not availed myself of these collections in any way, owing to my circumscribed limits, and desire to give more precise information of a later date, and more in accordance with my experience, than that which they furnish, yet will they be found to contain much of what has been considered of much more modern date, and, when sifted from the refuse, of no mean value.

The *Bibliography* of these diseases, in PLOUCQUET'S *Med. Digesta*, is brought down to the commencement of this century; but many of the references are inaccurate: that by YOUNG is very scanty, and not select. The list appended to the art. *Ileus*, in the great French Dictionary, is entirely a catalogue of *Theses* on the subject, of no value; instead of consisting, as it ought, of references to the experience of the best practical writers.

COLON. — SYN. Κωλον. *Der Grimmdarm*, Ger. *The Large Bowel.*

1. The colon is very often the seat of disease, the rest of the alimentary canal being but lightly affected. In some complaints, as *constipation*, *colic*, and *dysentery*, it is the part principally disordered; and in others, as *indigestion*, *diarrhœa*, *ileus*, *peritonitis*, &c., it participates in the disease with the rest of the digestive organs. The investigation, therefore, of these maladies necessarily includes the consideration of the chief morbid states of this viscus. But there are other derangements which require a brief notice at this place, and which do not belong to these diseases, or to those changes of structure that are common to it and the rest of the alimentary canal, and which will be considered in the article on the *Pathology of the* DIGESTIVE CANAL.

TORPOR OR ATONY OF THE COLON, AND ITS CONSEQUENCES. — CLASSIF. — I. CLASS, I. ORDER (*Author*).

2. DEFIN. *General debility, with indigestion; slow or irregular state of the bowels; distension, borborygmi, or stridulous noises, in the course of the colon; frequently pain or uneasiness, sometimes with tumours in some part of this viscus.*

3. i. ITS PATHOLOGY. — Atony and distension of the colon may be variously associated with other disorders. They obtain more or less in all cases of constipation and colic which depend not upon inflammation, or upon diminution or constriction of the canal of the intestines; and they are also often complicated with torpor of the liver, and deficient secretion from the internal surface of the colon. Distension is usually occasioned by flatus or fæcal matters; and it may produce little or no inconvenience, beyond constipation, until it reaches a great extent; but it frequently gives rise to *flatulent* and *stercoraceous colic*, and even to *ileus*. The gases found in the colon are azote, carbonic acid gas, and carburetted hydrogen, in varying proportions; and, when they accumulate largely, they always produce borborygmi or an unpleasant or painful sense of distension, and constipation or colic. *A. Flatulent distension of the colon* (see FLATULENCE) is commonly dependent upon want of vital tone of the digestive organs generally, and of this viscus particularly. In irritation or inflammation of the bowels, flatus is also generated in great quantity; but it is usually expelled quickly, especially when they are unobstructed, owing to reaction of their muscular coats. Much doubt exists as to the source whence this flatus proceeds. The circumstance of its rapid reproduction after its evacuation, when the bowels contain no substances which could give rise to it, and various physiological considerations, lead me to infer that it is in great measure exhaled from the digestive mucous surface; the gases consisting chiefly of those which pass into, or are formed by, the blood; and, in health, are afterwards given out from it, on the mucous surface of the lungs. Persons who often expel the flatus from the lower bowels, where it evidently is destined to perform useful purposes

in the economy, are most subject to an atonic state of the colon, and to a continued as well as an increased generation of the intestinal gases: and, when circumstances prevent the accustomed frequency of their discharge, are most liable to experience the effects of their accumulation. Atonic distension of the colon by flatus is also a common attendant upon congestion of some one or more of the abdominal viscera, and even upon general vascular plethora, particularly when it oppresses the circulating energies. It also often accompanies hysteria: and, owing to the increased sensibility of the organic nerves, as well as to the morbid irritability and irregular action of the muscular fibres of the bowels, gives rise to various painful sensations in their course, and to anomalous states of disorder.

4. *B.* When *an atonic and flatulent state* of the colon is associated *with morbid irritability* of the muscular coat, painful sensations in some part of the course of this viscus are frequently complained of, particularly by females; are by them often referred to its left arch and descending portion; and are attended by loud croaking or stridulous noises, especially upon full respiration and mental emotion. The bowels are usually constipated, and attempts at evacuation are accompanied with slight tenesmus, the stools being discoloured, hard, slimy, or in lumps. The abdomen is tumid; and tenderness, often shifting its place, and varying in degree or duration, is sometimes felt. The whole digestive organs necessarily participate in this state of disorder, and perform their functions imperfectly. The nervous system of organic life acquires increased sensibility; the cerebro-spinal system becomes morbidly susceptible of impressions, particularly in females; the countenance is pale, slightly discoloured, and often covered by an oily moisture; the tongue is loaded, flabby, sometimes large, presenting fissures on its surface, and the impressions of the teeth on its edges; the pulse is weak and soft; and a sense of distension and oppression follows a full meal. This state of disorder is very frequent in young females, who take not sufficient exercise; and, when neglected, is often the forerunner of more serious ailments, both of the bowels and of the generative organs.

5. C. Deficient vital energy of the colon also gives rise to *relaxation or irregular action* of its coats, to constipation, and to collections of fœcal matters, generally with more or less flatulence. *Fæcal accumulations* to a great amount is most commonly met with in aged females, or persons far advanced in life, who have injured the tone of the bowel by the frequent use of cathartics, and have passed a sedentary and luxurious existence. They also occur, but to a much less extent, in children and young persons, especially females from the ninth to the eighteenth year of age, and even upwards. Sometimes they occasion large tumours, particularly in the cæcum and sigmoid flexure, but occasionally also in the transverse arch and other parts of the colon. When distension proceeds from retained fæcal matters, in addition to the local signs observed on careful examination and percussion of the abdomen in the course of this bowel, numerous symptomatic ailments are complained of. These vary but little from those described above (§ 4.), and in the article treating of accumulations in the Cæcum (§ 11.). The countenance and skin are generally foul, unhealthy, and devoid of animation; the perspiration is thick, clammy, fœtid, and oleaginous; the breath very offensive; the tongue loaded or furred; the lips and gums are pale; muscular energy is much diminished; the appetite imperfect or capricious; digestion difficult; headach or vertigo is often present; the abdomen is tumid, doughy, and inelastic; the urine is loaded; the bowels are either constipated or irregular, or, if daily evacuations take place, the motions are slimy, very dark or otherwise discoloured, scanty, and offensive; and the pulse soft, weak, often slow, but afterwards accelerated. In many cases, pains in the loins, abdomen, and limbs, are complained of, with mental inactivity, general lassitude, œdema of the lower extremities, flabby inelastic state of the soft solids, leipothymia, or fainting, upon quickly assuming the erect posture, and occasional fits of sinking, especially in females.

6. Although torpor of the colon is most frequently followed by fæcal accumulations and distension, yet these are neither constant nor necessary results of this state, at least to any very manifest extent; for sordes and fæcal collections may be very injurious to the mucous surface, without proving so from their bulk or mechanical effects only. Indeed, they are often noxious from their acrimony, without occasioning remarkable distension, or any degree of obstruction, particularly when the vital energies are depressed. Their presence, therefore, should be inferred rather from various remote symptoms, than from those which are referrible to the colon itself. But, whenever disorder of remote organs leads us to suspect torpor of this bowel, the practitioner should make an accurate examination of all the abdominal regions, commencing with that of the cæcum, following the course of the colon, between the ilium and right ribs, below the epigastrium, and under both hypochondria, to the left side and iliac fossa, and to the hypogastrium. If a sensation of doughy fulness be felt by the examiner, in any part of its course, the internal surface of the bowel is probably lined with sordes and accumulated secretions, which its vital energy has not been sufficient to throw off. If hardness be felt, with more or less tumour, fæcal collections are most likely formed. But the evidence furnished by this examination should not satisfy us: we should enquire after the symptoms stated above, particularly the foul or clammy tongue, fœtor of the breath, unnatural state of the countenance and cutaneous surface, and the offensive and morbid evacuations usually attendant upon this ailment. A belief is too generally entertained, that fæcal matters and sordes will not accumulate in the colon, unless the patient has been constipated. But they may collect in its cells, the more central part of the canal allowing daily evacuations; and they may even remain there for a considerable period, producing much irritation, and even a relaxed state of the bowels; thereby misleading the judgment of the practitioner as to the pathological state constituting the disorder. How, therefore, is he to form an accurate opinion? By a careful examination of the abdomen in the course of the colon, of the urine, of the stools, and of all the organic and animal functions, and by ascertaining the pre-

sence of the symptoms enumerated above (§ 4, 5.). In many cases, when the morbid collections have become acrimonious, an irritative diarrhœa continues for some time, or recurs at intervals, before the morbid matters are fully thrown off, owing to spasmodic constrictions of parts of the bowel. On these occasions the stools are watery or fluid, and are apparently composed of discoloured fæces, broken down and mixed in a liquid; at other times they are dark green, muddy, putrid, &c.; very frequently they are slimy, containing lumps of hardened fæces, very offensive, and of a dark green or brownish black hue; and their evacuation is preceded by griping, tenesmus, or a scalding sensation at the anus.

7. *D.* Imperfect action of the colon is evidently dependent upon deficient vital energy of the frame, owing either to original conformation, or to various causes of exhaustion, acting chiefly on the digestive canal and associated viscera, with more or less torpor of the biliary functions. When allowed to continue, it perpetuates and augments the morbid condition in which itself originated; drawing other organs within the sphere of disease, particularly those of mental manifestation, and of generative function, in the female. In young persons it often occasions, or is *complicated with*, curvatures of the spine, chorea, chlorosis, retention or suppression of the menses, nervous tremors and convulsions, &c., and when the distension of the colon is great, dyspnœa or shortness of breathing, palpitations of the heart, &c.; these affections appearing oftener, perhaps, along with it, as associated effects of depressed vital power, than as consequences of this particular lesion of function.

8. *E.* The more *remote causes* of torpor and distension of the colon are, confinement in close and crowded apartments during the greater part of the day, and sleeping in chambers similarly circumstanced; constrained and sedentary positions, in which the abdominal muscles remain nearly inactive; premature and excessive cultivation of the mental, to the neglect of the physical, powers, — the discipline of modern boarding schools; the inappropriate combination and use of purgative medicines; indolent and luxurious habits; occupations which prevent bodily activity, and particularly those performed by the assistance of machinery, and in hot foul air stagnant in crowded manufactories; pre-existing debility of the stomach and digestive canal, or of the frame generally; paraplegia or hemiplegia; disease of the spinal column, its membranes, or chord; neglect of the first intimation to alvine evacuations; venereal excesses; the disgusting habit of expelling the flatus from the bowels; and by whatever weakens, either directly or indirectly, the vital manifestations of the alimentary canal, or disorders the general health.

9. *Local and constitutional effects produced by torpor of the colon.* — *A.* Owing to the course and connections of the colon, to the remote causes above enumerated, and to the depression of digestive and vital energy they occasion, the matters discharged into this bowel from the small intestines, and the secretions from its own internal surface, are liable to be retained for a long time. Fæcal accumulations and obstruction have been now shown necessarily to follow such retention. It may be *next* requisite to point out certain of the most important and frequent consequences of these states: — *a.* One of the most immediate is the retention of the mucous secretion within the follicular glands, as well as in the ducts leading from them; causing distension, and subsequently inflammation and ulceration of them. *b.* The retention of fæcal matters in the colon is often followed by absorption of much that otherwise would have been excrementitious, both into the general current of the circulation, and, at first, at least, into the blood which flows into the portal veins, where it often excites and irritates the liver, and either is partially removed by this viscus, giving rise to increased or vitiated biliary secretion, or contaminates the whole circulating and secreted fluids. *c.* The bile also may, particularly in warm countries, and in persons in whom it is habitually secreted in excessive quantity, be rapidly conveyed along the small intestines with the chyme, and yet be retained too long in the cæcum and colon, whence it may be absorbed, with a portion of excrementitious matters, into the circulation, and give a lurid or unhealthy aspect to the countenance, and occasion various constitutional ailments, characterised chiefly by lassitude, debility, irregular action of the bowels, loaded urine, and a foul tongue. *d.* Fæcal accumulations, when allowed to remain too long in the colon, and thereby to give rise to gaseous and noxious formations, not only impede many of its functions, but also favour changes in the vascular action and structure of its coats, particularly of its mucous, sub-mucous, and muscular tunics, — the first and second becoming irritated, inflamed, or even ulcerated; the third over distended, and thereby deprived of its power of salutary reaction. *e.* Among the most common consequences, also, of torpor and fæcal infarction of the colon, are hæmorrhage from it and the rectum, and hæmorrhoidal tumours, arising immediately from the foregoing changes, and from interrupted circulation through the hæmorrhoidal veins.

10. *B.* The effects of over-distension of the colon upon the other abdominal viscera, owing to the extensive connections subsisting between them and this bowel, may be readily inferred. *a.* The distended cæcum and sigmoid flexure of the colon press injuriously upon the femoral nerves and blood-vessels, the ureters, and the internal iliac veins; producing numbness, cramps, pains, and, owing to the impeded return of blood, more or less œdema, of the lower extremities. The ascending and descending portions of the colon press upon the kidneys and adjoining vessels, occasioning disorder of the urinary secretion, with a sense of weight, or dull aching pain in the loins. Distension of the right and left flexures, and transverse arch, deranges the functions of the biliary organs, the duodenum, stomach, and spleen. *b.* If the colon be distended to the utmost, not only are all these consecutive disorders much increased, but the descent of the diaphragm is also much impeded, and the actions of the heart and lungs materially affected; occasioning palpitations, intermissions, and irregularity of the pulse, dyspnœa, and a short and rapid respiration. Owing to this effect upon the circulating and respiratory organs, the return of the blood from the head is retarded, various nervous ailments, and headach, are occasioned; and determination of blood to, and con-

gestions and effusions of serum on, the brain and its membranes, supervene as the more remote effects. *c.* Fæcal or flatulent accumulations in the colon affect, in a very evident manner, the functions of the small intestines and stomach, or increase disorder in these viscera, when it previously exists, — a circumstance of frequent occurrence, the function of digestion being equally impeded with that of defæcation, and owing to the same primary pathological state, namely, imperfect manifestation of vital power throughout the organic nervous system. Hence the indigestion, the acrid and flatulent eructations, and the imperfect chylifaction and nutrition, so frequently associated with torpid function of the large bowels. *d.* In children and young persons, the mucous sordes, morbid secretions, and excrementitious matters, that collect as a consequence of this state, become not only a nidus for worms — remarkably favouring their generation; but also a cause of irritation to the mucous surface, to the absorbing vessels, and to the mesenteric glands, owing to their partial absorption, either alone, or with whatever chyle may be formed. That diseases of the intestinal mucous surface, and that obstruction and enlargement of these glands, with the consequent *marasmus*, &c., often arise from the morbid impression and irritation caused by these retained excretions, an extensive experience in the diseases of children has fully convinced me; and that dysentery and diarrhœa, among this class of patients, as well as in adults, frequently proceed from this cause, more especially in warm and unhealthy climates, will be acknowledged by every experienced practitioner. *e.* Even many of the diseases that affect the skin, and chronic ulcers of the lower extremities, arise from the absorption from the large bowels of excrementitious matters, that irritate and inflame, in the course of their elimination from the blood by the cutaneous function, the delicate vascular tissue subjacent to the cuticle. This is particularly the case in warm countries and seasons, in which the quantity of these matters always passing out of the circulation by the skin is much greater than is usually supposed. Whatever opinion may be formed as to the origin of such affections, there can be no doubt that the treatment based upon this doctrine is the most successful in removing them. *f.* Among other consequences of fæcal accumulations in the colon, elongations and displacements of this bowel may be ranked; and, when these changes take place, they increase the disorder which occasioned them. It has often been remarked, particularly by ESQUIROL, HINZE, and others, that displacement of the colon is one of the most common morbid appearances found in the bodies of hypochondriacal and melancholic persons. Torpor or atony of this viscus favouring fæcal accumulations in it, is an important characteristic of these affections, and is manifestly connected with the causation of displacement of the large bowel. (See art. HYPOCHONDRIASIS, &c.)

11. ii. TREATMENT. — The indications of cure in cases of torpid function of the colon, consist — 1st, of evacuating whatever fæcal or acrimonious matters may have collected in it; and, 2d, of restoring the energy of the digestive organs, and directing such regimen as may prevent a return of this disorder. *A.* Many practitioners, deceived by the reports of the patient, or misled by the appearances of the stools procured by the first purgatives prescribed, stop far short of the point to which these medicines should be carried. It is not sufficient to order two or three doses of purgatives, or even of active cathartics; but they ought to be repeated, or continued so as to secure their full effect, and be combined with such other medicines as will promote their operation without weakening the parts which they stimulate, and will prevent the patient from being debilitated by them. In all affections of the colon, purgatives that procure full, bulky, and not frequent or watery evacuations, should be selected. The preparations of aloes (F. 181. 454.), those of senna combined with gentian (F. 266. 430.), castor oil, rhubarb and magnesia, precipitated sulphur (F. 45. 82. 96.), the compound jalap powder, &c. (F. 635, 636. 652.) operate in this manner; and, particularly when we wish to promote the secretions from the intestinal surface, may be exhibited after a dose of calomel or blue pill taken at bed-time; or the compound extract of colocynth, or the aloes and myrrh pill, or jalap, may be combined with one of these mercurial preparations, and the extract of hyoscyamus (see F. 462. 471. 881.). When it is necessary to continue the exhibition of purgatives, they should be either alternated with tonics, or combined with vegetable bitters, which will both promote their action, and increase the strength of the patient (see F. 562. 572.). When the motions are morbid, great advantage will be derived from resorting to the use of clysmata, as recommended in the article COLIC (§ 57. 66. 77.). If fæcal collections to a great extent have formed, they are indispensable remedies; and if symptoms of obstruction, or of irritation, or chronic inflammation, are manifest, they should be assisted by the external means there advised (§ 66. 83.). Under every circumstance, the exhibition of purgatives by the mouth, and of enemata, should be persisted in until the stools assume a natural appearance. (See also the *Treatment* of diseases of the CÆCUM, and of CONSTIPATION).

12. In cases where retained matters in the colon have occasioned irritation, such clysters as will promote the full evacuation of its contents, and at the same time allay irritation, ought to be resorted to from time to time. These will relax irregular constrictions of the bowel, promote the operation of purgatives given by the mouth, dissolve hardened fæces, and loosen the adhesion of tenacious secretions lodged in its cells. In cases of this description, the soap injection, with, or without, the addition of castor or olive oil, the compound decoction of barley with common salt, or the soda tartarizata; the infusum lini, with the sub-borate, or the sub-carbonate of soda and assafœtida; the decoction of marsh-mallows, with the infusion of camomile flowers and linseed oil; and the turpentines triturated with white of egg or mucilage; will have a most beneficial effect, particularly when assisted by appropriate laxatives taken by the mouth. When the irritation of the bowel appears to be accompanied by spasmodic constriction, the aperients should be combined with either camphor, ammonia, ipecacuanha, hyoscyamus, the compound galbanum pill, &c. (F. 463. 890.), according to existing cir-

cumstances. In cases of this kind, much debility is often present, and the functions of the stomach require the aid of light nutritious food and gentle tonics; the purgatives being exhibited either at bed-time, or early in the morning, so as not to disorder the functions of the stomach. Such eccoprotic or alterative laxatives as are slow in their operation (F. 503. 892.) should be taken at night, and purgatives or cathartics that are quick in their action early in the morning, so that they may not interfere either with necessary food or with requisite avocations.

13. When the fæcal accumulations cannot be removed by the above means, others of a more powerful nature, as the elaterium or croton oil, assisted by colocynth or terebinthinate injections; and the purgatives advised in the more obstinate cases of *colic* and *constipation*, assisted by shocks of electricity and galvanism passed through the abdomen; should be resorted to. When the bowels are acted upon with great difficulty, the stools being very black and offensive, we may generally infer that not only is the colon torpid, but the follicles are loaded or obstructed, and their secretion morbid. In these cases, galvanism, as shown in an instructive case by Mr. Clarkson, promises to be of much service. In several instances, when the pulse has been weak, and the skin cool, I have added the extract of nux vomica to the purgative with much advantage, and combined a portion of this active substance with the liniment (F. 306.) which has been rubbed on the abdomen.

14. *B.* In order to prevent the re-accumulation of morbid matters in the colon, and give tone to the digestive organs generally, the patient should daily attend to the first intimations of evacuation, and promote the functions of digestion and defæcation, by resorting, whenever they flag, to aperients or laxatives, combined with tonics. Blue pill, with the aloes or myrrh pill, or F. 470., may be occasionally taken at night, and the tonic and aperient medicine (F. 266.) the following morning. The diet and regimen should be carefully regulated, and exercise be taken in the open air, either on foot or horseback. After health has been in a great measure restored, chalybeate mineral waters, and the artificial waters of Ems and Pyrmont, will be productive of much benefit; but frequently it will be more advantageous to commence with the Harrogate or Leamington waters, or with the artificial waters of Seidschutz, Eger, or Carlsbad, and have recourse subsequently to the chalybeates of Cheltenham or Tunbridge. In many cases, the warm or tepid salt water douche over the abdomen, sea-bathing, frictions of the surface of the body, and of the belly especially, night and morning, with either a hard towel or brush, will prove of much service.

15. II. Unnatural Positions of the Colon, &c. — This viscus is not infrequently found misplaced, and forming singular flexures, in those who have suffered from constipation, fæcal retention, dysentery, hypochondriasis, or melancholia. But there are no constant symptoms by which such changes can be inferred with much certainty during the life of the patient. M. Esquirol found, out of 168 dissections of melancholic patients, the colon displaced in 33. This change had previously been remarked by Morgagni (*De Sed. et Caus. Morb.* epist. iv. art. 16. *et seq.*), Haller (*Elem. Physiol.* l. xxiv. sec. 13. *et seq.*), Soemmerring (*De Corp. Hum. Fabrica*, t. iv. p. 313.), and Wells, but unconnected with mental disorder. In many cases, the bowel is not only displaced, but is also elongated, without being divided, as in its natural state, into cells by partial partitions, and the tonic action of its longitudinal bands. These changes seem to be favoured by relaxation of the mesocolon, and by complete atony of those bands. An elongated and displaced state of the colon is common in cases of old hernia; and in these is often connected with a stretched appearance of the mesentery, but without any organic change of the coats of the bowel: but sometimes the unnatural flexure or duplicature is adherent at its opposite sides, forming a large loop, particularly when it has been consecutive of acute or inflammatory dysentery. Displacement may take place in any part of the bowel, but it is most common in the transverse arch and sigmoid flexure; the former part hanging down towards the pubis, generally in an unadhering, but occasionally in an adhering, loop; and the latter part crossing over to the right side of the abdomen, or passing behind the pubis. Duplicatures of the colon may also form at the right or left parts of its arch; the opposite peritoneal surfaces being more frequently, in such cases, adherent to a considerable extent by coagulable lymph. Several plates are given by Mr. Annesley illustrative of this change; which is not infrequently observed in fatal cases of chronic dysentery, particularly in warm climates. That these unnatural flexures are also often caused by fæcal collections, and by obstructions to the fæcal discharges situated either in the rectum or in the sigmoid flexure of the colon, appears very probable; but they may also arise from a naturally elongated formation of the bowel. That, when once produced, they favour such collections, with their consequences, particularly severe dyspeptic and hypochondriacal ailments, dysentery, severe colic, or even ileus, and great distension or inflammation of the colon or small intestines, cannot be doubted; but that they will occasion insanity or melancholy, as Esquirol and Hinze suppose, seems not to be made out. Dr. Yelloly states that Mr. Lawrence and Mr. Dalrymple, who have examined many bodies of insane persons, have very seldom observed in them any deviation from the natural course of the colon.

16. As we have no certain or even probable means of ascertaining the existence of these changes during life, it is unnecessary to offer any remarks on their *treatment*. But this is a matter of but little importance, as the disorders which they produce are in all respects the same as those already noticed; and even if their nature were recognised, they can be remedied or alleviated only by the means described above, particularly by laxative and solvent enemata; and by whatever will, whether taken by the mouth, or injected *per anum*, preserve a fluid state of the stools, or reduce them to a softened condition, and promote the healthy secretions and regular functions of the large bowels, and of the digestive organs in general. (See F. 82. 98. 144.) — (See art. Digestive Canal, for the organic lesions of the colon; and arts. Diarrhœa, Dysentery, and Intestines, for its other diseases.)

Bibliog. and Refer. — *Severinus*, De Recond. Abs.

Nat. l. iv. cap. 35. (*Greatly distended, &c.*) — *Adolphi*, De Intestino Colo, mult. Morbor. Nido, &c. Lipsiæ, 1718. — *Vater*, De Situ Natur. et Præternaturali Intest. Coli. Witeb. 1737. — *Fischer*, De Morbis Intest. Coli, &c. Erf. 1728. — *Hamberger*, Observat. Clinic. Jenæ, 1754, p. 10. (*Great distension.*) — *Stoerck*, Annus Med. t. i. p. 126., et t. ii. p. 268. (*Flatulent and fæcal distension, and laceration of the longitudinal bands.*) — *Leusingk*, De Morbis a Situ Intestin. Crassor. pendentibus. Goet. 1756. — *Van Royen*, De Intest. Crassis, multorum Morb. Causa et Sede. Lugd. Bat. 1752, 8vo. — *White*, Cases in Surgery, p. 13. — *Hamilton*, On the Utility of Purgative Medicines, 8th ed. 8vo. 1826. — *Abernethy*, On the Constitutional Origin of Local Diseases, 8vo. — *Roth*, Patholog. Intest. Coli. Erlang. 1802. — *Wells*, in Transac. of Society for promoting Med. and Chirurg. Knowledge, vol. iii. p. 158. — *Esquirol*, in Diction. des Sciences Méd. t. xxxii. p. 172.; et Journ. Génér. de Méd. Fran. et Etrang. Mai et Juin, 1818. — *Geoghegan*, Transac. of the College of Physicians of Dublin, vol. i. p. 194. (*Great distension of the colon.*) — *Stoker*, in Ibid. vol. ii. p. 6. (*Rupture from distension, without ulceration.*) — *Hinze*, Archives Génér. de Méd. t. iii. p. 125. (*Displacement of colon.*) — *Yelloly*, in Edin. Med. and Surg. Journ. vol. xvi. p. 476. (*Displacement of colon.*) — *Clarkson*, in Ibid. p. 475. — *Annesley* and *Author*, Researches on the Diseases of India, &c. vol. ii. p. 50. *et seq.*

COMA. — Syn. and Deriv. Κῶμα, *Profound Sleep* (from Κω, I lie down). *Carus*, Sauvages, Good. *Cataphora*, J. Frank. *Lethargie*, *Assoupissement*, Fr. *die Schlafsucht*, *Schlaffieber*, Ger. *Sopore*, *Somnolenza*, Ital.

Classif. 2. *Class*, Nervous Diseases; and 1. *Order* of this Class (*Cullen*). 4. *Class*, 4. *Order* (*Good*). IV. Class, III. Order (*Author*, in *Preface*).

1. Defin. *Preternatural sleep, with physical torpitude, and suppression of the mental powers.*

2. I. Varieties and Symptoms. — There are various modifications of coma, each of which have received different appellations, as *Lethargus*, *Cataphora*, *Agrypnia*, *Carus*, &c.; these names being also used generically by some authors, but more frequently specifically, as I shall apply them on this occasion. They are all most commonly symptomatic of pre-existing disease; but they are also occasionally primary affections. I shall, therefore, after describing very succinctly each variety of coma, and its more constant symptoms, notice it first as a primary affection, and next as an important phenomenon in other acute diseases, particularly of their severe forms or advanced stages: afterwards the different pathological states causing this affection, the signs which distinguish them, and, lastly, the means best adapted to relieve them, will be briefly stated.

3. i. Coma Vigil — *Agrypnia*, Κῶμα ἀγρυπνῶδες (Hippocrates), Typhomania, *Sopor cum Agrypnia* — is *characterised* by a constant disposition to sleep, without falling into quiet, sound, or natural sleep; by low muttering delirium, or unconnected talk; unnatural action of the hands and fingers, sometimes also of the feet; pale sunk countenance; a natural or but slightly increased temperature of the head; by the patient opening the eyes and staring about upon the slightest disturbance, or starting up as if frightened by strange sights, and again attempting to lie down; and sometimes by difficulty of speech and of swallowing liquids.

4. ii. Lethargy — *Lethargus* * (from λήθη, Lethe, et ἀργος, celer), *Veternus*, Lat. — is *characterised* by slight but constant somnolency, or mental and corporeal torpor, evidently depending upon a morbid condition of the brain; when addressed, the patient answers forgetfully, and afterwards sinks into the same state as before. This is a slighter grade of the following varieties, and may pass into them.

5. iii. Coma Somnalentum — *Cataphora* — is *characterised* by sopor or profound sleep, without the power of wakening spontaneously; the patient, when roused, slowly opening the eyelids, and answering either rationally, forgetfully, or incoherently, but immediately afterwards falling into the same state of profound sopor; and frequently by relaxation of the muscles of the lower jaw, it thereby differing from apoplexy and carus.

6. iv. *Coma profundum* — *Carus*, Κάρος — is *characterised* by its more or less sudden invasion; by the profound sopor, the eyes being shut as in a deep sleep, and the patient being generally deprived of motion and sensation. Sometimes, however, upon being called to loudly, he opens his eyes, but immediately shuts them, without answering any question; and occasionally when pinched he draws away the part, indicating remaining sensibility; the breathing is undisturbed or irregular, sometimes laboured, but without stertor: there is seldom much febrile heat, and the evacuations are passed without consciousness.

7. *A. Review of the chief symptoms.* — *a.* The *pulse* varies greatly in each of the above states of coma. It is generally slow, full, and soft; but it is also often small and quick in coma vigil, or in any of the varieties, when accompanying the last stages of fever; and small, hard, and sometimes irregular, in the coma attendant upon inflammatory action of the brain or its membranes. It is also frequently unequal, intermittent, and generally slow, but sometimes also quick, in the coma produced by injury of the brain, and by hæmorrhage or effusion of fluid within it. *b.* The *respiration* is often natural, as in coma vigil; sometimes accompanied by sighs, or laboured, as in coma profundum; frequently slow, and very seldom stertorous, unless in the coma of apoplexy. *c.* The *pupils* of the eyes are generally more or less dilated, and sluggish in their motions, or altogether insensible to light; but they are sometimes, in the most unfavourable cases, much contracted, or one contracted and the other dilated. *d.* The *countenance* is usually tumid, and without expression; sometimes pale or bloated, or red or injected; the eyes are prominent or suffused, and the head somewhat warmer than natural, or of the healthy temperature, the beat of the carotids being full or strong: in the coma consequent upon fever, and in coma vigil, the features are commonly pale, sunk, and cool; the action of the carotids being weak and soft in some cases, and hard and oppressed in others. *e.* The *mental powers* are commonly suppressed; but upon being momentarily excited, they sometimes appear more or less disordered, particularly in any of the states of coma supervening upon fever, or inflammation of the brain or its membranes; low delirium and febrile heat then being also present. *f.* The *surface* of the body is often natural, sometimes cold or clammy; but when the affection is caused by fever or inflammation,

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* I have, conformably with the received acceptation of lethargy in this country, made it the slightest form of soporose coma; although the ancients, our countryman Willis who has written ably on this affection, the greater number of writers of the sixteenth and seventeenth centuries, and many modern German authors, have defined it nearly as follows: — "profound sopor, or preternatural sleep, with fever and delirium;" thus applying the term to the more profound state of febrile coma.

the temperature may be somewhat elevated, and the skin dry. *g*. The *extremities* are frequently natural at first, but they are also often cold or clammy, or become so. *h*. The *position* is commonly supine, without attempts at motion, in profound coma; and, in the worst cases, the patient slips down in bed. *i*. The *tongue* is natural, or merely much loaded, in some instances; but in coma symptomatic of inflammation or fever, it is usually furred, dry, and brown, hard, and constricted. *k*. The *alvine excretions* are either retained, or passed without consciousness.

8. *B. Duration and termination.* — *a*. Any one of the forms of coma may be sudden in its *attack*, and terminate speedily in death; or it may come on gradually, and be of short duration, sense and voluntary motion as slowly returning. The seizure may be repeated frequently, or it may be periodic, particularly when attendant upon epilepsy, or remittent fever of a bad form. When its accession is slow, it often commences with drowsiness or headach. *b*. Its *duration* is very various; the lethargic and slighter varieties being occasionally of long continuance — sometimes lasting many weeks, and spontaneously passing off; the more profound states of coma frequently terminating fatally in a few hours, and seldom continuing longer than a very few days. *c*. It may *terminate* in either recovery or death, or in some other disease with which it is more or less closely related, as apoplexy, paralysis, insanity, or melancholia, epilepsy, and epileptic or other forms of convulsions with which it occasionally alternates; and in inflammation of the brain or its membranes.

9. *C. Diagnostic remarks.* — The states or grades of disease described above may pass one into the other, or into some other malady, whether they appear primarily or consecutively. They are often very nearly allied to, or rather are less degrees of, APOPLEXY; and apparently consist of a somewhat similar condition of the organic nervous power and vascular action within the brain, to that which obtains in a great proportion of the attacks of that disease (§ 62. *et seq.*), particularly those which do not immediately depend upon hæmorrhage. *a*. The close resemblance of many cases of coma vigil to *ecstasy*, and of the other states of coma to *catalepsy*, not only as to the grouping of the sensible phenomena which respectively constitute them, but also as to their presumed proximate causes, indicate that *catalepsy* and *cataleptic ecstasy* are merely unusual modifications of the state of cerebral disease now under consideration. *b*. The absence of stertor constitutes the chief difference between the most profound state of coma, carus, and *apoplexy*. *c*. The fulness and strength of the pulse, particularly in the carotids, and the natural or strong state of the respiration, are sufficient to distinguish coma from *syncope*, in which latter the action of the heart is greatly diminished primarily, the functions of the brain failing consecutively. *d*. Coma differs from *asphyxy* in the circumstance of the respiratory functions being first suppressed, and subsequently the action of the heart in the latter; the consequent coma arising from congestion of venous blood in the brain, produced by the abolished respiration, and obstructed circulation through the lungs and cavities of the heart.

10. II. OF PRIMARY OR IDIOPATHIC COMA. — Either of the varieties described above may occur as a primary affection arising from states of the organic nervous power and circulation within the brain, which will be noticed in the sequel (§ 13.), and which are commonly produced by the following agents: — *Causes*. — The continued or intense action of cold upon the nervous system and circulation; the influence of narcotics, particularly in some constitutions; indulgence in spirituous or intoxicating liquors, either carried too far or continued too long; venereal excesses; insolation; fatigue or prolonged watching; the influence of particular odours, condiments, or kinds of food, in some temperaments; inanition or exhaustion of vital power, by whatever cause, especially in the aged of the male sex; immoderate evacuations or discharges; mephitic or carbonaceous fumes or gases; sadness, anxiety, fright, terror, anger, and other violent mental affections; the inappropriate use of either warm or cold baths; the exhaustion of vital or nervous power by excessive or long continued pain; concussions and injuries of the brain; erratic, atonic, or retrocedent gout; pregnancy or child-bearing; and suppression of the menses or lochia; are the causes which produce, in a primary form, any of the states of coma described above.

11. III. SYMPTOMATIC COMA. — Either of the varieties of coma may supervene in the advanced course, more rarely on the invasion, of intermittent, remittent, or continued fevers, particularly typhus; of inflammations of the brain and its membranes; and of insanity and melancholia. Simple determinations of blood to, or congestion of, the encephalon will frequently be sufficient to induce the slighter states of coma; whilst its more severe or profound conditions are common consequences of effusions of blood or serum, and of numerous organic changes occurring within the head. (See BRAIN — *Organic Lesions of its Membranes and Substance*, § 21 — 84.). It is one of the most important symptoms that appear in the course of erysipelas of the face or head, and of exanthematous fevers; it may likewise supervene, particularly *coma vigil*, in the advanced stages of several acute maladies evincing exhaustion of the vital energy of the brain and nervous system, and in those in which the circulating fluid and secretions become vitiated or contaminated. The coma which is usually consecutive of epileptic or convulsive attacks consists of the slighter varieties denominated lethargic and somnolent, forming a part or consequence of these diseases. Coma is sometimes, also, a symptom of severe hysteria, particularly in plethoric persons with interrupted catamenial discharge; and, in rare instances, of worms, but by no means so frequently as stated by some writers. The occasional occurrence of any of the varieties of coma from suppression or retention of urine, from metastasis of gout and rheumatism, from the suppression of accustomed discharges, and more rarely from the retrocession of eruptions, and the drying up of old ulcers, should not be overlooked, particularly as such morbid relations require a peculiar and appropriate treatment.

12. IV. The PROGNOSIS in most cases of coma is unfavourable; for, although many will recover — even the great majority — the slighter cases will often present sudden changes. A much more

favourable opinion may be entertained of coma when it is produced by narcotics and spirituous liquors, than when it comes on in the course of febrile or malignant diseases, particularly after the absorption of morbid matters into the blood. The occurrence of epistaxis, of swellings of the parotids; the accession of the catamenia, or the hæmorrhoids; a fæculent diarrhœa; copious general perspiration; abundant discharge of urine depositing a sediment; erysipelas, eruptions, boils, gout, or rheumatism, appearing in external parts, particularly the lower extremities; and the return of sound natural sleep during a state of coma vigil, or typhomania; are very *favourable* — indeed, critical symptoms. The persistence of the affection; scanty secretion or retention of urine; subsultus; spastic contractions of one or more limbs; loss of speech, and total insensibility; distortion of the eyes; vomiting or retching; a previous breaking up of the constitution; preexisting cachexy, and old age; bleeding from the ear, when it has been caused by external injury, as in concussion; constant supine posture, and slipping low down in the bed; coldness of the head, with sunk countenance, and cold clammy surface; loss of the faculty of deglutition, or return of matters put in the mouth; are very *unfavourable* signs.

13. V. PATHOLOGY. — *A.* Primary and symptomatic coma may be resolved into the following *pathological states*, either of which may exist singly, or in conjunction with one another: — 1st, Exhaustion of the organic nervous influence supplying the brain, or torpor or suppression of it, inducing a state which may be called paralytic — a paralysis of all the cerebral functions: this condition is produced chiefly by directly or indirectly sedative causes, and by whatever depresses or exhausts the vital energy generally, or the nervous power in particular: it may be attended by anæmia of the brain; and then the coma will be preceded by, or accompanied with, convulsions, or alternate with them; but it is more frequently productive of some one of the states about to be noticed, especially congestion, and occasionally effusion within the head: it may go on to dissolution, or it may be followed by reaction and active congestion or acute inflammation; the comatose states sometimes observed at the invasion of dangerous forms of fever, and of certain apoplectic seizures, and the coma of the early stage of concussion of the brain, being of this description. 2d, Congestion of the capillaries, veins, or sinuses of the brain, is, perhaps, the most common morbid condition that obtains in coma, as respects the vascular system: but this state can scarcely arise, unless the organic nervous influence with which these vessels are supplied has been exhausted or depressed, excepting in those cases where the congestion proceeds from obstructed return of blood by the sinuses, or by the large veins coming from the head: in many cases, therefore, the existence of this state presupposes that first described, at least to some extent; and whether thus originating, or proceeding from impeded or obstructed return of blood, will equally occasion pressure of the organic nervous and cerebral tissues, and suppression of their functions: congestion of the blood-vessels within the head may, moreover, be associated with some other morbid states, as with contamination of the circulating fluid; as in the coma that occurs in the advanced stage of typhus, and when morbid secretions are absorbed into the blood. 3d, Active determination of blood to the head will seldom occasion more than lethargy or coma vigil, — states which are frequently produced in this way in the advanced stages of various acute diseases, and sometimes by the use of anodynes, which, in some constitutions, disorder the nervous functions and excite the cerebral circulation. 4th, Inflammation of the brain or membranes, owing to the tumefaction consequent on it, &c., will often be accompanied with coma; and still more frequently terminate in it, as shown in the article on that disease: and, as we have seen that coma will thus proceed from very different or even opposite states of organic nervous power, and of vascular action, it becomes a matter of the utmost practical importance to distinguish them with accuracy: but not only may those pathological conditions exist in different cases, they may obtain at different stages of the same case: thus the coma of concussion, in which the first of those conditions exists, may successively pass into congestion and inflammatory action, forming the three stages which Mr. ABERNETHY has very accurately pointed out in concussion of the brain; coma, accompanied with very different symptoms, and modified in degree, being present throughout. 5th, The circulating fluid itself may be more or less changed; it either being of a darker colour, and in a less decarbonised state, than in health; or having entirely lost the power of coagulating, or presenting a coagulum of a weak or dissolved texture. (See BLOOD, § 94.) In addition to this state of the circulating fluid, congestion of the cerebral vessels and increased action of the heart may exist, as in the advanced stages of malignant, exanthematous, and febrile diseases; these associated lesions may be also preceded by, or coexistent with, depressed vital or organic nervous energy of the encephalon. 6th, Effusion of blood or serous fluid within the brain will give rise to profound coma, generally as a consequence of either the first, second, third, or fourth preceding states, occurring either primarily, or in the advanced progress of febrile diseases.

14. *B.* It must be evident, that a successful treatment of coma, under the numerous circumstances and diversified forms in which it presents itself in practice, must be based upon a recognition of the pathological states that occasion it. But how are these states to be ascertained? The difficulty even of an approximation to this knowledge is doubtless great; but the practical results, to which the information leads, are of the utmost importance, as respects both the issue, and the reputation of the physician. I shall therefore offer a few remarks, with the view of facilitating the investigation of this subject, and placing our intentions of cure upon a rational basis. *a.* In the *first* of the above pathological states, the pulse is weak, soft, unequal, or intermitting; the pulsation of the carotids is smaller, weaker, and softer than natural; the breathing is soft, slow, or laboured, but without stertor; the limbs and muscles are relaxed, and deprived of sensibility; the surface is pale, cool, moist or clammy, particularly the extremities; the head is cool, or at least not above, frequently below, the natural temperature; the countenance is pale or sunk;

he eyes open, without suffusion, and the pupils dilated; the tongue is soft, flabby, and broad, unless in the last stages of fever, when it is covered by a brown or dark fur; and the skin is dry or harsh. The feebleness and intermissions of the pulse, the depression of animal heat, and the loss of sensibility and voluntary motion, are generally in proportion to the exhaustion of vital power in the brain, and therefore important guides in the treatment of coma. *b.* The *second* pathological condition, or that of congestion, will vary in different cases, or even in different stages of the same case, from the depressed state of vascular action and animal heat, described above, to that now to be noticed. The pulse is oppressed, or full, slow, irregular, occasionally nearly natural, — in the carotids somewhat fuller, stronger, or more labouring, than in health, or in other parts where it can be felt; the respiration is either natural or slow, laborious or irregular; the countenance is slightly tumid, bloated, or livid; the eyes are somewhat suffused and prominent, the pupils dilated and insensible; the temperature of the head is occasionally natural, but more frequently slightly increased, and the face and scalp moist; the appearance of the tongue, as in the foregoing state, varies according as the coma is a primary or consecutive state of disease; the evacuations are either retained or passed insensibly; and sensibility, voluntary motion, and mental manifestation, are abolished in proportion to the extent of depression of the organic nervous influence of the brain, and of vascular congestion. This state may supervene on the former with more or less rapidity, and terminate either in a return to healthy action, or in the *third* and *fourth* states referred to. *c.* The *third* and *fourth* pathological states are different grades of vascular action, often arising out of the preceding: that consisting of active congestion or increased determination of blood through the cerebral vessels may present nearly the same symptoms as those characterising congestion, but in a much slighter degree; sensation and voluntary motion not being quite abolished; the coma being in its slighter grades, — as lethargy and coma vigil, very rarely coma somnalentum. The pulse and respiration may not be materially affected, or it may be merely accelerated; the temperature, even of the head, may also be natural, or but slightly increased, that of the extremities being depressed; the countenance may not be materially changed; in some cases it may be even sunk or depressed; but the carotids generally beat more fully and strongly than in health; and the mental manifestations are not merely more or less suppressed, but sometimes also disordered. The state of inflammatory action, and its consequences, give rise to phenomena of greater intensity than those now noticed, and which have been very fully described in another place. (See Brain, § 180.) *d.* The *fifth state* which I have referred to, as obtaining in some cases of coma, seldom occurs alone, but is associated with one or two of the preceding, particularly the *first*, *second*, or even the *third* conditions. It is characterised chiefly by a lurid, foul, dirty, or cachectic appearance of the surface; a sunk or sallow countenance; a frequent, soft, small, or broad and open pulse: by low delirium or typhomania; starting of the tendons, and picking of the bed-clothes; preceding and associated febrile, exanthematous, or malignant diseases; and by fœtor of the secretions and excretions. In some cases, when this state has come on rapidly, the tongue is merely broad, flabby, marked by the teeth at the edges, and covered by a creamy sordes; but in the last stage of acute diseases, it is deeply furred, or coated with a thick mucous sordes of a dark brown colour, often extending to the gums, and even to the lips. *e.* The *sixth and last* state, that of effusion, may be consequent upon any of the preceding, and be caused by one or more of them. If the effusion be sanguineous, the attack is often sudden; the respiration is generally stertorous, irregular, &c.; and signs of local paralysis may often be detected. (See Apoplexy.) If serum be effused, the coma is as profound as that caused by sanguineous effusion; but slower in its accession, and less frequently attended by stertorous breathing, and local paralysis; it is also more commonly preceded by signs of inflammation, active determination, or congestion of blood, within the head. (See Dropsy of the Encephalon.)

15. VI. Treatment. — The foregoing pathological states will often insensibly lapse into one another, as in concussion and inflammation of the brain, giving rise to distinct stages of these diseases, and requiring a different treatment for each; and, according as they may thus vary, so will their symptoms be modified; the principal phenomena connected with the cerebral functions, the pulse, the respiration, the animal temperature, the state of the head and carotids, &c. being the practitioner's guides in the direction and combination of his means of cure. These means will now require no further notice than a bare enumeration, as they are more fully discussed in the articles on the diseases in which coma, in one or other of its forms, most commonly presents itself.

16. *A.* The *first* pathological state (§ 13, 14. *a.*) requires stimulants and counter-irritants; but these remedies must be exhibited with much caution; as an excessive or inappropriate use of them might produce, even in the slighter cases of cerebral exhaustion, determination of blood to the head, and convert congestion into inflammation, — consequences which will frequently supervene, at least in a slight degree, as in concussion, notwithstanding the utmost care to avoid them. The preparations of ammonia, musk, and camphor, internally and externally employed; enemata, containing the same medicines, or the infusion of valerian, castor, assafœtida, or the terebinthinates; wine and cordials, given frequently and in small quantity; irritating or vesicating embrocations, cataplasms, sinapisms (Celsus, Aretæus, Paulus Æginera, to the head), and plasters, as well as moxas, and the cautery (Zacutus Lusitanus, Rhodius, and Severinus) applied to various parts, or even to the head itself; blisters to the nape of the neck, behind the ears, or to the head (Bonet, Lanzani, Sydenham); volatile substances held to the nostrils or applied to the temples; errhines (Cælius Aurelianus, &c.); urtication (Aretæus, Selti); galvanism and electricity (Hufeland, &c.); the affusion of warm, tepid, or, in some, cold water on the head; active and stimulating emetics (Riviere, Rigal, &c.); purgatives combined with stimulants, antispasmodics, and tonics;

cathartic clysters, conjoined with similar substances; the use of coffee and green tea, particularly when this state of disease has followed the ingestion of sedative or narcotic poisons, and after the stomach has been evacuated by emetics and the stomach pump, and washed out by the injection of warm water; are severally of use in this state of coma, and may be resorted to in various combinations, according to the circumstances and severity of the case. All these measures are, however, not equally applicable to every case where this pathological state may be presumed to exist; but the judgment and experience of the practitioner can alone enable him to employ them in an appropriate manner; the shades of difference in particular cases requiring certain means, or peculiar combinations of them, scarcely admitting of description, at least within the limits to which I am necessarily confined.

17. *B.* The *second* pathological state (§ 13, 14. *b.*), when closely verging, as it occasionally does, upon the first, will require several of the means enumerated with respect to it; whilst, when fully formed, and approaching that of active determination or congestion, but few of them are applicable. Much, however, will manifestly depend upon the habits and the constitution of the patient; upon the nature and duration of the disease of which coma is an advanced phenomenon; and upon the state of the pulse, the temperature of the head, and the character of the countenance. The *first* state is injured by blood-letting in any form, it being even not an infrequent consequence of inanition, or even of anæmia of the brain; but this second state will generally be benefited by depletion, and in proportion to its approximation to the *third* and *fourth* states described above (§ 13, 14. *c.*). The question chiefly is as to what extent it may be carried, and the manner in which it may be performed. In the majority of cases, local depletions, by cupping between the shoulders and nape of the neck, or by leeches applied behind the ears or on the neck and occiput; by simple scarifications by a lancet in the last-named situation in some cases; in others bleeding from the feet whilst they are placed in warm water, and cold or tepid water is being poured in a stream upon the head; and in certain instances the application of a number of leeches on the inside tops of the thighs, or about the anus; are the preferable modes of having recourse to depletion in this state of disease; but the extent to which the evacuation should be carried must entirely depend upon the symptoms and circumstances of the case, and the effects produced by it. In addition to this important means, purgatives ought to be given by the mouth, and their action increased by cathartic clysters, in which either assafœtida, valerian, camphor, the terebinthinates, or other antispasmodics and stimulants, may be also exhibited. Counter-irritants and derivatives should be applied, but at a distance from the head; and, while a frequent operation of the bowels is procured, the functions of the skin and kidneys should be promoted by diaphoretics and diuretics, the extremities being kept warm, the head cool, its hair cut off, and the shoulders highly elevated. In many instances of this state, even local depletion should be cautiously employed; and in these, as well as in others, much advantage will often accrue from having recourse to restorative means. It is in this pathological condition of coma, and in those about to be noticed, that oil of turpentine, in large doses, so as to act freely on the bowels, has proved so beneficial in my practice. This state very generally obtains in coma from narcotics and spirituous liquors; and is then, especially, very remarkably benefited by the cold affusion on the head, and the preparations of ammonia.

18. *C.* The *third* and *fourth* states (§ 13, 14. *c.*) require nearly the same treatment as the second, but carried much further; general and local depletion, cold affusion on the head, or the application of ice, or evaporating lotions; the most active cathartics, clysters, and derivants or counter-irritants, and the other measures, as fully pointed out in the article on *Inflammation of the* BRAIN (§ 174.), When these states have gone on to effusion either of blood or of serum, — the *sixth* pathological condition adduced, — the treatment recommended in APOPLEXY and in DROPSY OF THE ENCEPHALON (see these articles) should be employed.

19. *D.* The *fifth* pathological state obviously requires stimulants, tonics, and antiseptics, particularly camphor in considerable doses; the chlorides of soda, potash, &c.; wine, with cordials, spices, &c.; bark, with camphor; purgatives conjoined with stimulants, so as to excite the eliminating or depuratory functions; cathartic, tonic, and antiseptic clysters; calomel, combined with camphor and ammonia, or musk; the turpentines given by the mouth, and in enemata, with capsicum and aromatics; external derivation and counter-irritation; the various balsams, with the chlorides, &c.; quinine, with the aromatic sulphuric acid; the preparations of cinchona or cascarilla with soda, or with the muriatic acid, or muriatic æther; Cayenne pepper internally, as well as externally in camphorated embrocations, &c. When coma is consequent upon the retrocession of gout, rheumatism, erysipelas, or cutaneous eruptions, the propriety of having recourse to sinapisms, rubefacient pediluvia, and other derivatives, in addition to such other means as the symptoms of the case may suggest, must be obvious. If it follow suppressed discharges, we should endeavour to restore these, or produce one supplemental of them. (See the treatment of the diseases of which coma is most frequently an important symptom.)

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CONCRETIONS, Biliary. — **Syn.** *Calculi or Lapilli Cystici*; *Calculi Fellei*; *C. Biliares*; *C. Biliarii*; *Cholelithi*; *Hepatalgia Calculosa*; Var. Auct. *Concrementa Biliaria*, Soemmerring. *Chololithus*, Good. *Calculs Biliares*, Fr. *Die Gallenstein*, Ger. *Gall-stones.*

Classif. 1. *Class*, Cœliaca; 2. *Order*, Splanchnica, *Gen. iii.* (*Good*). I. Class, II. Order (*Author*).

1. **Defin.** *Concretions formed in the bile-passages, and occasioning in many instances more or less disturbance, with paroxysms of pain commonly referred to the right epigastrium and hypochondrium, reaching to the back, &c., with increased suffering whilst passing into the alimentary canal, and often giving rise to sickness or vomiting, to jaundice, and severe attacks of colic.*

2. Biliary concretions were first noticed by Benevenius, Fallopius, Vesalius, Kentmann, and Fernelius, who were nearly contemporaries. They were afterwards more accurately described by Glisson, Hoffmann, Morgagni, Bianchi, Boerhaave, Van Swieten, and particularly by Haller; and the more recent researches of Heberden, Soemmerring, Thomson, Thenard, Bostock, Merat, and Chevreul, have greatly advanced our knowledge of their nature and pathological relations. Notwithstanding the frequency of these concretions, and the very serious symptoms they occasion, but little attention has been paid to them by practical writers since the appearance of Soemmerring's *Treatise;* and they have been nearly overlooked by the majority of systematic writers. Haller remarks (what every pathologist will acknowledge), that they are infinitely more frequently found in post mortem researches than calculi of the urinary passages; and Heberden agrees with him in admitting that, while urinary calculi are much more common in the male, biliary concretions are most frequent in the female sex — probably in the proportion of one in the former, to four or five in the latter.

3. I. **Description.** — Biliary concretions vary remarkably as to form, size, number, and colour, as well as composition. *a.* They may exist in any *number* — from one to a thousand, or even more. Morgagni, Walter, and Baillie, have found the latter number; and Soemmerring, with many of the authors referred to at the end of the article, have observed from fifty to several hundreds, and even upwards, either in the gall-bladder, or in the ramifications of the hepatic ducts. When thus numerous, they are usually very small — the size of pin-heads, or but little larger — of a dark brown, green, or greenish yellow colour, sometimes almost filling the gall-bladder, and occasionally slightly agglutinated by thick bile. More frequently, however, a small number, or two, three, or four are detected, and very often only one. When only two or three are found, they sometimes are jointed into each other, or have their opposite surfaces smooth or flat. In rare instances they seem divided by a septum. *b.* When one, two, or three only exist, they are usually large, but they seldom reach the *size* of a hen's egg, or are much larger than a walnut. Dr. Saunders, however, has found one of the bulk and figure of the gall-bladder, which it filled. They are not infrequently as large as a pigeon's egg, or as a hazel nut; and are often found from that size downwards. *c.* Their *colour* varies through every shade of black, green, brown, yellow, white, &c., that of the surface often differing from the centres and certain of their layers. They are often beautifully mottled or marbled; sometimes white and shining like spermaceti; at other times dull like wax; occasionally lamellated; often crystallised or striated, either with or without distinct centres, which are frequently different in colour and composition from the portions crystallised or collected around them. They are also more or less opaque, or slightly translucent. *d.* Their *form* varies from a round, oval, or oblong — when they are solitary — to a cone, a cube, pentagon, polygon, &c., when more numerous. They are usually smooth, sometimes polished, particularly the surfaces that have been in contact with each other; more rarely rough or glabrous, and occasionally they appear as broken into fragments. *e.* Their *consistence* also varies from what is barely sufficient to preserve their form, to that which does not yield to the pressure of the finger, and is divided by a knife with difficulty. *f.* Their *specific gravity* is much more frequently below, than above, that of water; consequently, they are commonly found swimming on the surface of water when the evacuations are mixed with it.

4. *Situation and Composition.* — Biliary concretions have been found in every part of the biliary passages: — 1st, In the radicles of the hepatic ducts; 2d, In the hepatic duct, and its ramifications; 3d, In the cystic duct; 4th, In the gall-bladder; and, 5th, In the common duct. They have been likewise found in every part of the intestines, in their passage out of the body; and, in rare instances, in the stomach, whence they have been observed to have been ejected by vomiting. These concretions are often the result of obstruction to the course of the bile; and are then generally found to consist of an admixture of inspissated bile with mucus. But more frequently they are a consequence of an alteration of this fluid from its healthy constitution, as respects either the presence of elements foreign to it, or the superabundance of those which are the least soluble, and which are precipitated during the retention or accumulation of bile in the ducts and gall-bladder; the latter being most commonly the case. Of this description are the concretions formed of a crystallisable fatty matter described by Poulletier de la Salle and Fourcroy, under the name of adipocire, afterwards by Marcet, Bostock, &c., and named *cholesterine* by Chevreul. Some biliary calculi consist almost entirely of this substance. Others are formed of mucus and the thickened yellow matter, or the resin, of bile; and many are composed of cholesterine, the yellow matter, and the resin. Instances

of concretions different from these in composition have been noticed by **Marcet**, **Orfila**, and **Caventou**, but they are very rare. The greater part of these that consist of cholesterine have inspissated bile for nuclei, which, having passed along the hepatic ducts into the gall-bladder, form the centres around which the cholesterine crystallises. All these are soluble in warm alcohol, which deposits the solution in brilliant crystallised plates when cold; also in spirit of turpentine, and in the æthers, or in an admixture of turpentine and æther, leaving more or less of a residuum, according to the quantity of mucus or animal matter they contain. They also form a soapy solution in the caustic alkalies, melt at a high temperature, are inflammable, and insoluble in water.

5. The formation of biliary concretions in the radicles of the bile-ducts has been disputed; but M. **Cruveilhier** has given a very fine illustration of this rare occurrence in his excellent pathological work. When found in this situation, they generally consist of very small grains, of variable size and form, and of a dark green colour, disseminated through the healthy structure of the liver, and are formed chiefly of inspissated bile. Biliary concretions are most commonly found in the gall-bladder, and are usually the consequence of the remora or accumulation of bile; the absorption that takes place of its watery parts during its retention probably occasioning the precipitation or concretion of such of its more solid ingredients as it can no longer hold in solution or in suspension. **Soemmerring**, however, supposes that they form very rapidly, without any absorption or inspissation of the retained secretion; and this is probably more frequently the case, particularly in respect of those consisting chiefly of cholesterine, and when irritation of the internal surface of the gall bladder produces a morbid secretion, which may combine with the less soluble ingredients of bile, or dispose them to crystallise, particularly when they are secreted in larger quantity than natural, owing to a defect of the assimilating functions, and consequent accumulations of the elements of a morbid biliary secretion in the blood.

6. II. **Symptoms.** — Calculi in the gall-bladder seldom give rise to any marked or definite symptom unless they are very large, obstruct the outlet of this receptacle, or excite inflammation of its mucous surface. Every experienced practitioner must have met with cases in which these concretions have been evacuated, and others also in which the gall-bladder has been found, after death, filled with them, without any ailment referrible to this organ having been complained of. The symptoms, therefore, usually stated to proceed from concretions in the gall-bladder should be viewed with limitations, inasmuch as they are not necessarily consequent upon their actual presence in it, and as they may proceed from some other pathological states. But, whilst we should view these symptoms with caution, we ought not to reject them; for, although concretions may form, and even pass into the alimentary canal, without creating much disturbance, or giving rise to any symptom distinctive of the existing derangement, yet not infrequently their presence, particularly their passage from the gall-bladder into the intestines, occasions such a train of morbid phenomena, as will often enable the observing practitioner to form a correct diagnosis.

7. *A. Of calculi in the gall-bladder.* — Patients with biliary calculi often complain of a sense of weight and oppression at the epigastrium, and right hypochondrium, with cardialgia and various dyspeptic symptoms, especially after a meal, with constipation or slight irregularity of the bowels, an occasional deficiency of bile in the evacuations, and sallow or yellowish tint of the countenance and skin. In some cases a dull pain in the epigastrium, with a tympanitic fulness, is felt (**Strack**); and in lean persons, a distinct tumour below the anterior margin of the right ribs may occasionally be detected, particularly when signs of obstructed excretion of bile have previously existed, indicating its accumulation in the gall-bladder. These may be all the symptoms, and often so slight as not particularly to interest the patient; they may, even when most evident, continue a longer or shorter time, until, at last, the pain and uneasiness increase, — especially when the patient turns, or lies upon the left side, uses exertion, rises quickly to the erect posture, takes a full inspiration, or soon after a meal, — and extend to the right hypochondrium, to the back or right shoulder-blade, sometimes to the right breast, shoulder, arm, and side of the neck, and even throughout the abdomen, particularly to the right flank and hip.

8. *B. The symptoms indicating the passage of concretions into the intestines* may not differ materially from the above, excepting in their severity and duration; and they often have little relation to the size of the calculus. When the concretions still remain in the gall-bladder, they occasion either little or no disturbance, or such as has been now described, in a more or less continued form. But when they are passing along the ducts, the symptoms are often very sudden in their invasion, of much greater intensity, of shorter duration, and generally recur in paroxysms. The pain is then frequently very acute, is attended by nausea, flatulence, or vomiting, by a bitter taste in the mouth, acid or bitter eructations, irregularity of bowels, colic, or distension of the abdomen, &c., and is followed by either a complete jaundice, or a slight yellow tint about the eyes or lips, the cheeks being clear. This discolouration commonly passes off soon after the paroxysms of suffering, which often come on about two hours after a full meal, and it either recurs along with, or follows closely upon, them; but it is not, nor, indeed, any of the symptoms enumerated, constantly observed, as **Coe**, **J. P. Frank**, and others, have demonstrated, and as every experienced practitioner must have remarked, even when large concretions have found their way into the bowels. The pulse is generally unaffected, and there is no fever, unless in the more violent seizures, or after their frequent recurrence or long duration; when, in addition to these symptoms, loss of flesh and strength, a furred, loaded, dark yellowish tongue, great restlessness, anxiety, and tenderness at the epigastrium, and right hypochondrium, are observed. The intervals between the attacks are extremely variable. Sometimes the paroxysms are periodic; and are evidently owing, on these, as well as on other occasions, either to some change in the position of the concretions, or their passage into the intestines,

or to inflammation produced by them in the gall-bladder and ducts. In many instances they are most excruciating; the patient is bent double, rolls about in great agony and anxiety, or presses upon the epigastrium, and complains of an acute or lacerating pain in the region of the ducts and duodenum, either with leipothyma or syncope; or with retching, distension of the abdomen, and severe colic. Females — who are most subject to these seizures — sometimes experience more suffering from them, than from parturition; and even in them the pulse may not be affected. The bowels are more frequently constipated than relaxed, and the motions are often devoid of bile, although diarrhœa be present. The most acute attacks may terminate as suddenly as they commenced, the patient soon recovering his strength and functions, unless more calculi remain to be passed. They are usually of short duration — not exceeding a few hours; but they become longer after their repetition, sometimes at last continuing several days, with partial remissions. Occasionally they are preceded by a sensation of something unusual, or alive, in the region of the stomach, or in various parts of the abdomen; and attended by dryness or slight pain of the throat, thirst; inability to straighten the trunk, or to keep it erect; by scanty, orange, or high coloured urine, and slight strangury.

9. C. *The affections and lesions sometimes caused by biliary concretions* attach to themselves much interest. In some cases, violent convulsive motions come on, from the pain and irritation they occasion, either with or without vertigo, headach, and cerebral congestion. Mental depression, obstinate dyspepsia, hypochondriasis, and melancholia; also flatulent and colicky states of the bowels, constipation, and diarrhœa; are not only frequent attendants upon, but also consequences of, biliary concretions. The less common disorders they occasion are, dyspnœa, syncope, slow remittent states of fever, hæmorrhoids, suppres-pression of the catamenia, and apoplexy (BURSERI). The effects produced by them upon the gall-bladder and ducts are often most important; inflammation, thickening of their coats, ulceration, great dilatation of the ducts, adhesion of them, or of the gall-bladder, to the duodenum, or of the latter to the stomach, liver, or colon, or even to the parietes of the abdomen, with ulceration, and passage of the calculus into any of these parts of the digestive canal, or through an external opening at the right epigastrium, having been observed by several eminent authorities. COLOMBUS states, that, upon the examination of the body of the celebrated IGNATIUS LOYOLA, a biliary calculus was found to have ulcerated its way through the gall-bladder, into the trunk of the vena porta. CHESELDEN mentions a case in which two large calculi made their way, by inflammation and ulceration, through the abdominal parietes; and similar instances are recorded by HOFFMANN and CRELL, in one of which about eighty small calculi passed out through a sinuous ulceration below the right ribs. TOLET states a case in which a biliary concretion of the size of a pigeon's egg was discharged from an ulceration at the umbilicus; and BUETTNER saw thirty-eight calculi discharged in the same situation. SCHURIG mentions an instance of two such concretions having een taken from an abscess in the anterior abdominal parietes, opened by FABRICIUS; and cases have been recorded by BLOCK, HALLER, WINCKEL, DIXON, CALLOWAY, and BAFFOS, of tumours having formed below the cartilages of the right false ribs, followed by inflammation, ulceration, and the discharge of biliary calculi of various sizes. SOEMMERRING states, that he has a preparation of a gall-bladder filled with concretions, and having an ulcer at its fundus, through which one of them had escaped. J. P. FRANK found, in the body of a woman who died during the puerperal state, the gall-bladder ruptured, and containing calculi, to which he attributes the rupture; and he met with another case in which the calculi had occasioned abscess and rupture of this viscus. Mr. BRAYNE has detailed an interesting case, in which adhesion of the gall-bladder to the duodenum had occurred, and in the centre of this adhesion an ulceration into the intestine had taken place, through which a very large calculus had passed, and been discharged by stool, a considerable period before the death of the patient; and similar instances are alluded to by Dr. SAUNDERS, as having been observed by Dr. CHESTON and Mr. CLINE. It is not improbable, that in some of the instances on record, in which biliary concretions have been voided by vomiting, adhesions of the gall-bladder to the stomach had taken place, and the concretion had made its way by ulceration at the place of adhesion into this viscus, from whence it had been ejected. A reference to the cases recorded by SCHURIG, ORTESCH, and BIONDI, in which biliary concretions had been evacuated from the stomach, will show that this is not an unreasonable inference.

10. Besides the usual appearances produced by inflammatory action in the coats of the gall-bladder, viz. adhesion to adjoining parts, thickening, ulceration, &c., they have been found almost or altogether destroyed by suppurative ulceration. In a case detailed by Dr. SCOTT, they were half an inch in thickness; and HALLER observed them destroyed by suppuration and ulceration — the calculus that had caused the inflammation lying in the midst of a disorganised and puriform matter. Obturation of the ducts has been often found on dissection, the gall-bladder being at the same time enormously distended by accumulated bile. In many cases, the ducts have been found very much dilated after the passage of large calculi through them. Such cases have been recorded by WALTER, DIETRICH, RICHTER, THOMAS, CRAIGIE, &c. HEISTER found the common duct dilated so as to admit his little finger. MORGAGNI states, that he has observed the same duct so wide that its diameter was nearly two fingers' breadth; and SOEMMERRING has preserved, in his museum, several specimens of great dilatation of this canal. RUYSCH and BLUMENBACH have found biliary concretions in the substance of the liver; and others that had perforated the cystic duct, and caused ulcerations of both the liver and duodenum. WALTER observed the ramifications of the hepatic duct, throughout nearly all the liver, enormously dilated, and filled with bile and some thousand small calculi; and CRUVEILHIER and myself have met with very great distension of all the ramifications of this duct, with thickening of its coats, and concretions mixed with viscid bile throughout their canals. It is obvious that concretions, either in

the hepatic ducts or in the gall-bladder, will sometimes give rise to very serious disease of the liver itself. A torpid state of this viscus, so frequently observed in connection with their formation, is rather their cause than their effect. Hence obstruction of the liver, and its consequences, particularly dropsy in some one of the shut cavities, or the cellular tissue, are of more frequent occurrence than inflammation of this organ; but, nevertheless, both acute hepatitis and abscess of the liver have been sometimes met with, owing to biliary concretions.

11. *D.* When biliary concretions, particularly those of a large size, have passed into the intestinal canal, they often give rise to very severe and even dangerous symptoms. Cases have been referred to in the article Cæcum, in which I had seen fatal results, consequent upon the passage of biliary calculi into the appendix of the cæcum, they having produced inflammation, ulceration, or gangrene of this process, and, consecutively, fatal peritonitis: and, in the case recorded by Civadier, where a biliary concretion had escaped by an ulceration in the right groin, it is very probable that it had passed out through the cæcum, by inducing inflammation and ulceration of this part. The more common consequences, however, are, thirst, constipation of the bowels, colicky pains, sometimes tenderness on pressure referred to a particular part of the abdomen, followed by tenesmus, alvine evacuations, and the passage of the calculus. When it is very large, the symptoms will be the same as enumerated with reference to *Intestinal* Concretions, or it will produce severe colic or ileus. Instances of fatal results, sometimes occurring very rapidly, from biliary calculi, have been adduced by several of the authors already named, as well as by Bianchi and Richter; those of a slower progress have presented, with various organic lesions and dropsical effusions into the large cavities, — consequences which have sometimes not appeared until a remote period from the voiding of concretions.

12. III. Causes. — Biliary concretions occur much more frequently in the female than in the male sex, and during the decline of life, than at an early age. They are very rarely met with much before the prime of life, and still more rarely in children. Their generation is favoured by the phlegmatic, bilious, and melancholic temperaments; by the violent or depressing passions — particularly anger, sadness, anxiety, &c.; the use of spirits; by sedentary occupations, rich and full living; protracted sleep; by sitting with the body bent forwards after meals (Hoffmann, Van Swieten, Coe); by chronic dyspepsia and costiveness; and by imperfect assimilation and corpulency. Torpid or disordered function of the liver and gall-bladder; inaction of the latter and of its ducts; and a vitiated secretion of the bile itself; are obviously connected with the production of these concretions. Several writers have supposed that they arise from a putrescent state of the bile retained in the gall-bladder; but, as Goldwitz and Soemmerring have shown, this change, even granting it to occur, would rather prevent than favour their production. Various writers, as Leake, suppose that they are formed from the inspissation of the bile in the gall-bladder, from absorption of its watery parts: but this cannot be the only or even a principal cause, as we often find this secretion remarkably thickened from long retention in this receptacle, without such formations. The absorption can, therefore, only favour the occurrence of other changes in the bile, to which certain peculiarities in its composition strongly dispose it. The very small concretions which occur in the ramifications of the hepatic duct generally consist of inspissated bile and mucus; and these, as they pass into the trunk of this duct, or are carried into the gall-bladder, may become the nuclei around which the superabundant cholesterine in the bile collected in the gall-bladder or in the ducts may crystallise; the increased quantity of this fatty matter in the bile being the chief pathological condition connected with their formation. As far as my own observation has extended, these concretions have occurred in persons whose assimilating functions have been imperfect. That the liver performs an assimilating as well as a secreting office, has been shown by me in another work (see *Appendix* to Richerand's *Physiology*, p. 580.); and when, either from torpid function of this organ, or from imperfect action of the other assimilating viscera, the chyle is not perfectly animalised, fatty matter abounds in the circulation, and is modified into cholesterine during its excretion by the liver — that portion of it which the watery parts of the bile cannot preserve in solution, crystallising into biliary concretions upon the occurrence of the circumstances favouring this change. The fact, that these concretions are most commonly met with in fat persons, in whom assimilation is defective, and at that period of life when it begins to flag, — imperfect assimilation causing the superabundance of fatty matter in the circulation, and its consequent deposition in the adipose tissue — seems a strong proof in favour of this opinion, which is further confirmed by the circumstance of my having observed the serum whitish or milky on two occasions on which blood was taken from persons with biliary calculi, — an appearance now demonstrated to arise from the superabundance of fatty matter in the serum (see Blood, § 104.). I need not occupy my limits with the various speculations, or opinions, entertained by authors respecting the remote as well as pathological causes of biliary concretions, particularly as the most of them have been found to be erroneous. Those who are curious respecting them, will find almost all of any consequence that has been adduced on the subject, in the references at the end of the article, and particularly in the works of Coe and Soemmerring.

13. IV. The Diagnosis and Prognosis can only be inferred from the entire history and contingent circumstances of the case; as there are no symptoms, which, from their constant presence, or relation to certain pathological conditions, will of themselves enable the practitioner to form a correct judgment as to the precise nature or result of the disease: and yet the experienced and observing will very generally draw tolerably correct conclusions as to both, from reasoning on the procession, relation, or grouping, of the symptoms present: and, although the disease is not frequently fatal, he will often have reason to be cautious in hazarding an opinion as to the ultimate or remote result; especially as the same morbid condition of the system that

gives rise to these concretions, often occasions other dangerous maladies, even although the concretions themselves do not produce any fatal lesion, or even serious disorder.

14. V. TREATMENT.— The measures required in cases where the concretions are presumed to be in the gall-bladder, are somewhat different from those, which their passage along the ducts usually demands. 1st. When the symptoms lead us to suspect the presence of concretions in the gall-bladder, the medicines recommended by SOEMMERRING may be prescribed in various states of combination. These consist of the sub-carbonates of the fixed alkalies, the muriate of ammonia, the acetate of potass, the spiritus ætheris nitrici, the liquor potassæ, Castile soap, the extracts or decoctions of taraxacum, herba saponaria, the fumaria, &c. It is obvious that deobstruent aperients, and the above medicines, will often have much influence in improving the biliary secretion, and promoting its discharge into the duodenum, particularly when the patient takes regular exercise in the open air, and saline mineral waters. The remedy of DURANDE, consisting of three parts of the spiritus ætheris sulphur. comp., or the sulphuric æther, and two of rectified spirits of turpentine, given in doses of half a drachm to a drachm, has been much employed on the Continent; and, although it generally occasions unpleasant eructations, and sometimes increases the sickness, it has received the commendations of SOEMMERRING and RICHTER, who advise it to be given after the exhibition of emollient, resolvent, and aperient remedies; and to be followed, particularly in cases where the passage of the concretions along the ducts is suspected, by the repeated use of gentle laxatives. I have prescribed the remedy of DURANDE in somewhat larger doses, and combined with it the tinct. of hyoscyamus, and certainly with marked benefit. Numerous French and German writers speak favourably of this medicine, while others fear its effects in cases where inflammatory action may exist. But my experience has proved that it will not aggravate such action, and far less give rise to it.

15. The *deobstruent* medicines that are most to be depended upon in this state of disease, are, the extract or decoction of taraxacum in large doses, with the alkalies (F. 77. 391.), the subcarbonates, the acetates, or the sub-borates of the alkalies; or with soap, ammoniacum, blue pill, small doses of vini antimonii tartarizati, and the æthers (F. 397. 503—510. 837.). After these have been exhibited for some time, DURANDE's remedy may be taken on the surface of any fluid, or mixed in the yolk of an egg. Active purgatives or cathartics are upon the whole less beneficial than a frequent repetition of *laxatives*, or of such purgatives as are gentle and emollient in their operation; and even these, when exhibited early, are generally less successful than when deferred to a more advanced stage of the treatment. The oleum ricini, in doses of about one or two drachms, triturated with mucilage, or with the yolk of an egg, and repeated every five or six hours until it operates, manna, the oleum olivæ, the acetate of potass, &c., and warm milk whey, are the most appropriate laxatives. In many instances, a full dose of calomel, or five grains of blue pill, may precede their exhibition, as either of these often proves beneficial, especially when combined with a full dose of hyoscyamus, and about a grain of camphor, and without any risk of those unpleasant effects imputed to it, or rather dreaded from it, by various Continental writers. The operation of *laxatives* should be promoted by the exhibition of oleaginous, saponaceous, and emollient *clysters*. As to the use of *emetics*, opposite opinions have been advanced. HOFFMANN, DURANDE, and FRANK very justly express themselves decidedly against them; and, indeed, BERTIN declares that he has met with cases, in which they caused rupture of the gall-bladder, its duct being obstructed by a calculus.

16. 2d. Those cases in which the symptoms indicate the passage of concretions into the bowels (§ 8.) require, in addition to the means above enumerated, warm anodyne fomentations; the belladonna plaster placed over the right hypochondrium; the exhibition either of this narcotic internally, or of the acetate of morphine, opium, or hyoscyamus; the remedy of DURANDE, or the combination of it with one or other of the medicines now mentioned. In some cases, an anodyne and discutient liniment (F. 297. 313.) may be placed over a warm poultice, and applied to the chief seat of pain. Local or general *depletion* is seldom of much service either in this or the preceding state of the disease, unless the existence of vascular plethora, or of tenderness of the hypochondrium and epigastrium, the state of the pulse, or habit of body, indicate it, when it should not be omitted. If tumour and tenderness of these regions, with other marks of inflammation of the gall-bladder and ducts, manifest themselves, general and local *blood-letting*, followed by poultices and fomentations, are requisite. In such cases, as well as in the more violent paroxysms of the malady, the treatment recommended by BRICHETEAU—of the success of which, in some very obstinate and instructive cases, he has adduced very striking proofs — may be put in practice. This consists of the application of a bladder, containing pieces of ice, over the seat of pain; of repeating it, as soon as the ice is dissolved, until relief is obtained; and of administering subsequently mild laxatives and clysters until the bowels are freely evacuated. MERAT had previously advised the injection of cold enemata; and DURANDE, of those which are tepid; but the cases adduced by BRICHETEAU seem conclusive of the superior efficacy of the means he has recommended. PETIT has contended for the propriety of making an early opening into such tumours at their more prominent part, with the view of evacuating the calculi, or the accumulated bile, which the gall-bladder cannot expel owing to occlusion of its duct. But the incertitude of adhesions having been formed between its fundus and the abdominal parietes, and of success even although they have actually taken place, must prevent every physician from directing the performance of this operation. In the majority of cases, the tumour will point outwardly, and either open spontaneously, or arrive at that stage which will warrant the artificial opening of it if the adhesion have formed. Even in three such cases, MORGAGNI found only one which healed up favourably; the other two long remaining in the state of fistulous ulcerations. — "Ergo non, nisi in adhesione vesiculæ felleæ ad integu-

menta abdominalia, tentenda exulceratio est, vel apertura artificiosa." (Soemmerring.)

17. 3d. When the previous ailments and the existing symptoms indicate that the concretions have passed into the bowels, the use of gentle laxatives, as advised above, or the treatment directed with respect to *Intestinal* Concretions, and Colic, is strictly appropriate. In some instances, when the calculi are large, they will give rise to much suffering referred to the cæcum, the sigmoid flexure of the colon, and to the rectum; they occasioning, in this last situation, constipation, colic, and urgent tenesmus. In these cases, the rectum should be carefully examined, and mechanical as well as medical means used to facilitate the passage of the concretion.

18. 4th. After the patient has been relieved, and, indeed, during the continuance of the treatment, the evacuations should be carefully examined, and mixed with water, with the view of detecting the concretions,—this being of much importance as respects not merely the diagnosis, but also the treatment. If we have reason, either from their presence in the motions, or from the disappearance of ailment, to presume that they have been evacuated, remedies ought to be prescribed with the view of improving the digestive, assimilating, and biliary functions. The use of taraxacum with soda, &c. (F. 76. 392.); of gentle and deobstruent aperients; of vegetable bitters, with the alkaline preparations, and laxatives; regular exercise; light digestible food, and ripe fruits; a moderate use of lean but fresh meat; the strict avoidance of fatty substances and of spiritous liquors, of mental disquietude, and of all the exciting causes (§ 12.); should be enjoined, and the patient recommended change of air, the Cheltenham or Leamington mineral waters, and the artificial waters of Seidlitz, Scheidchutz, Eger, Pyrmont, Spa, and Carlsbad, according as they may be respectively appropriate to the circumstances of particular cases.

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CONCRETIONS — INTESTINAL.

Syn.—*Alvine Concretions; Alvine Calculi*, Monro. *Calculous Concretions*, Andral. *Intestinal Calculi; Enterolithus*, Good.

Classif.—I. Class, II. Order (*Author*, in *Preface*).

1. Defin. *Substances accreted into solid masses in some part of the alimentary canal, chiefly owing to imperfect action of the digestive functions and nature of the ingesta, and giving rise to dangerous states of disease.*

2. I. Calculous Concretions occasionally form in various parts of the human alimentary canal; and, although generally the result of weak digestive function, hence, a consequence of disease, they are, in some cases, the chief cause of extreme suffering and danger. They are most commonly found in some part of the intestines, particularly the cæcum and large bowels; but they are sometimes also formed in the stomach, and there reach a very large size. Bonetus, in his *Sepulcretum Anatomicum*, relates two cases, in each of which a stone as large as a hen's egg, and weighing four ounces, was found in the stomach; and a third case, in which this viscus contained nine calculi weighing together three ounces and a half.

3. i. Origin and Composition.—Intestinal concretions are of several kinds, varying extremely in their nature and origin. In very rare instances they have assumed the appearance of *bezoars*, as in the case recorded by MM. Champion and Bracconnot, who ascertained their nature by chemical analysis. In some cases, they consist chiefly of earthy deposits, in obscurely crystallised layers, around a distinct nucleus; in others, they are formed principally from those parts of the ingesta which are incapable of change during the digestive processes. The concretions which Dr. Good names intestinal calculi, and which consist chiefly of earthy deposits, are found in the human intestines, as well as in the alimentary canal of the larger ruminating animals. They are generally formed in concentric layers, and are often radiated, sometimes very obscurely, from nuclei, which are either gall-stones, or some hard foreign body. They are more or less porous, either spheroidal

or oblong, and vary from the size of a pea to that of a hen's egg; and sometimes reaching a much larger size.

4. With respect to their *origin*, they may be divided into three varieties: — 1st. Those which have arisen from nuclei formed either in the alimentary canal, or in the biliary apparatus, such as gall-stones, inspissated mucus, &c., around which certain saline and animal particles have attached themselves during their abode in the intestines. 2d. Those having nuclei consisting of foreign bodies, such as fruit-stones, seeds, or the husks of seeds, fragments of bones, &c., around which the alimentary particles have collected and crystallised, so that without the presence of the nucleus the calculus would not have been formed: and, 3d. Those which are formed entirely in the alimentary canal, and which are generally more or less homogeneous, and present no distinct nuclei.

5. The concretions of the *first* class have their nuclei or central part composed chiefly of cholesterine, the yellow colouring matter and the resin of the bile, surrounded by layers of a mixture of the phosphate of lime, and of the ammoniaco-magnesian phosphate, with animal matter. **Haller** supposed that the saline constituents of these, and, indeed, all the other calculi, were furnished by the pancreatic juice; and that the resinous parts were derived from the bile. That such are the chief, although not the only, sources of these constituents respectively, will not, I think, be disputed.

6. Those belonging to the *second* class are nearly similar as respects their outer layers; their central parts varying according to the nature of the substance or substances forming their nuclei. This kind of intestinal calculi are not infrequent in those parts of Scotland where the inhabitants live chiefly upon oaten bread; the beard and fibres of the husks of the oat resisting digestion, and collecting together, so as to form concretions or nuclei, around which saline matter, with accessions of these fibres, collect. The external layers of the calculus formed from this source are generally solid, compact, soft to the touch, and composed of saline matter: in other instances, the outer layer has a velvety appearance, and consists of very fine fibres closely united. Dr. **Marcet** found these concretions to consist of compact layers of fibrous substances and of phosphates. The following is his analysis: —In 100 parts, 25·20 were animal matter; 3·90, resin; 5·16, ammoniaco-magnesian phosphate; 45·34, phosphate of lime; and 20·30, vegetable fibres. The vegetable fibres were cemented together by deposits of earthy matter, and the animal matter.

7. Some of those concretions very nearly approach those of the *third* class, and present no distinct nucleus, being merely an agglutinated mass of vegetable fibres with inspissated mucus and earthy phosphates, sometimes containing other foreign ingredients or accidental ingesta.

8. Other concretions are formed in the intestines of persons who have taken large quantities of magnesia or chalk, with the view of preserving an open state of the bowels, or of correcting acidity in the stomach. The concretions, in these cases, consist of those earthy bodies cemented together by thick mucus. These concretions are, in some instances, merely agglomerated masses; in others, they are indistinctly disposed in layers: they seldom have any proper nucleus, and belong rather to this *third* class, than to any of the foregoing. To this division are also to be referred those concretions which are formed of fæcal matters with earthy phosphates, and inspissated secretions sometimes hardened to the consistence of calculi.

9. *Number*, *Size*, *Colour*, &c.—There are seldom more than two concretions in the intestinal canal, but a greater number is occasionally found. **Bonet** met with nine in the stomach, **Lanzoni** with ten, and **Bilguer** with thirty in this viscus. The first **Monro** detected by the touch twelve concretions in the colon of a boy who was much emaciated; and various authors make mention of as great, as well as of a lower number. The *colour* of the smaller concretions nearly resembles that of iron ochre: the larger concretions are generally externally of a coffee colour, sometimes approaching to purple; and occasionally they have a whitish surface. The different layers often present a slight difference in the deepness of shade. They are sometimes so hard as to admit of an imperfect polish. Some of the calculi have been found extremely large. The first **Monro** met with them five, six, seven, and even eight inches in circumference; and the second **Monro** removed from the colon of a woman one which weighed four pounds. The larger calculi are generally more irregular in figure than the smaller. This may be owing to the additions made to their surface during the time they remain fixed within a certain portion of the canal. Where more than one are found, they often indent each other, or form, as it were, parts of one long concretion, as in the instance of the very large one, which weighed upwards of twelve ounces, and consisted of three parts, recorded by Mr. **Torbet** (*Edin. Med. and Surg. Jour.* vol. xxiv. p. 87.).

10. ii. The **Causes** of these *concretions* are, sedentary occupations, inactivity, and indolence; a slow, weak, and torpid state of all the digestive functions; deficient vital energy of the assimilating organs (§ 4, 5, 6.); a long, free, and injudicious use of magnesia, prepared chalk, and other calcareous earths, for the purpose of correcting acidity of the stomach (§ 7.), &c.; portions of the husk and beard of the oat, from living upon oaten bread, &c.; swallowing incautiously fragments of bones, stones of fruit, or seeds; and an habitual neglect of the state of the bowels.

11. iii. Their **Local Effects.**—When these concretions reach a large size, they interrupt the functions of the intestinal canal, preventing the passage of the fæces, and occasion dilatation of the bowel above the place in which they are lodged, followed by inflammation, ileus, &c. In more favourable cases, they expand the intestines surrounding them into a sac, which in process of time acquires considerable thickness. Dr. **Monro**, in his very able chapter on alvine calculi, describes three cases in which the cæcum was extended into the form of a sac, the muscular fibres of which were hypertrophied, and the mucous membrane thickened and corrugated. This sac communicated with the commencement of the colon by a circular opening, which, in one case, was nearly an inch, in another scarcely

above a quarter of an inch, in diameter. A similar sacculated extension has been likewise noticed by this pathologist at the extremity of the ilium, near the cæcum.

12. Owing to the irritation occasioned by these concretions, the intestine is often found constricted around and immediately below them, as demonstrated by SCHENK and MONRO. Adhesion of the concretions to the inner coat of the viscus is a much rarer occurrence. Cases, however, have been observed by HORSTIUS and the first MONRO, where such adhesions existed. Ulceration of the parts in which they are lodged, owing to the irritation occasioned by them, is amongst the most common of the local effects to which they give rise. In some cases, the inflammation induced by them in the internal surface of the bowel extends to the external tunics, until it reaches the peritoneal surface, where coagulable lymph is thrown out, and the convolutions in its vicinity are agglutinated into one mass, or adhesions to adjoining parts take place.

13. iv. The SYMPTOMS which alvine concretions occasion vary extremely, according to their nature, and the size they have attained. Sometimes it seems wonderful, considering their great bulk, that the intestinal canal is not completely obstructed by them. In some cases, they have remained for years, with evident symptoms of their existence. In more fortunate instances, they have been ejected with the contents of the stomach after severe retching and vomiting; or have passed by stool, after severe dysenteric symptoms and tenesmus. In almost every instance, the digestive powers are very much impaired, and the patient becomes, after a time, greatly debilitated and emaciated. The pulse, at first, is but little affected; but the patient complains much of pain and tension in different parts of the intestines, and is subject to occasional attacks of nausea, vomiting, tormina, or purging. The pain in the bowels is usually referred to one part, and is much more severe at one time than at another, particularly after taking acids, or food difficult of digestion. Constipation of several days' duration is often complained of, and yet the patient has a constant inclination to go to stool: at other times, or in other cases, there are frequent watery and scanty evacuations of a viscid ropy mucus or blood, which sometimes give a short relief.

14. When the concretion is of a large size, and the patient is somewhat emaciated, a very hard, painful, globular tumour may be felt in the abdomen, most frequently in the course of the large bowels, upon placing him on his back, and relaxing the abdominal muscles. It can seldom be made to change its place within the intestine, but often appears to do so in consequence of the change of place of the portion of the intestine containing it, particularly when it is lodged in the small intestines, or in the arch of the colon. Some patients are under the necessity of abstaining from solid food, and others reject the greater part of their food. When the concretion has existed for some time, the bowels are generally so much obstructed that laxatives or clysters are necessary to procure a passage. Dr. MONRO states, that when it changes its place, and passes down into the sigmoid flexure of the colon, or into the rectum, it creates excruciating torture in the region of the pelvis and fundament, and the bowels become obstinately constipated, and much distended, from the passage being interrupted.

15. When alvine concretions lodge low in the rectum, they occasion much pain when the patient is sitting, and upon going to stool. When this is the case, an examination *per anum* is requisite, which will lead to their extraction by the forceps. In a case in which the second MONRO was consulted by Mr. GOODSIR, the patient passed, in the course of two or three weeks, nine concretions in this way, some of which were as large as a hen's egg. This patient had laboured for many weeks under very acute pain in the region of the stomach.

16. When the concretions are small, they frequently pass away with the fæcal matter, without occasioning any evident disturbance; the patients, generally, having complained of nothing further than long pre-existing dyspepsia and constipation — the chief causes of their formation. In other cases, especially when they reach a large size, most distressing and urgent symptoms are produced by them; commencing with those already enumerated (§ 13, 14.), and terminating with violent colicky pains, obstinate constipation, pain at the top of the sacrum and loins, or in the hypogastrium, sickness, retchings, and, at last, complete ileus, or all the phenomena of acute enteritis, or peritonitis. Even the smallest concretions occasionally give rise to fatal consequences. Two cases have occurred to me, wherein the most acute peritonitis, followed by the effusion of coagulable lymph, with adhesions, and terminating in sphacelus of the vermicular appendix of the cæcum, was occasioned by these concretions having passed into this part. A similar case is recorded by RUYSCH (*Museum*, 142.).

17. v. TREATMENT. — We are often without any satisfactory proof afforded us, during the life of the patient, of the existence of these concretions in the intestinal canal, the symptoms they occasion being the same with those proceeding from various other causes. Their existence is, therefore, often merely a matter of conjecture, to which the deficient energy of the digestive action, the means resorted to by the patient to palliate dyspeptic symptoms, and his accustomed diet, frequently lead; and we seldom can form any correct diagnosis, unless they are so large as to occasion tumours in the course of the bowels, or are lodged low in the rectum. When their existence is proved by their discharge, we may consider the mischief, in a great measure, if not entirely, removed, unless, indeed, the symptoms continue, when we may infer one of two causes, namely, the presence of more concretions, or the existence of inflammatory action induced by them in a portion of the intestines, or of intus-susception.

18. When the symptoms seem to proceed from the injudicious use of calcareous or magnesian absorbents, these must be entirely avoided. Aperients of a different nature should be employed, particularly the supersulphate of potash, or the sulphate of soda or of magnesia, with the addition of dilute sulphuric acid. In order to relieve the more urgent symptoms, copious injections of an oleaginous, emollient, and purgative kind, should be thrown up. And, in order that

these may more fully answer the intention, they ought to be administered whilst the patient rests upon his knees and elbows, with the pelvis elevated above the shoulders. If vomiting be present, care should be taken not to increase this symptom by the administration of medicines by the mouth. For, by frequently exciting the inverted action of the stomach, this action will extend to the alimentary canal, and terminate in fatal ileus. It is preferable to solicit the action of the bowels by emollient, anodyne, and aperient enemata, and by frictions with oleaginous substances, or fomentations on the abdomen. When we suspect the concretion is owing to the nature of the food, this cause must be avoided. When the concretions are seated low in the rectum, their extraction by the forceps must be tried. Those arising from the use of oat-bread being, generally, partly composed of the earthy phosphates, and considering the solubility of these salts, Mr. Torbet and Dr. Duncan conceive that an impression might be made on them by a course of mineral acids taken by the mouth, or injected by the anus.

19. The second Monro recommends, in cases where the concretion is evident to the touch, forming a distinct and fixed tumour in the bowels, and where the symptoms are urgent, all other means having failed, to attempt its extraction by an incision through the abdominal parietes into the intestine; and in this recommendation Mr. Torbet and Dr. Duncan agree. But, before resorting to this last means, Dr. Monro advises the following very judicious plan, which I extract from the very excellent materials which his son has laid before the profession: — "1st, Let the patient (a female) take every day a quarter of an ounce (?) of Castile soap, in pills, and of castor oil. 2d, Once or twice a week, let her take a purgative composed of sal glauberi, ʒj., sugar half an ounce, and the same of salad oil, and whey ℔ss., or ℔j. 3d, Three times a week let her get a clyster of a quart of water, in which an ounce of linseed and half an ounce of Castile soap have been infused for two hours. 4th, Let her foment the belly, and take the above clyster, when she suffers much pain. Let her diet consist of loaf-bread, milk, whey, broth, soft eggs, butter, a bit of light-dressed meat; and if she take porridge, let her melt a good deal of butter in it." (p. 50.) Such was the advice of a most experienced physician in this description of disease; and it proved successful in the case for which it was directed. (See also the *Treatment* of Colic and Ileus, and of Constipation.)

20. II. Fatty and Heterogeneous Concretions. — *A. Concrete substances*, differing very materially from those already described, are sometimes formed in the alimentary canal, particularly in the large intestines. These are usually derived from two principal sources, viz. a morbid state of the secretions poured into the intestinal tube, or secreted from their internal surface; and alterations of the usual state of the fæcal matters, during their retention in the cæcum and large bowels. To these, a third may be added,—the ingestion of substances into the stomach, which are incapable of undergoing any material change during their passage through the canal, excepting their agglutination into firm balls.

21. *B. Concretions* of an *oleaginous* nature, or varying from an oleaginous to an *adipocirous* or even *waxy* character, are sometimes voided by persons who suffer from a torpid state of the bowels, and deficient digestive function. These concretions are often mistaken for gall-stones, but are readily distinguished from them by the following characters: — They are generally of a globular form, vary in size from that of a small pea to the bulk of a large grape, are of a cream colour, slightly translucent, and of sufficient consistence to preserve their form and be cut with a knife, like soft wax.

22. These unctuous concretions cannot in general be traced to any oleaginous material introduced into the stomach; yet there is sometimes evidence furnished of their origin in oleaginous or fatty substances which have not undergone the requisite changes in the prima via, but have been merely slightly changed by the acid existing in the stomach, and by the secretions poured into the alimentary canal, so as to assume the appearances now described. It is possible, however, that they may be occasionally formed by intestinal secretion, or by a chemical change effected on parts of the recrement of the food, after having passed into the cæcum and colon. Fat, either in the concrete form now described, or in a state of fluidity and purity resembling oil, has been occasionally, although rarely, voided from the bowels, independently of having been taken by the mouth; although more frequently proceeding from the latter source; as instances observed in the course of practice at the Institution for Children have proved. Cases of this description have been recorded by Dr. W. Scott (*Ed. Med. Comment.* vol. iv. p. 334.), Dr. Babington and Dr. Elliotson (*Philos. Trans.* 1813, art. xxi.), Dr. Kuntzmann, of Berlin (*Journ. der Pract. Heilkunde, July*, 1821.), Dietrick, and several others.

23. Sir Everard Home endeavours to account for the production of these adipocirous and fatty concretions, by contending that it is the office of the large intestines, particularly of the colon, to convert a considerable portion of the matters poured into them into fat, by combining them with the bile; and the fat thus formed in the large intestines is taken up and conveyed into the circulation, to be deposited in various parts of the body, to supply the wants of the economy. But the production of fat in the intestines seems to be only the result of a diseased action, inasmuch as it is voided from them, in any of its states, only during disease — during visceral complaints, and colicky or dysenteric affections — and is never observed to be passed from, nor is found within, these viscera, when they are in their healthy condition. It appears from the history of the cases on record, as well as from those recently observed by Dr. Elliotson and Mr. Lloyd, to be especially connected with disease of the assimilating viscera, and consequently with imperfect assimilation; a portion of the chyle, instead of being changed to healthy blood, assuming an oleaginous state, as not infrequently observed in the serum. The fatty matter thus accumulated in the blood, will, in several states of disease, be eliminated from it by excreting organs — particularly by the mucous surface of the bowels, and by the liver and kidneys — instead of being deposited in the adipose tissue for ulterior purposes, and

will assume either a concrete or fluid form, owing to modifications of its state as originally secreted, or to the action of other matters upon it during its retention in the bowels or urinary bladder.

24. A singular case has been recorded by Dr. Kennedy (*Medico-Chirurgical Journal for Sept.* 1817.), of an intestinal concretion, which was found, upon its analysis by Dr. Ure, to be similar in its composition to ambergrise.

25. *C.* Intestinal concretions have been found to consist entirely of those matters which have been swallowed from either a depraved appetite, or bad habit; thus, concretions causing violent symptoms, have been produced by the habit of chewing the ends of threads used in sewing, and which have formed a firm felt with the mucus of the intestines and some fæcal matters. I was lately consulted in the case of a young lady who had been long under treatment for obscure abdominal disease, respecting the nature of which no two of the several eminent practitioners who had been in attendance agreed. The existence of accumulated matters in the cæcum and colon seemed evident to me, upon examination, and from the character of the constitutional and other symptoms. Purgatives and injections were long persisted in; at last several concretions — (about twelve) — from the size of a filbert to that of a walnut, were evacuated. Upon examination, they presented a substance resembling pasteboard, with a fæcal smell, of a brown colour, and containing earthy particles. On being broken down and macerated, they were found to consist chiefly of coarse paper reduced to a pulpy state, but containing fragments not materially altered. The portions of pulpy paper were agglutinated with mucus, portions of fæces, and a little phosphate of lime. After some time the patient confessed that she had occasionally been in the habit, about the age of thirteen and fourteen, of chewing, and sometimes swallowing, portions of the grey paper with which she curled her hair. After the evacuation of these concretions, all the symptoms disappeared, and she rapidly recovered. A few years ago, I attended, with Mr. Annesley, a similar case to the foregoing, but in a younger lady. She recovered perfectly by the use of purgatives and clysters.

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CONGESTION OF BLOOD. Classif. General Pathology: and I. Class, IV. Order (*Author*, in *Preface*).

1. Defin. *Deficient vital tone or power, chiefly of the capillary vessels and veins, occasioning accumulation of blood in them, and a languid or more or less retarded circulation, the functions of the organ or part being thereby proportionately disordered.*

2. 1. Nature and Relations of Congestion. — It has been stated in other places (see arts. Blood, Disease.) that morbid states of the vascular system, and of the fluid circulating through it, must be imputed, in a large proportion of cases, to changes induced primarily in the organic nervous system, which is, anatomically, most intimately connected, not only with the circulating system, but also with the organs essentially vital; this connection subsisting by ramifications proceeding to them both directly and obviously either from the great central ganglion or from appropriate subordinate ganglia, as well as indirectly and less apparently through the medium of the blood-vessels, on which the organic nervous system is every where profusely distributed, the one accompanying the other throughout the frame. Thus intimately interwoven, they experience reciprocative changes, and generate a common influence. The vital organs, as well as their subordinate parts, in the more perfect animals, being supplied by both these systems, — the most rudimental type and essential requisites of organisation, — and actuated by their common influence, are thereby enabled to perform their destined functions; the superadded or peculiar organisation of each organ being the instrument, which, thus actuated, performs specific offices in the economy.

3. It results from this, — 1st, that we are not justified in considering changes in the states of vascular action, or in the relation subsisting between the vessels and the quantity or quality of the fluids circulating in them, apart from the condition of the organic nervous system, which is thus intimately connected, by structure and function, both with them and with all vital organs; 2d, that changes in the vascular system are very often induced by impressions made primarily upon the organic nervous system; whilst, on the other hand, a morbid state of the former, particularly in respect of its circulating contents, will most seriously affect the latter; and 3d, that, upon tracing the procession of morbid phenomena, the first impression made by the exciting cause, and earliest change from the healthy state, will be found in the functions of this system of nerves, in perhaps the larger proportion of cases; vascular action, &c., and the secreting and assimilating functions, being very soon afterwards disordered. The truth of these propositions will become more manifest after having surveyed the causes which induce congestion, the phenomena which accompany it either as coincidences or consequences, and the results to which it leads; and we shall be more fully convinced of the propriety of viewing it as very much more frequently a link merely in the chain of morbid action, than as a primary or even an early change.

4. Congestion has been divided by many modern pathologists into *active* and *passive*, they understanding by the former that state of vascular action which coincides with *active determination of blood*, according to the meaning I have attached to it in another article. (See Blood, § 25.) It may be defined to be a vital excitement with somewhat of expansion of the vessels, and the circulation of a larger quantity of blood through

them, without any obvious tendency to form new productions, or to occasion disorganisation, unless inflammation, or some other morbid condition, supervene, which is very often the case. From this state—*active congestion* (see BLOOD, § 26.)—in which the vital action of the vessels is above their healthy standard, there is every intermediate grade, lapsing insensibly into extreme *passive congestion*, in which there is deficient or depressed vital power, the current of the circulation through the weakened vessels being remarkably languid and retarded. In this state, the venous and arterial capillaries, having lost the principal part of their tone or vital tension, re-act imperfectly upon the mass of blood injected into them by the heart's action, and become distended and *congested*. This state, then, existing in any degree, down to that which is barely compatible with the continuance of the life of the part, constitutes congestion; it being thus considered as a state of sub-action, and not of super-action, as determination of blood undoubtedly is.

5. i. In respect of *the modes of accession* by which congestion presents itself, much diversity exists. It may occur suddenly, after intense causes; slowly, after slight influences or other disease; and almost insensibly, after active determinations of blood and inflammatory action. It may be almost the primary lesion, the impression made by the exciting cause upon the organic nerves being the only previous change; or it may be one of the most remote, and only antecedent of, or immediately consequent upon, dissolution. It is generally the result of directly or indirectly depressing causes; and assumes every grade according to the intensity of their operation relatively to the organic nervous or vital energies of the frame on which they act.

6. ii. *The textures most liable to undergo congestion* are such as, owing to their conformation, particularly the laxity of their vital and physical cohesion, admit of the distension of their vessels. Cellular parts, and organs in which the cellular structure predominates, as the parenchyma of various internal organs, particularly the brain, the lungs, the liver, spleen, and kidneys; the mucous membranes, especially those of the bronchi and digestive canal, and the uterus and ovaria; are most liable to experience this state of their blood-vessels. Besides these, however, other and less yielding structures, as the serous and fibrous membranes, the skin, the muscles, &c., may be congested to a certain extent, particularly after exhaustion of the vital energies of the frame, and diminution of the vital cohesion of these structures, either by causes which depress the organic nervous power, or by noxious agents contaminating the blood, or by over excitement of the vascular system of the congested part, or of the whole frame. In one or other of these three ways, congestion supervenes when it is observed at the commencement, in the course, or towards the close, of febrile and constitutional maladies; the same causes, and operating in a similar manner, also occasioning congestion of those viscera which are most liable to it by conformation.

7. iii. *The causes of congestion* are, therefore, 1st, those which act by primarily depressing the organic nervous influence; such as advanced age; the continued or prolonged impression of cold, mental anxiety, and all the depressing passions and moral emotions; prolonged sleep, mental and physical inactivity; miasmal, contagious, or infectious emanations; various vegetable, animal, and gaseous poisons; and the rapid loss of the natural electrical tension of the frame: 2d, those which mechanically impede the return or circulation of the blood itself, or which change its quantity and quality, either locally or generally; as excessive heat; general plethora, produced either by too full living, or by the suppression of the natural or accustomed discharges, interrupted circulation through the heart, the lungs, liver, &c.; a long retained posture by debilitated persons; the use of unnecessary ligatures and tight lacing; improper and unwholesome food; contamination of the blood, by the absorption or introduction into it of noxious mineral, vegetable, and animal substances, or gaseous fluids; and changes taking place in its constitution, from the interrupted secretion and elimination of hurtful matters from it (see BLOOD, § 115. *et seq.*)—these latter causes affecting the vital manifestation of the vessels and nervous systems: 3d, those causes which exhaust the irritability or vital tone of the vessels, by previously exciting them above their natural state of action; as local determinations of blood, general vascular excitement; fatigue from violent or continued exertion; pre-existing fever, inflammation, or other diseases. Thus it will be seen that congestion arises from changes induced (*a*) in the state of organic nervous power, and externally to the vessels; (*b*) in the blood itself, and acting internally on the vessels and structures; (*c*) in the coats of the vessels themselves; and (*d*) in two or more of these simultaneously.

8. iv. The *symptoms* indicating the existence of congestion are sometimes very apparent, at other times very obscure. When it is present in a marked degree, and in vital organs, the disturbance of function is usually so great as to indicate its existence; but even then the kind of disturbance may be very nearly the same as proceeds from morbid states, which we shall hereafter find congestion not infrequently occasions, viz. sanguineous or serous effusion; as in the cases of intense congestion of the encephalon. Upon the whole, however, it gives rise to partial loss, or entire abolition, of the functions of the affected part. Thus, congestion of the brain, when moderate, will occasion a slight state of lethargy, or vertigo, &c.; where more severe, epilepsy, coma, or apoplexy. Congestion of the liver is attended by more or less complete arrest of the biliary secretion, with tumefaction of the organ, &c.; and congestion of the bronchial surface and lungs, with dyspnœa, asthma, &c. Febrile phenomena seldom accompany congestion, unless it arise in the course, or towards the close, of febrile diseases, or be excited by infectious or miasmal emanations, or is about to pass into an inflammatory or hæmorrhagic state. When it occurs in large secreting viscera or surfaces, the function of secretion is either impeded, vitiated, or altogether suspended; a return or increase of the secreting action either restoring the healthy state of circulation, or converting it into active determination, or even into inflammation. When congestion affects several parts, or two or more important viscera, as on the invasion or towards the close of malignant fevers, or when the circu-

lating fluid and soft solids become contaminated, the functions of the economy are very gravely disturbed, and some of them almost annihilated: in such cases, the morbid impression made by the existing causes upon the organic nervous system, disorders the various functions it actuates, and even puts a stop to some of them; the derangement of function being often a coeval and coordinate effect with the congestion. Hence the arrest or diminution of function becomes one of the most common indications of the extent of congestion, even although it may not be the actual consequence of this state of the vessels.

9. v. The *appearances presented by congested parts* after death vary extremely with their structure, and the degree and duration of the congestion. In addition to more or less engorgement of the small vessels and veins, there are generally found a darker colour of the contained fluid than in the natural state, considerable tumefaction, and diminished cohesion of the affected structure, and alteration of its colour. The change of colour may be of various grades of deepness, to a brownish or greenish black, as frequently observed in the liver and spleen; and the loss of vital cohesion may be very remarkable, as in the same viscera, tumefaction being then very considerable. These appearances are often accompanied with effusion of a serous, aqueous, or sanguineous fluid from the congested surfaces; and sometimes with ecchymoses of a deep colour in or beneath the mucous tissues, and occasionally in serous membranes and parenchymatous parts.

10. vi. The *general consequences and terminations* of congestion are deserving strict attention, as to this state are to be imputed several of those more grave and dangerous changes presented to us in the advanced stages of numerous diseases. 1st, Congestion terminates in the restoration of the healthy circulation. This is most frequently the case in respect of secreting parts, as the mucous and villous surfaces and glandular organs; the return of their secreting functions aiding most materially the restorative process, by diminishing the fulness of the vessels, and soliciting an accelerated circulation through them. Hence, although a restoration of the circulation, to some extent at least, is often antecedent of the return of the secreting function, yet we frequently succeed in restoring the former by exciting the latter; the stimulus thus imparted extending itself to the weakened and congested vessels. Parts which have once suffered congestion in a very marked degree, very often retain a disposition to experience it again, upon exposure to its causes; this disposition, however, diminishing with the lapse of time, if judicious means of strengthening the organ be adopted. 2d, Congestion may pass into active determination, or into inflammation of various grades of intensity. This may arise from changes induced in the state of the blood itself relatively to that of the vessels; or from the re-action of the vessels upon the distending fluid, and the augmented impulse following the temporary retardation of the circulating current; or from the use of irritating and inappropriate stimulants in order to remove the congestion; or from inordinate excitation of the secreting functions, when we endeavour in this way to remove oppletion of the vessels. 3d, Congestion frequently occasions serous or aqueous effusions in the vicinity of the congested organ, or in the areolæ of its cellular tissue. We often observe this termination in the different internal viscera, and cavities in which they are situated. It evidently depends upon the rarefaction of structure occasioned by distension of the parietes, and loss of tone of the congested vessels, most probably assisted by weakened vital cohesion of the tissues, and diminished crasis of the blood; these conditions either accompanying or following the congested state, which very frequently is partially, or altogether removed by the consequent effusion. 4th, Hæmorrhage may supervene, either from the surface, or into the substance of the congested organ or part; owing either to a constitutional disposition to hæmorrhage, arising from original conformation, the vessels readily yielding from distension or accidental impulse; or to the existence in a more or less intense degree of the same changes which produce aqueous effusion, particularly weakened cohesion of the tissues, and, consequently, of the delicate canals conveying the blood through them, and a morbid state of the blood itself. 5th, Congestion of the minute capillary canals, either frequently recurring, or continuing long, seems to give rise to various morbid or adventitious structures, particularly when it takes place in persons of a scrofulous diathesis, or affected by any other constitutional taint. In such cases there is a marked indisposition, both of the part to return to a healthy state, and of the adventitious structure to be absorbed. 6th, Retardation of the circulation in congested vessels may be so complete as to occasion even loss of vitality and gangrene of the part. We observe this in the congestion arising from extreme cold, from the exhaustion consequent on intense excitement, &c.

11. vii. *Congestion, and its consequences in respect of particular structures*, are of great importance, and are therefore considered among the principal changes to which vital organs are subject. Although the local relations of congestion fall under their appropriate heads, it may be remarked, in general terms, that congestion may occur in any structure or organ during life, without evincing upon dissection unequivocal proofs of having ever existed; and that it may apparently continue till dissolution, without being very manifest upon examination afterwards. Such is especially the case in respect of congestion of mucous and serous surfaces, the vessels of which empty themselves soon after death, when the propelling power no longer acts upon them and distends their relaxed parietes, in consequence either of the passage of more or less of their contents into the adjoining veins, or of the escape, through the extreme canals and pores of these structures, of the more aqueous or serous parts of the blood they contained, or of both these changes conjoined. From this it will be manifest that many cases of recent or not very intense congestion, wherein we have reason to infer that the small vessels have not altogether lost their vital tone, particularly of membranous parts, will present upon dissection chiefly fulness of the veins, proceeding from these parts, with the effusion of more or less of a serous, aqueous, or sanguineous fluid in their vicinity. On the other hand, congestion of internal organs may not have been detected at all during life, or it may have occurred

but shortly before, or at the time of death, and yet be very evident upon inspection afterwards. This is not infrequently observed in respect of parenchymatous organs and mucous and villous surfaces. When congestion, however, occurs in the large viscera, as the brain, lungs, liver, and spleen, and continues up to the time of dissolution, it is generally very manifest in them upon dissection. In many diseases, particularly those in which the blood becomes affected previously to, or continues fluid after, death, and in those which terminate by asphyxy, congestion of depending parts is a very common *post mortem* occurrence, and one which should be carefully distinguished from the congestion that has existed during life.

12. II. Of the Treatment of Congestions.— i. It is necessary always to keep in view the fact, that congestion is a consecutive lesion, arising generally from causes which depress the vital manifestation of the organic system of nerves supplying the blood-vessels; and that, although it is very frequently associated with general plethora, and necessarily implies the existence of local plethora (see Blood, § 23.), yet, on account of this depression of nervous power, *general depletion*, unless to a small amount, is seldom of much service in the treatment of congestion, unless it be conjoined with the use of stimulants, derivatives, and excitants of the secreting functions. *a.* But *local depletions*, particularly when directed in such a manner as to operate some degree of revulsion from the congested part, sometimes carried to a considerable extent, or repeated as circumstances require, are among the most requisite means of cure. *b.* When the powers of life are much reduced, even local depletions should be employed with caution, and never without having recourse, at the same time, or previously, to suitable *excitants* and external *derivatives*. Of these classes of remedies, the most preferable are such as tend to equalise the circulation throughout the viscera, and determine it to the periphery of the frame. *Diaphoretics*; the *warm* or *vapour bath*; warm poultices and fomentations; *rubefacient embrocations*, epithems or poultices, especially those with Cayenne pepper, mustard, horseradish, &c.; *blisters*, and warm and rubefacient *pediluvia*; are calculated to accomplish these purposes. *c.* Much advantage will also accrue from attempting to restore, by *emetics*, *purgatives*, or other remedies, the secretions of the mucous surfaces, and the functions of the congested organ; as the restoration of these functions, which are generally impeded or altogether arrested, will unload the vessels, and accelerate the retarded circulation in them. But it should be kept in mind, that the medicines that operate in this manner are generally local and specific excitants; and hence that they, as well as the stimulants usually given internally, should be exhibited with caution, and preferably at the same time that local depletion, with *derivation* to the surface of the body and lower extremities, are being employed. Without attention to these precautions, we may convert, particularly in plethoric persons, simple congestion into active determination of blood, or into inflammation. *d.* The *diffusible stimulants* that are generally most serviceable in removing congestions are, camphor, the preparations of ammonia, the æthers, weak infusions of arnica or serpentaria, warm diluents with saline medicines or the nitro-muriatic acids, the liquor ammoniæ acetatis, small doses of ipecacuanha, with camphor and opium, &c., and several of the gum-resins and essential oils. *e.* In many cases of congestion of vital organs, it will be requisite, in addition to the foregoing measures, to direct internal *revulsant agents* to remote viscera. Thus, in congestion of the head or lungs, we shall derive advantage from exciting the action of the lower bowels by *irritating cathartics* and injections; and, having prescribed depletions and external derivation, from a judicious employment of active *diuretics*. *f.* In all cases, it will be necessary to promote the natural secretions and excretions; inasmuch as we thereby keep up a regular distribution of the circulating fluids, and eliminate from them such hurtful substances as might irritate the vessels and induce consecutive disease, if they were allowed to accumulate. *g.* In many instances, benefit will accrue from the *affusion* or *aspersion of cold or tepid water* over the part enclosing the congested organ, especially when the state of the pulse, and the seat of congestion, lead us to dread the supervention of hæmorrhage, as in congestion of the brain or of the lungs. *h.* Besides the external means already alluded to, various others may be employed near the seat of congestion; as *moxas*, the actual *cautery*, dry cupping, stimulating or rubefacient *liniments*, dry friction, the warm and tepid affusion or *douche*, the nitro-muriatic acid lotion, chlorine or fumigating baths, electricity or galvanism; but these are most appropriate to the more chronic states of congestion. There are other remedies besides the few now adduced, which are suitable to particular states and seats of congestion, and which fall under different heads.

13. ii. Having removed the congestion, it will be necessary to employ means to prevent its recurrence, for the part once thus affected long retains a morbid disposition. This object can be obtained only by a careful avoidance of the exciting causes — by preserving a free state of the secretions and excretions — by promoting the digestive functions, and invigorating the system by moderate exercise in the open air, either on foot or horseback — by the use of mineral waters, particularly those which combine a tonic with an aperient and deobstruent operation, as the waters of Cheltenham, Harrogate, Scarborough, Leamington, Seidschutz, Carlsbad, Bath, Marienbad, Vichy, and Eger — by warm clothing, and by guarding against general vascular plethora.

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CONSTIPATION.—Syn. *Constipatio vel Obstipatio Alvi; Alvus tarda, dura, adstricta,* Var. Auct. *Tarda Alvi Dejectio,* Vogel. *Obstipatio Alvina,* Young. *Stypsis* (from στύφω, I constringe) Ploucquet. *Coprostasis,* Good. *Hartleibigkeit,* Germ. *Constipation, Paresse du Ventre,* Fr. *Costipazione,* Ital. *Bound-Belly, Costiveness, Obstipation, Fæcal Retention, Alvine Obstruction.*

Classif.—4. *Class,* Local Diseases; 5. *Order,* Obstructions (*Cullen*). 1. *Class,* Digestive Diseases; 1. *Order,* Affecting the Alimentary Canal (*Good*). I. Class, I. Order (*Author*).

1. Defin. *Prolonged retention of the fæces; or slow, imperfect, or difficult evacuation of them.*

2. Dr. Good has made Coprostasis, or Costiveness, a genus, and divided it into *C. Constipata,* and *C. Obstipata;* the chief difference being, that the evacuation is voluminous in the former, and scybalous or slender in the latter. This division is nearly the same as that previously adopted by Dr. Bateman, viz. into Costiveness and Constipation. I believe, however, that any distinction between them is quite unnecessary; inasmuch as either the one or the other, even according to the import these writers attach to them respectively, may arise from exactly the same pathological conditions; and that it will be better to employ these terms in their usual acceptation, and to make constipation an intermediate grade between costiveness and obstipation; or, if any other difference than that of degree be imputed to them, to consider obstipation as a modification merely of the others, by attaching to it the idea of difficult and imperfect voidance of the fæces, as well as of prolonged retention of them—which latter alone will apply to costiveness and constipation, according to the degree of obstinacy by which the retention may be characterised.

3. The slighter grade, or costiveness, can scarcely be considered as a disease in some constitutions, as it is often attended by a good state of health in other respects, and seldom continues so long as to occasion any appreciable disturbance. But, when neglected, it gives rise to those collections in, and morbid conditions of, the *colon,* which have been described in that article, and favours the occurrence of other maladies. Although cases are frequently occurring in which little disorder results from constipation, except from the means used to remove it, yet very serious or even fatal effects not infrequently accrue from it. I shall, therefore, adopt the opinion of Cullen, and consider the retention of the fæces beyond twenty-four hours, without the desire of evacuation, as an approach to a morbid state, and therefore requiring medical aid.

4. *Duration, &c.*—The annals of medicine abound with cases in which the fæces had been retained for an almost incredible time, without any serious or severe symptom supervening. The occurrence of constipation for several days, or even weeks, is not rare, particularly in some constitutions, and in weak or delicate females, who take little nourishment, and as little exercise; and, excepting listlessness with debility, little disorder is complained of. It is not uncommon to meet with cases, especially in this sex, where extremely little food is taken, and where the fæcal evacuations are not more frequent than once a week, or once a fortnight or three weeks; eliminations of effæte matters from the blood taking place chiefly by means of the skin, the surface of the lungs and kidneys, and generally in an insensible manner. But cases also more rarely occur, where the retention is much longer, even without any other symptom than great flatulent and fæcal distension, particularly of the colon, until, suddenly, symptoms of colic, ileus, or inflammation, come on, and soon terminate the life of the patient, or put it in extreme jeopardy. Instances have been adduced by Rhodius, Panarolus, Salmuth, Devilliers, Blankard, Erhard, Mossman, &c., of constipation continuing for five, six, or seven weeks, and even for as many months, without any fæcal evacuation. Dr. Baillie published a case which continued for fifteen weeks; and Joerdens met with cases of fourteen, fifteen, and twenty-one weeks. Instances of constipation continuing three, four, five, seven, eight, and nine months, have been detailed respectively by Triœn, Chaptal, Smetius, Staniland, Pomma, Crampton, and Valentin. In many of those very prolonged cases, the appetite was very deficient; but in that adduced by Mr. Staniland, which continued for seven months, the appetite continued good until inflammation, which rapidly terminated life, came on. This person, a young female, never had more than one evacuation every two months, during a period of five years; all which time she appeared otherwise in good health. Indeed, in some instances of less duration than those now alluded to, the appetite has been much greater than in health. I have met with several cases of habitual constipation, in which the patient had a ravenous appetite, and yet did not pass a fæcal evacuation oftener than once every four, six, eight, or ten days; but, in almost every such instance, either the breath has been loaded with an offensive vapour, or the perspiration has been abundant and disagreeable, or the urine copious and much loaded,—evidently proving that the disorder was connected with a rapid absorption from the alimentary canal, and augmented evacuation by the other excreting surfaces, or by the kidneys. The inordinate excretion that takes place by this latter emunctory, and the constipation, and ravenous appetite accompanying it, in diabetes, further shows that a very large proportion—sometimes nearly all—of the ingesta will sometimes be so far digested as to admit of their absorption, their subsequent discharge taking place almost exclusively by the skin, lungs, and kidneys; a proportionate diminution of the excreting functions of the bowels, and consequently of fæcal matters in them, being the result; that portion, however, which does collect, being retained until it excites them to action, either by the bulk or by the irritating properties it may have acquired, when also it may be the cause of a morbid or perverted action. The above circumstance shows (what, indeed, physiological research has proved), that, in healthy persons, the principal part of the fæcal discharges consists of secreted matters, and but a small portion of them of such parts of the food as have escaped the changes produced by digestion; and it proves the accuracy of the opinion entertained by Cullen, at least as respects a

large number of such cases, viz. that costiveness arises, in great measure, from the absorption of the more fluid parts of the contents of the bowels, whether consisting of the digested aliments, or of the exhaled or secreted fluids poured into them.

5. I. Causes.—i. *Remote causes.* Habitual costiveness is most common in persons of the melancholic temperament, of a thin and robust habit of body, and of a rigid constitution of fibre; and is often connected with great activity of the absorbent function. The most prolonged cases of constipation usually occur in thin delicate females, and is obviously owing to an asthenic condition of the organic functions, particularly those more intimately connected with the alimentary canal. Meckel states, that cretins are very generally constipated, partly owing to their inactive existence. It is very often caused by the use of indigestible food, as heavy, or imperfectly leavened, or adulterated bread, new cheese, nuts, cucumber, &c.; by stimulant and astringent aliments and beverages; by the use of narcotics; by smoking or taking snuff; travelling in carriages or on ship-board; by sedentary occupations; too long indulgence in sleep, and too warm beds; inattention to the first intimation to alvine evacuation; venereal excesses; prolonged lactation; excessive perspirations, or increased exhalation and secretion from other surfaces and parts than the intestinal canal; mental or physical exertions too long continued; advanced age; pregnancy; and the various mechanical and organic causes about to be noticed (§ 9. *et seq.*).

6. ii. The *immediate causes*, or *pathological states giving rise to the retention* and imperfect excretion of the fæces, appear to be the following:—1st, Impaired or *torpid functions* of the *duodenum* and *small intestine*. (See Duodenum.) In this form of disorder, more or less obvious symptoms of indigestion are usually complained of from two to four hours after a meal, and it is often attended by a slow pulse, slight sallowness of the countenance and skin, with distention or uneasiness about the right hypochondrium, and, in some cases, with a dull pain in this situation, and unnatural heat of the palms of the hand and soles of the feet. The tongue is foul at the root, while the sides and point are red; the urine high-coloured, or depositing much sediment, and the pulse sometimes slower than natural; but occasionally quicker a few hours after a meal. 2d, *Torpid function* of the large bowels, affecting either the *cæcum*, *colon*, or *rectum*, in a more or less special manner. In this form of disorder, constipation is usually more prolonged than in the foregoing, and the sense of distension or uneasiness is referred to the situation of these viscera. There is also much flatulence, and all the symptoms more particularly noticed in the article on *Torpor of the* Colon.

7. Constipation may thus arise from an inactive state of any part of the alimentary canal, but it most frequently and immediately depends upon torpor of the portion devoted to the function of fæcation; and, although a part only of the digestive tube may be chiefly affected, yet disorder is seldom limited to it,—the functions of the adjoining portions, and, in many cases, of the whole canal, being impaired. It may be useful, also, to endeavour to estimate in what this disordered function may consist, and whence it proceeds; and although nothing beyond conjecture will often be advanced, yet will our opinions very often be well founded, particularly after repeated observation, and the attempt will therefore become advantageous in practice. Impaired function, then, of any part, or even of the whole, of the intestinal canal, producing either habitual costiveness, or the occurrence of prolonged constipation may be owing to one or more of the following states:—*a.* To a diminished secretion, or modified condition of the biliary and pancreatic fluids; *b.* To lessened exhalation from the mucous coat of the intestines, and to impaired secretion from the follicular glands of this membrane; *c.* To a rapid absorption from the internal surface of the bowels; *d.* To relaxation, or torpor of the muscular coats of the intestines giving rise to distension, followed by imperfect or irregular re-action on the distending power, and consequent fæcal and flatulent accumulations, particularly in the large bowels; *e.* To rigidity of the longitudinal bands of the colon, forming this viscus into cells, and diminishing the calibre of the central canal, from each side of which the cells diverge,—thereby occasioning that state of constipation or obstipation, which is characterised by scybalous stools, and a difficult and imperfect evacuation of them; *f.* To the production and accumulation of flatus in the intestinal tube, which, by the distension and inaction of the coats it occasions, as well as by its mechanical effects in obstructing the passage of the fæces, and impacting them into masses, often proves no mean obstacle to the regular process of fæcation; *g.* To the accumulation of mucous sordes on the surface of the intestines, or the lodgment of hardened fæces in the cæcum, cells of the colon, or rectum; and, lastly, To a varied combination of two or more of the above states of function. All these may be resolved into, or referred to, one morbid condition, viz. impaired organic nervous power, or diminished vital manifestation of the digestive canal, expressed in one or more of the above modes, or occasioning these pathological conditions.

8. The above may constitute *primary* or *idiopathic* constipation, or intestinal indigestion; or, in other words, functional impairment of the defæcating process. But constipation is as frequently *consecutive* of lesions, either (*a*) of the structure of the coats of the bowels themselves, and affecting the calibre of their canal; (*b*) or of adjoining parts, causing obstruction, compression, or displacement of them; (*c*) and it is also very often sympathetic of other diseases, which derive from them some portion of the vital action requisite to the regular performance of their functions. The last of these requires no further notice, as it resolves itself into the pathological states above enumerated; but it is very important that the practitioner should be enabled to recall to his recollection the various changes which not infrequently do occur, and give rise to the same state of disorder as the functional derangements above stated; as, upon a recognition of their presence or of their absence, the prognosis and treatment will very materially depend. The enumeration of these will also comprise all that has been found upon the dissection of such cases as have terminated fatally, fuller details respecting them

being given in other articles, particularly in that upon the *Organic Lesions of the* Digestive Canal.

9. *A. Lesions, chiefly of structure, affecting the bowels and retarding the defæcating processes.* — *a.* Extreme dilatation of one or all of the large bowels, sometimes independently of much fæcal accumulation; but most commonly accompanied with large collections of hardened fæces and gases (Stœrck, Brendel, Callisen, Abercrombie, Staniland, and many others). In cases of this description, the cæcum and colon have frequently been observed from twenty to thirty inches in circumference. *b.* Scybala, hard bodies, particularly biliary or intestinal concretions, the stones of fruit, &c., in various parts of the intestines, especially in the cæcum or before its valve, the sigmoid flexure of the colon, and in the rectum just above the sphincter, and pressing upon it and the prostate. Instances of prolonged constipation have occurred in my practice from the obstruction occasioned by large balls of lumbrici and ascarides. A singular case of this description was noticed by me in the *London Medical Repository* (vol. xvii. p. 243.), and similar effects have been mentioned by Lieutaud, Brera, Renauldin, and Bremser. *c.* Of inflammation of an insidious character, and sub-acute or chronic form, affecting chiefly the muscular or peritoneal coats of some part of the bowels, particularly of the small intestines; and either altogether arresting the peristaltic and tonic movements of that part, or greatly diminishing their activity. *d.* Contractions of various parts of the intestinal tube, but most frequently of the rectum, next of the colon, and least frequently of the cæcum and small intestines: these may be small in extent, although great in degree; or they may be the reverse. The narrowed part may be affected by spasm, or by thickening of one or more of its coats; this latter change being either so limited as to have the form of a ring (Home, Baillie); or extended much wider, and seated in a large portion of the bowel, or in more than one part. It may, moreover, be ulcerated, callous, cartilaginous, scirrhous, or even carcinomatous, &c., and it is always attended by great distension of, and fæcal accumulations in, the part above it (Morgagni, Lorry, Stoll, Baillie, Portal, Howship, Calvert, Annesley, &c.). *e.* Hæmorrhoidal tumours, either in a state of inflammation or irritation, and fissures, &c. of the anus, will often occasion constipation: the latter, by rendering the sphincter of the anus irritable and spasmodically contracted, so as to oppose the expulsion of the fæces retained in the bowel; the former, by producing the same effect upon the sphincter, as well as by presenting a mechanical obstacle when seated internally. *f.* Constriction, or contraction, of a portion of intestine by adhesions or by cicatrisation (Theden). *g.* Polypous, fungous, or fleshy excrescences growing from the inner surface of the cæcum, colon, or rectum; polypi of the sigmoid flexure of the colon passing down into the rectum (Portal, Meckel, &c.); sarcomatous tumours, and scirrhous and carcinomatous productions in the rectum or colon, are irremediable causes of obstruction when they reach a certain extent, and occasion great, and sometimes enormous distension of the parts immediately above them, with fæcal accumulations*, &c.

10. *B.* Constipation is also not infrequently the consequence of *diseases seated exteriorly to the coats of the intestines, and compressing or displacing them*, and of which the following are the most remarkable: — *a.* Tubal or extra-uterine fœtation, pregnancy, hernia, &c. *b.* Pressure on the rectum, arising from luxation or fracture of the os coccygis (*Ephem. Nat. Curios.* dec. iii. ann. v. and vi. ob. 241.). *c.* The pressure of tumours in the uterus or ovaria; prolapsed or retroverted uterus (Hunter, Wedel, Schultz, Marsinna, and myself). *d.* Various tumours seated between the uterus, vagina, and rectum (Bader, Bonet, Burggrave); abscess in the same situation (*Ephem. Nat. Curios.* dec. i. ann. iii. ob. 167., and myself); and too large a pessus in the vagina (Bayard). *e.* Abscess between the bladder and rectum (Conradi, Leske, &c.); and enlargement or other disease of the prostate (Ford, myself, and others). *f.* The pressure of enlarged sacral glands (Cruickshanks), of an enlarged ovarium descending in the pelvis (Moeller, Odier, &c.), and of various kinds of tumours — sarcomatous, steatomatous, fibrous, and cartilaginous — developed in the omentum, within the pelvis, &c. (Lauth, Reidlin, Schæffer, Osiander, Hufeland, &c.).

11. *C.* Obstinate constipation may also depend upon, or at least be connected *with, injury or disease of the spine.* In delicate females, it is not uncommon to find fæcal retentions proceeding from this cause. In many of such cases, much pain is felt when the spine is examined, indicating the presence of inflammatory irritation of the envelopes of the chord, or scrofulous disease of the bodies of the vertebræ. In cases of this description, the functions of the intestinal canal are impeded, or otherwise disordered, by the morbid influence exerted by the spinal nerves upon the organic nervous system, through the medium of their communications with this system.

12. II. The Consequences and Terminations of constipation require the utmost attention, as respects both the prevention of such of them as are unfavourable, and the recognition of their early approach. Among the most common *remote* consequences of fæcal retention, are cutaneous eruptions, headachs, vertigo, various

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* The following case is not only extraordinary but instructive: — M. G——, a medical officer in the French service, was always costive from birth. He ate largely, but seldom passed a stool oftener than once in one or two months; and his abdomen assumed a large size. At the age of 42, his constipation was usually prolonged to three or four months. In 1806, after medicines had been taken to procure a stool, which had not been passed for upwards of four months, abundant evacuations continued for nine days, and contained the stones of raisins taken a twelvemonth before: but the constipation returned. In 1809, the enlarged abdomen became painful, vomiting supervened, and he died at the age of 54, having seldom, through life, passed more than four, five, or six stools in the year. On opening the abdomen, a fibrous partition obstructed the rectum about an inch from the anus. Immediately above this partition, the rectum was so enormously dilated as to fill all the pelvis, and nearly all the abdomen. The enormous cloaca contained thirty *kilogrammes* of brownish black and very offensive pultaceous fæces. Its inner surface presented gangrenous and ulcerated patches. The lower part of the colon was enlarged to the size of the stomach; which, with the small intestines, liver, &c., appeared diminished in volume and capacity by the pressure of the distended rectum. (Renauldin, in *Dict. des Scien. Méd.* t. vi. p. 257.)

dyspeptic symptoms, chlorosis, hysteria, and chorea. The straining at stool is liable to produce apoplexy and hernia in aged, and hæmoptysis in young persons. When constipation is neglected or improperly treated, the most serious effects are produced *immediately* upon the bowels themselves; *hæmorrhoids*, severe *colic*, passing into *ileus* or *enteritis*, being not infrequent results. These very serious consequences of constipation may, however, proceed as much from the use of too powerful drastic or acrid remedies, to procure evacuations, as from the fæcal retention. I have repeatedly seen dangerous effects follow a large, or even a moderate dose of castor oil, which had become rancid or acrid by exposure to the air, or by long keeping. When the constipation has continued long, the most distended portions of the bowels, either by flatus or accumulated fæces, sometimes pass rapidly and insidiously into an inflamed state, which, if not speedily subdued, soon terminates in sphacelation, or in a kind of sphacelating ulceration. In all cases, therefore, of obstinate, and even of early constipation, the state of the abdomen — particularly in respect of tension, tumefaction, hardness, definite or indefinite tumour, tenderness, heat and dryness of skin, and pain on pressure, &c. — should be carefully examined by touch, and *mediate percussion*; and if any of these symptoms be present, the accession or early progress of inflammation, and other unfavourable consequences now noticed, should be dreaded or even inferred. If, to these be added nausea and vomiting, heat of skin, high-coloured urine; an erect, white, or loaded appearance of the papillæ of the tongue; hard, constricted, or oppressed pulse, even although it may be slower than natural; and more especially if pain, tension, &c. be present, with hiccup; inflammatory action of a serious or unfavourable kind is obviously present, or even far advanced, and calls for the most decided means. (See arts. Colic, and Intestines — *Inflammation of*.) Nor should we overlook the fact, that constipation is a very common symptom of enteritis, which may actually exist without occasioning much febrile disturbance, or affecting the pulse; great care is therefore necessary at the outset, in distinguishing simple constipation, from the constipation which proceeds from the slow and insidious occurrence of inflammation of the intestines, — a *diagnosis*, which only a careful examination of the abdomen, and enquiry as to the above symptoms, can furnish.

13. III. The Prognosis in constipation is *very favourable* in slight cases, and in those of short duration, particularly when unattended by nausea or vomiting, or by pain, tenderness, and tumefaction of the abdomen, or by any febrile symptoms: it should be given with great caution when these symptoms are present, as they indicate the accession of inflammatory action: and it ought to be *unfavourable*, when the obstruction is prolonged notwithstanding the judicious employment of remedies, or when any of the symptoms indicating the accession of the unfavourable terminations noticed above make their appearance; for these states of disease are more dangerous when they supervene on obstinate or prolonged constipation, than when they occur in a simple and idiopathic form. When fæcal retentions apparently proceed from any of the organic changes enumerated above (§ 9, 10.), the prognosis will necessarily depend upon the nature, seat, and extent of these lesions, as far as they can be ascertained; as, for example, when it is owing to enlargement of the prostate, contractions of the rectum and colon, tumours in the pelvis, &c., an opinion of the result, although generally unfavourable, will vary according to numerous concurrent circumstances, particularly as respects a permanent recovery, or an immediate or remote occurrence of a fatal issue.

14. IV. Treatment. — The means of cure in every case of constipation are directed with the intention, 1st, of procuring fæcal evacuations by as gentle and unirritating means as may be adequate to the purpose; and, 2dly, after having fully accomplished this end, of preventing a recurrence of a torpid condition of the bowels and digestive organs generally.

15. i. *The removal of existing constipation.* — *A.* The *slighter* and more *common cases of constipation* are most benefited by the use of such means as are generally employed to promote the secretions poured into the intestinal canal, and to excite its peristaltic action. About three or four grains of blue pill, either with or without a little Castile soap and extract of taraxacum, taken at bed-time, once or twice a week; and a draught consisting of equal quantities of the compound infusions of gentian and senna, with a little neutral salt, &c. (see F. 205. 266.); or of the compound decoction of aloes; on alternate mornings, will generally be all that is required. Besides these, any of the stomachic and aperient medicines prescribed in the Appendix may be adopted (see F. 215. 252. 558. 574.); the patient having recourse to the shower bath, or cold plunge bath, in the morning, and resorting regularly to the water closet after breakfast.

16. *a.* In the slight, as well as in *habitual* and frequently recurring constipation, it will be useful to ascertain, as accurately as possible, the particular viscera in fault, and what function is deficient (§ 6. *et seq.*). When we suspect that the duodenum and *small intestines* are especially affected (§ 6.), the compound infusion of senna, or the infusion of rhubarb, combined, according to the circumstances of the case, either with the alkalies or their sub-carbonates, or with vegetable bitters and tonics, or with ipecacuanha, taraxacum, and antispasmodics, as here directed, will generally remove all disorder. (See also F. 251. 391. 506. 562.)

No. 143. ℞ Infus. Rhei (vel Infus. Sennæ Comp.), Aquæ Pimentæ, āā ʒvj.; Liq. Potassæ ♏ xx.; Extracti Taraxaci ʒj.; Spirit. Myristicæ ʒj. M. Fiat Haustus, mane vel horâ somni sumendus.

No. 144. ℞ Infus. Sennæ Comp. ℥vss.; Sodæ Sub-carbon. ʒjss.; Vini Ipecacuanhæ ʒjss.; Spirit. Ammon. Arom. et Tinct. Hyoscyami āā ʒj.; Tinct. Cardamom. Comp. ʒij. M. Fiat Mist., cujus capiat Coch. iij. larga mane nocteque.

No. 145. ℞ Infus. Calumbæ (vel Infus. Gentianæ Comp.), Infus. Sennæ Comp., āā ℥ijss.; Liq. Potassæ ʒjss., Extr. Taraxaci ℥ss.; Spirit. Pimentæ (vel Myristicæ) ʒij. M. Fiat Mist., de qua sumantur Coch. iij. larga horâ somni, vel primo mane.

No. 146. ℞ Extr. Colocynth. Comp. ℈ij.; Saponis Castil. gr. x.; Pulv. Ipecacuanhæ gr. vj.; Extr. Hyoscyami ʒss. Contunde bene simul et fiant Pilulæ xviij., quarum capiat binas horâ somni quotidiè.

No. 147. ℞ Decocti Aloës Comp. ℥ivss.; Liquoris Potassæ (vel Sub-carb. Sodæ) ʒj.; Vini Aloës ʒvj.; Extr. Taraxaci ʒiij.; Spirit. Pimentæ ℥ss. M. Capiat tertiam vel quartam partem pro dose, et repetatur pro re nata.

No. 148. ℞ Magnes. Sulphatis ʒj. (vel Potassæ Sulphatis ʒss.); Infus. Rosar. Comp., Infus. Gentianæ

Comp., āā ʒvj.; Acidi Sulphurici Arom. ♏x.; Tinct. Sennæ (vel Tinct. Aurantii) ʒj.—ʒij. M. Fiat Haustus, omni meridiè capiendus.

In most instances of constipation depending upon torpor of the small intestines, and *deficient biliary secretion*, a full dose of blue pill or of calomel should be exhibited at bed-time, and a common black draught the following morning, at the commencement of the treatment, with the view of promoting the secreting functions of both the liver and the mucous follicles of the bowels; and a moderate action ought to be kept up for some time subsequently by the remedies now adduced.

17. *b*. In those cases in which the *large bowels* are chiefly in fault, the preparations of aloes variously combined, the means already mentioned, particularly ℞ 146, 147., or those recommended in the articles on the COLON, and on COLIC, will be generally found appropriate. In some instances, however, it will be requisite to have recourse to more powerful cathartics than I have yet mentioned—particularly when irritability of the stomach, or of the system generally, does not exist—and to promote their action by enemata. The following, or F. 140, 141. in the *Appendix* may be employed.

No. 149. ℞ Pulv. Jalap. gr. xij.; Pulv. Scammoniæ gr. v.; Potassæ Sulphatis ʒj.; Olei Caryoph., et Ol. Carui, āā ♏iij. Tere bene simul, et fiat Pulvis in quovis vehiculo idoneo sumendus.

No. 150. ℞ Magnes. Sulphatis ʒvj.; Infus. Sennæ Comp. ℥ij.; Tinct. Jalap. ʒj.; Tinct. Opii ♏vj.—x. (vel Tinct. Hyoscyami ʒss.); Tinct. Castorei, Spirit. Pimentæ, āā ʒj. M. Fiat Haustus.

No. 151. ℞ Extr. Colocynth. Comp. ℈ij.; Saponis Castil. gr. xij.; Olei Crotonis gtt. iij. (vel Extr. Nucis Vomicæ gr. iij.) M. Fiant Pilulæ xii. Capiat duas horâ decubitus.

No. 152. ℞ Mannæ ʒj.; Infus. Anthemidis ʒxij.; solve, et adde Olei Olivæ ℥ijss.; Magnesiæ Sulphatis ʒjss. Sit Enema.

18. *c*. In cases apparently depending upon deficient tone of the muscular coat of the large bowels, and imperfect propelling power of the upper part of the rectum, I have seen benefit derived from combining the spirituous extract of nux vomica or strychnine with the pilula aloës cum myrrha, or with the compound extract of colocynth, as directed above in ℞ 151., in place of the croton oil. When this state is connected with deficient secretion from the intestinal mucous surface (§ 7. *b*.), small doses of the croton oil, from one sixth to one half of a drop, combined with some other purgative, and repeated daily, or on alternate days, will remove obstructions from, and restore the secretions of, the mucous follicles. In cases also where the internal surface of the intestines are loaded with a viscid mucous sordes (§ 7. *g*.), it acts more efficiently than any other medicine, particularly when combined as above (℞ 151.), or with calomel or blue pill, and restores more permanently the functions of the intestines. I have recently met with several cases of constipation consequent upon attacks of pestilential cholera, and in nearly all of these I have inferred the existence of not only imperfect peristaltic action of the bowels, but also an accumulation of viscid, mucous, or albuminous sordes on their internal surface,—an inference confirmed by the state of the evacuations. The combination of purgatives now alluded to has proved more efficacious in removing this morbid condition, than any other I have employed.

19. *d*. In *children* and *young females*, constipation is generally attended, even if it be not caused, by deficient secretion from the mucous follicles, and by an accumulation of mucous sordes (the *Saburra intestinales* of the older writers, and the *Embarras Sabural* and *Embarras intestinal* of French authors) on the internal surface of the bowels. In these cases, a dose of calomel, with either jalap or scammony, and triturated with sugar, and followed by castor oil, or the infusion of senna with salts, or by the decoction of aloes, &c., according to the circumstances of the cases, will generally procure full evacuations. But in many such cases, the repeated exhibition of these will be required before the collected sordes can be removed; and even when the evacuations have assumed a healthy appearance, it will be requisite to resort occasionally to purgatives combined with tonics and resolvents—such as senna, aloes, or rhubarb, with gentian, cascarilla, cinchona, or calumba; and with potass, soda, &c., before the functions of the bowels will be altogether restored.

20. *e*. When the fæcal retention assumes the form of *obstipation*, and is attended with difficult or imperfect evacuation; or with frequent desire, and tenesmus; and with hard, rounded, scybalous discharges; we may infer the existence of rigidity of the longitudinal bands of the colon (§ 7. *e*.); and should combine anodynes and antispasmodics with purgatives. I have commonly derived most advantage from small doses of castor or olive oil, exhibited frequently, in some carminative or aromatic water, with a little tincture of hyoscyamus and ipecacuanha wine; and from demulcent, anodyne, and oleaginous clysters (F. 143, 144. 795.) Electuaries, also, consisting of the confection of senna, with cream of tartar, magnesia, extract of hyoscyamus, &c. (see F. 96. 98.), will generally prove more serviceable, in these cases, than very active medicines. When the retained scybalous fæces produce irritation of the colon, the frequent calls to stool, and the scanty, mucous, and watery evacuations, may lead the practitioner to suppose, if he rely upon the account of the patient only, that diarrhœa, instead of constipation, actually exists, and hence to adopt an improper treatment. In these cases, the warm or tepid bath, the addition of ipecacuanha, or hyoscyamus, or both, to the purgatives given by the mouth, and the use of clysters with infusions of ipecacuanha and linseed, and with olive, linseed, or almond oil, will generally procure the evacuation of scybalous fæces. When the bowels are distended by flatus, the operation of aperients will be most assisted by gentle friction of the abdomen; and confidence to persist in the use of it will be given by directing the friction to be employed with some liniment (F. 298. 306.), or with ℞ 157. subjoined.

No. 153. ℞ Olei Ricini recentis ℥j—ʒij.; tere cum Vitelli Ovi unius, et adde terendo, Vini Ipecacuanhæ ♏x.; Tinct. Hyoscyami ♏xv.; Tinct. Castorei ♏xx.; Aquæ Pimentæ ʒxj. M. Fiat Haustus, 4tâ vel 5tâ quâque horâ sumendus.

No. 154. ℞ Potassæ Supertart. in pulv. ℥j.; Sodæ Sub-carbon. exsic. (vel Magnes. Calcinat.) ʒiij.; Confectionis Sennæ ℥jss.; Confectionis Rutæ ʒijss.; Extr. Hyoscyami gr. xij.; Pulv. Ipecacuanhæ gr. ij.—iij.; Tinct. Capsici ʒss.; Syrup. Zingiberis q. s. ut fiat Electuarium, cujus capiat partem quartam 4tis vel 5tis horis donec plenè dejecerit alvus.

No. 155. ℞ Sodæ Sulphatis, Mannæ Opt., āā ℥j., solve leni cum calore in Aquæ Menth. Virid. ℥vjss., et adde Tinct. Sennæ ℥j.; Vini Ipecacuanhæ ʒj.; Tinct. Capsici ʒss.; Spirit. Carui ʒij. M. Capiat Coch. larga quatuor tertiis vel quartis horis.

No. 156. ℞ Olei Amygdalæ, Olei Ricini, Mannæ Opt., āā ʒjss.; Aq. Pimentæ ℥xj. M. Fiat Haustus, 4tis, 5tis, vel 6tis horis sumendus.

No. 157. ℞ Unguenti Cetacei ℥jss.; Olei Carui et Tinct. Opii āā ʒjss. Misce, et fiat Linimentum, cum quo illinatur abdomen, urgente flatu.

21. *B. a. In the more obstinate or prolonged cases of constipation*, which have resisted the above, or any other means usually employed to procure evacuations, we should endeavour to ascertain, by enquiring into the previous state of the patient's digestive and intestinal functions, and by examining the abdomen, rectum, and parts in the vicinity, the probable cause of obstruction. The account which may be furnished of the appearance of the evacuations heretofore, and of the facility with which they had been evacuated, as well as of the sensations felt before or at the the time of evacuation, will very materially guide the judgment of the practitioner in concluding respecting the existence of organic disease of the colon or rectum, or in the vicinity of the latter. Frequent attacks of diarrhœa, tenesmus, or dysentery, previously to the occurrence of constipation, or of pain in the course of the colon, or along the sacrum, should always lead us to suspect narrowing, or thickening, or both, in some part of the colon or rectum (§ 9. *d*.). In such cases, we should endeavour to solicit fæcal discharges by oleaginous and saponaecous clysters, and frictions of the abdomen, rather than by purgatives taken by the mouth; and we ought not to be too officious in the use of these; but should so study the feelings of the patient, as to prevent irritation and febrile disturbance — the harbingers of inflammation — from coming on. In those cases particularly, examination of the state of the rectum, and the lower part of the colon, by the introduction of the long flexible bougie, as recommended by Dr. Willan, should not be omitted; and if any stricture exist within the reach of this instrument, its gradual dilatation should be attempted. If a stricture be reached, it may be of service to use a hollow bougie, along which enemata may be thrown up so as to pass beyond the seat of obstruction, which might otherwise not be overcome by them. Instances have been met with, in which stricture and organic disease of the colon have apparently existed for some time without constipation having been complained of; and yet the exhibition, when constipation did take place, of acrid purgatives in large and repeated doses, has been soon followed by an unfavourable issue, which, however, might not have been much longer deferred by any treatment whatever. Cases illustrative of this occurrence have been recorded by Home, Sterry, Annesley, &c. (See references.)

22. *b*. In almost every instance in which the bowels still remain obstinately costive after two or three doses of purgative medicine have been given, but without any urgent symptom being complained of, it will be more advantageous to use gentle means, to trust chiefly to enemata, and to wait patiently the result, than to prescribe medicines which will irritate, and invert the action of the upper part of the digestive tube without reaching the seat of obstruction. If, notwithstanding, symptoms of inflammatory action begin to appear; or if the stomach become irritable; or if the pulse be oppressed, hard, or constricted; or if the patient be plethoric and of a sanguine or irritable temperament, venæsection; or the application of leeches to the abdomen, or both, should be resorted to, and hot poultices and fomentations, or the warm turpentine epithem, or a blister, be afterwards placed upon the belly. The patient may then be left quiet for several hours, in expectation of the action of the purgatives previously given; or, if the stomach be irritable, soothing and anti-emetic remedies (F. 178, 179. 357.) only, or a full dose of calomel with opium or hyoscyamus, should be taken, and after a few hours the enema may be repeated. In cases of obstinate constipation, unconnected with contraction of the colon or rectum, a large dose of calomel, either alone, or with opium or hyoscyamus, may be exhibited, and repeated once or twice, at distant intervals; each dose being followed either by castor oil, or by the common black draught, or by half an ounce of turpentine with an equal quantity of castor oil in any suitable vehicle. But where inflammatory disease, or lesions consequent upon inflammation, are suspected to exist in either the colon or rectum, calomel, or even a full dose of blue pill, will often aggravate the mischief, unless emollient enemata be frequently thrown up. Indeed, I believe, from the experiments and observations I have made respecting the action of calomel on the alimentary canal — from remarking its effects in irritating and inflaming the inner surface of the colon and rectum when taken in large doses — and from the history of the previous ailments, and treatment of many of those who have had stricture of the rectum or colon — that a very large proportion of such cases has been brought on by the frequent use of calomel as a purgative.

23. *c*. When we believe that constipation is owing to a torpid or paralysed state of the muscular coats of the large bowels, and the accumulation of hardened fæces consequent thereon (§ 9. *a*.), oleaginous purgatives given by the mouth; in some cases, a full dose of calomel, followed by a turpentine and castor oil draught; and, subsequently, oleaginous, saponaceous, and terebinthinate enemata; are generally the most appropriate means. If, however, these fail, then small but repeated doses of castor, olive, or almond oil; frequent demulcent enemata; the aspersion of cold water over the abdomen or lower extremities; or injections of cold water, may be tried. (See § 26.). If there be great inflation or fæcal distension of the colon, friction, with the carminative liniment prescribed above (℞ 157.), may also be employed, with various other internal and external means recommended in the articles on Colic and Colon. In aged females especially, hardened fæces sometimes collect to such an extent, and are lodged so firmly in the rectum and lower part of the colon, as to require removal by mechanical means. Cases of this kind have been detailed by Schurig, Petit, Bishoprick, Secheverel, White, &c., and have occurred in my own practice, as well as in that of many others. They require the careful introduction of a marrow-spoon, or some similar instrument, into the rectum, to break down the fæces; and subsequently the means just stated, particularly oleaginous and terebinthinate injections thrown up by the pump apparatus now in general use, which should be provided with a large and very long pipe, or with a long, hollow, and flexible

bougie, which ought to be passed as far as possible up the rectum.

24. *d.* If alvine obstruction be apparently owing to organic, malignant, or other diseases about the uterus, its appendages, the vagina, or rectum (§ 10.); or to spasmodic constriction of the sphincter ani excited by inflammatory irritation in its vicinity, or by hæmorrhoids, the warm bath, semicupium, or the hip-bath; the vapour of hot water and narcotic decoctions directed to the anus; anodyne and relaxing injections; and the extract of conium or hyoscyamus, made into either a suppository or an ointment, with the addition of a little of the extract of belladonna; may be prescribed, along with such other measures as the circumstances of the case may require.

25. *e.* When constipation is dependent upon, or associated with, disease of the spine, or inflammatory irritation of the membranes and envelopes of the chord, leeches should be applied near the place where pain is complained of; or the patient may be cupped in the vicinity, kept quiet, and in the horizontal position; and the action of the bowels promoted by the means stated above (§ 16, 17.), and by terebinthinate injections. If inflation of the bowels exist, the carminative liniment may be employed; and if tenderness, tension, or pain of the abdomen be complained of, leeches, followed by fomentations, &c. as already advised (§ 22.), should be resorted to.

26. *C.* Besides the above, other means have been recommended by authors in various states of the disease, and found of much service when appropriately prescribed. Joerdens advises the frequent administration of *assafœtida* in enemata, and, in cases of deficient secretion and healthy action of the colon, it is certainly of essential use, either alone or in conjunction with purgative medicines. Starke recommends the inspissated *ox-gall*, both in the form of pills and in clysters. In the latter form, it is calculated to prove an excellent adjuvant of other means; and when combined with aloes, taraxacum, soap, extract of gentian, &c. (F. 559. 562.), it is very serviceable in restoring the healthy functions of the bowels, and digestive organs generally. Wendt directs repeated clysters of the decoction of *gratiola* to be thrown up. Numerous writers have advocated the application of *cold*, in cases of obstinate constipation. Schenk, a Fonseca, Blankard, and Laison advise the patient to walk or stand upon a marble pavement or slab; and Brassavolus states that Savanarola cured the Duke of Ferrara, by making him walk barefooted over a cold wet marble floor. Stevenson, Falconer, Percival, and Spence direct the affusion of cold water over the lower and upper extremities, and adduce cases wherein the practice had been successful after other measures had failed. Kite, Bartram, Sancassini, and Schmidtmann recommend cold epithems, and the affusion or aspersion of cold water, over the abdomen; and Kaehler, Korb, and Brandis advocate the administration of cold clysmata, in addition to the employment of cold externally. The cold and tepid *shower bath*, the cold plunge bath, and warm and tepid bathing, have severally been resorted to in aid of other measures, and are frequently of use, — the former particularly in habitual constipation, the latter in cases attended by difficult and imperfect evacuation, and seemingly dependent upon rigidity of the longitudinal bands of the colon. *Electricity* and *galvanism* have been employed successfully by Kite, Sigaud la Fond, Grapengiesser, and Clarkson; and the injection of *tobacco smoke*, and of a weak infusion of the leaves of *tobacco*, has been advised by Von Mertens, Vogel, and other authors referred to, when discussing the *treatment* of Colic and Ileus (*which see*). The decoction of *berbery*; powdered *charcoal* (Mitchell and Daniel), in the dose of one, two, or three table-spoonsful given every hour in milk or lime water; frictions of the abdomen (Quelmalz); inunction of it with *linseed* or *olive oil* (Riedlin, &c.); fomentations consisting of senna leaves made hot and moist by boiling water, and placed over the abdomen (Petit); purgative extracts; tinctures, and infusions, applied to this situation, either in the form of ointment or fomentation (Schenck, Alibert, &c.); and enemata containing *tartarised antimony* (Elias), have also been employed. The exhibition of *emetics* was advised by Hippocrates, Praxagorus, Cælius Aurelianus, and Alexander Tralles; and of ipecacuanha or antimonial emetics by Stoll, Sims, Sumeire, Deplace, and Hosack. I have seen benefit derived from inunction of the abdomen with an admixture of castor and linseed oils, to which three or four drops of croton oil had been added. In a great proportion of the cases of constipation which have occurred to me since 1817, when I first adopted the practice, very certain and immediate advantage has been derived from a full dose of calomel (either with or without opium or hyoscyamus), followed in a few hours by half an ounce of oil of turpentine, and an equal or somewhat larger quantity of castor oil, taken either in a cup of milk, or in a glass of some aromatic water. The action of these has usually been promoted by an injection containing castor, olive, or almond oil; and, if the operation has not been sufficiently copious, another dose of castor oil has been given, and the enema repeated.*

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* The following *synopsis* exhibits a succinct view of the *treatment*:— 1. If the pulse be hard or constricted, and if there be pain, increased on pressure, bleed generally or locally, or both — apply blisters or hot fomentations, or the cold affusion, or cold epithems, &c., on the abdomen; afterwards exhibit purgatives, enemata, &c. 2. If constipation seems to arise from diminished secretion and exhalation, give calomel or blue pill, carbonates of the alkalies, jalap, the purgative oils, senna, camboge, elaterium, croton oil, &c., according to circumstances. 3. If it depend upon a rigid fibre and habit of body, combine purgatives with relaxants and nauseants — with ipecacuanha, antimony, colchicum, soda, hyoscyamus, &c.; prescribe emollient and relaxant medicines in preference to those that are acrid; and give them with antispasmodics and sedatives. 4. When it arises from torpid peristaltic action and lessened secretion, conjoin tonics, gum resins, and bitters, with purgatives and aperients; myrrh, assafœtida, galbanum, &c., with aloes; sulphate of quinine, or ext. of gentian with aloes; the alkaline solutions, with tonic infusions; use friction with stimulating liniments to the abdomen, or along the spine; resort to the cold salt-water bath or shower bath, and the tonic and aperient mineral waters of Cheltenham, Leamington, Vichy, and Carlsbad. 5. When it is attended by accumulations of hardened fæces in the colon, have recourse to copious soapy or oily clysters — to the introduction of a marrow-spoon to break down the fæces — to the injections of cold water, &c. by the valve-apparatus, with a long bougie attached to the pipe — to the aspersion of cold water on the abdomen, or the application of cold to the lower extremities, &c. 6. If it proceed from organic change of the large bowels, or of parts affecting them, solicit evacuation by emollient and relaxant enemata, and

27. ii. The *prevention of a recurrence of the disease* should be strictly guarded against, particularly after active cathartics have been given to remove it. Purgatives, aperients, or laxatives, combined with stomachic bitters and tonics (F. 187. 266. 872.), ought to be taken daily, and afterwards on alternate days, until the functions of the bowels are fully restored. The patient's diet should be light and nutritious; all astringent and indigestible substances avoided; and, if the abdominal secretions be deficient, an occasional dose of blue pill, or hydrarg. cum creta, and a course of taraxacum, with deobstruent laxatives and tonics (F. 390. 510. 873.), prescribed. Subsequently a course of Leamington or Cheltenham mineral waters, or the artificial Seidschutz, Marienbad, and Carlsbad waters, and in some cases the Pyrmont and Spa waters, will prove of much benefit. The shower bath, upon getting out of bed, or the cold salt-water bath, will further tend to promote the digestive and defæcating processes. Costive persons, with a large or pendulous abdomen, should wear a broad belt or bandage around it, which will serve to promote the functions of the bowels. The patient should carefully avoid the remote causes of constipation, attend daily to the first intimations to stool, and have an early recourse to medicine when such intimations are delayed beyond the usual time. When the bowels require the assistance of medicine to preserve them in a regular state, aloes may be combined with mastich and Cayenne pepper, or with a bitter extract, myrrh, and assafœtida, and taken daily about two hours before dinner.

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CONSUMPTION. See Pulmonary Consumption, and Mesenteric Consumption.

CONTAGION. See Infection.

CONVULSIONS. — Syn. Σπασμὸς, Gr. *Spasmi Clonici*, *Motus Convulsivi*, *Distensiones Nervorum*, *Conductiones*, Auct. Var. *Convulsion*, *Spasme*, Fr. *Zuckungen*, Ger. *Convulsioni*, Ital. *Convulsion Fits.*

Classif. 4. *Class*, Nervous Diseases; 3. *Order*, Spasmodic Affections (*Cullen*). 4. *Class*, Affecting the Nervous Function; 4. *Order*, Affecting the Sensorial Powers (*Good*). II. Class, III. Order (*Author*, in *Preface*).

1. Defin. *Violent and involuntary contractions of a part, or of the whole of the body, sometimes with rigidity and tension* (tonic convulsions); *but more frequently with tumultuous agitations, consisting of alternating shocks* (clonic convulsions); *that come on suddenly either in recurring or in distant paroxysms, and after irregular and uncertain intervals.*

2. Convulsions have attracted a due share of attention from the medical writers of all ages. Hippocrates states, that "convulsions arise either from repletion or evacuation" (*Aphor.* sect. vi. § 39.); and Galen, whilst he admitted the propriety of referring them to these two morbid states, argued for a *third*, namely, irritation occasioned by a morbid humour. Ætius adhered to a similar arrangement, but considered that the *third* of these pathological conditions performed the principal part. Subsequent writers, chiefly copiers or commentators on Galen, adopted his views. Zacutus Lusitanus imputed much importance to the second morbid state of Galen, viz. *excessive evacuation*; and considered that a positive or relative dryness of the nervous and muscular system was occasioned by it. The writings of Willis and Sylvius De le Boë made some alterations in the received doctrine of the origin of convulsions, by referring more than their predecessors had done to the nervous system and animal spirits, and less to

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suppositories; sooth local and constitutional irritation, preserve the functions of the stomach, and give the alkaline solutions with conium, belladonna, &c. — (*From the Author's short Notes of his Lectures delivered from* 1824 *to* 1829.)

the influence of morbid humours. It was not, however, until the appearance of the writings of F. Hoffmann, that a spirit of accurate investigation was manifested in this department of medical enquiry. This writer, to whom our science still continues under great obligations, regarded convulsions as a consequence chiefly of a morbid state of the spinal chord and its membranes, — an opinion which has been adopted by many, and which numerous facts seem to support, in respect of several manifestations of these complaints, although it cannot so frequently be shown that this part of the voluntary nervous system is that primarily affected.

3. The opinions respecting the nature and relations of convulsions, entertained during the last century, and what has past of the present, have been so numerous and vague, that the advantages resulting from a review of them could by no means compensate for the limits they would occupy. Such of them as deserve notice will be referred to hereafter. It may, however, be remarked respecting them, generally, that no two writers of reputation agree as to either the import of the word, the diseases coming within this denomination, or the manner of arranging and considering them. Under such circumstances, the systematic and eclectic writer might be placed in much difficulty, if he had not extensive and diversified experience to guide him. Upon this, however, my chief reliance is placed, even while I endeavour to profit by the labours of my predecessors,— some of them my followers in the adoption of important curative means in these affections.

4. If, in defining convulsion, we state it to be "*an anormal action of muscular or fibrous parts,*" we at once make it synonymous with spasm, and embrace a most numerous class of diseases, viz. those forming Dr. Cullen's order, Spasmodic Diseases, as well as many of those in which spasm is merely a part of the morbid state. If we define it to be "*an irregular or anormal action of voluntary muscles,*" we shall comprise all those maladies, which usually put on nearly a regular form or type, owing to certain peculiarities of the spasmodic action and concomitant phenomena; as tetanus, epilepsy, &c. But if we adopt the more confined and precise definition given above, those disorders only which assume no regular type; but which, whilst they approach, on the one hand, those of a regular form, often pursue, on the other, very eccentric courses, and even anomalous states. It is impossible to consider the diseases of the frame in a way true to nature, and at the same time as abstract entities — as species perfect and distinct of themselves. They are individually, in truth, merely certain morbid states, lapsing on the one side insensibly into others, to which, although most intimately allied in every respect, different names have been but too arbitrarily assigned; and passing on the other side into affections otherwise denominated, although not materially differing in their natures. Thus, if we make spasm the essential character of one great family of diseases, we may divide it into subordinate orders, genera, and species, according to the parts affected, and the functions concomitantly disordered, and the permanency, the rigidity, the relaxations, and the frequency of recurrence of the spastic action. But still the essence of disorder will be very generally the same; and each of these subdivisions—each of the manifestations of the particular morbid states made the basis of distinction — will so insensibly glide into each other, as to defy the possibility of drawing lines of demarcation between them. The practitioner will be unable, on many occasions, to detect in practice the specific differences assumed; and will continually meet, as I have in many hundreds of instances, with cases which he cannot refer to one species more than to another, and which are as much eclampsia as epilepsy, or as much what are usually called convulsions as either the one or the other. If we take the character of the spasm, in respect of permanency, rigidity, relaxation, and recurrence, as a basis of arrangement of all the diseases attended by anormal action of voluntary muscles, we shall have every grade, passing imperceptibly from the most acute form of tetanus through cramp, epilepsy, eclampsia, convulsions, &c., down to the most atonic states of chorea and tremor. Also, if we consider the affections called convulsions, and which are usually irregular in their forms, with reference to the character of the anormal contraction of the muscles, we shall perceive it in some cases of the most violent and spastic nature, frequently of some continuance, the relaxations being of brief duration, or scarcely observable; and in others nearly or altogether approaching to tetanic. These constitute the more *tonic* form of convulsions, from which there is every possible grade, down to the *atonic* or most *clonic* observed in chorea or tremor. Thus, then, anormal actions of muscular parts, like all other morbid actions, may, in respect of grade, be either above or below the healthy standard — *tonic* and *clonic* marking each respectively; but between which there exists every possible degree; these terms being therefore entirely relative, and conveying no definite and unchanging meaning. But, besides varying remarkably as to grade, the anormal actions of voluntary muscles may be attended by numerous phenomena giving them specific characters. Thus, when accompanied with complete insensibility, or any other superadded morbid condition, they have been denominated epileptic, hysterical, &c.; and, from this circumstance, they assume certain types, but of no very constant or immutable kind. When, however, they are not so associated, they constitute a simpler state of disease, and put on less regular forms, affecting either the whole of the voluntary muscles, or a greater or less number of them.

5. I. Forms. — From this, therefore, it is to be inferred that, although Dr. Cullen, and many others, have considered convulsions as characterised by the clonic nature of the spasms — by the alternation of contraction and relaxation without the control of the will — yet this does not universally obtain, they sometimes assuming states approaching to tetanic, and every degree of violence, as well as length of duration. The more regular and specific forms of convulsion, as epilepsy, hysteric fits, raphania, hiccup, tetanus, rabidity, &c., are discussed in separate articles; I shall, therefore, consider at this place only those simple and irregular states of convulsion which do not fall within its more specific manifestations.

6. Simple convulsions present great diversity of character. They have been already shown to differ widely in violence and degree; and they vary as greatly in duration, modes of accession, and recurrence, as well as in the number of parts affected by them. Hence they may be *acute* or *chronic* — most frequently the former; *partial* or *general; continued, recurrent,* or *intermittent; uncertain* in their accession, or *periodic;* and they may, moreover, attack a number of parts in succession. The circumstances and causes which originate them will also impart to them certain characters, which, although frequently difficult of detection, should not be overlooked. Thus, they are either *idiopathic* or *symptomatic*, most frequently the latter, even when the primary lesion illudes observation. But these diversities of form, although most deserving of attention, can only partially serve as a basis for the practical consideration of convulsions. I shall therefore view them — 1st, in respect of their partial or local occurrence; 2d, as to their general manifestations; 3d, as they affect infants and children; and, 4th, as we observe them in connection with the puerperal states: I shall also notice them as associated with, or consequent upon, other acute diseases.

7. i. Partial or Local Convulsions. — Many of the disorders which have been imputed a convulsion of individual parts, fall more appropriately under the denomination of spasm. I shall therefore briefly notice only such as, from the alternation of relaxation and contraction, appear to approximate to the convulsive state. *A. Involuntary contractile parts* are more subject to spasmodic action, than to that which may be said to be really convulsive. Whether or not certain of the phenomena presented in various diseases of the alimentary canal, as gastrodynia, pyrosis, rumination, retchings, colic, borborygmi, ileus, the tormina of dysentery, &c., are more properly convulsive or spasmodic, must be entirely a matter of opinion, to which but little practical importance should be attached, as they are both modifications merely of the same proximate condition. This remark applies equally to the anormal actions sometimes presented by the urinary bladder and uterus; and it is probable that palpitations of the heart, and angina pectoris, are chiefly manifestations of convulsive contractions of this viscus. (See Angina Pectoris, and Heart — *Palpitations of.*) That hiccup is altogether owing to convulsive actions of the diaphragm, cannot be doubted. (See Hiccup.)

8. *B. Voluntary muscles and parts* present the most unequivocal appearance of partial or local convulsion; although several local affections, denominated convulsive by some writers, are, more strictly speaking, spasm or cramp of particular muscles. *a.* The muscles of the *eye-lids,* owing either to the contraction of an ill habit, or to irritation of the ophthalmic branch of the fifth pair of nerves, are sometimes clonically convulsed — forming the *nictitatio* of authors. *b.* The muscles of the *eye-balls* are also not infrequently similarly effected, particularly in infants and children — occasioning, particularly during sleep, rolling of the eyes. This state of local convulsion is common during dentition, and disorders of the stomach and bowels. Either a more severe state of convulsion of these muscles, approaching to spasmodic contraction of one or more of them, or a paralysis of their antagonists, will occasion distortion of the eyes, or strabismus, with or without irregular oscillations of the iris, dilated pupil, &c.; as in inflammatory and organic affections within the cranium, and in verminous disorders. *c.* Twitching convulsions of the *muscles of the face,* or those inserted into the lips; retraction of the angles of the mouth, giving rise to what has been called the *risus sardonicus;* are often observed, but generally as a symptom of the invasion or actual existence of most dangerous diseases; as inflammation of the encephalon, or of the diaphragm, and various organic changes affecting the substance of the brain. Twitchings of the muscles of the face, however, sometimes occur in persons of a nervous and irritable temperament, or with an excited brain, without any apparent disease. *d.* Convulsive movements of the *tongue* are seldom observed unconnected with irregular movements of other parts, unless in the diseases now named, and in apoplexy. *e.* Slight convulsive actions of the *muscles of the lower jaw,* giving rise to grinding of the teeth in sleep, are very common occurrences in persons with worms, or other diseases of the alimentary canal; or excited circulation of the encephalon. *f. Trismus,* or spasmodic contraction of these muscles, in infants, arises from disorders of the prima via, the impression of cold, or irritation of the umbilicus, but does not strictly fall under the head of convulsions. *g.* A clonically convulsed state of the *muscles* of the *neck* are sometimes, but rarely, observed, producing convulsive tremor, or shaking palsy of the head, which is aggravated on certain occasions of mental perturbation, and nervous or vascular excitement. (See Palsy, Shaking, and Tremor.) *h.* The abnormal actions which approximate more closely to the permanent or spastic contractions, and affect one or more of the cervical and adjoining muscles, are much more common, and are often induced by a current of cold air, by over-straining, or by inflammatory irritation about the bodies, or intervertebral substance of the upper cervical vertebræ; or from disease about the medulla oblongata or base of the brain; or from irritation of remote parts — as of the genital organs of the uterus or ovaria; or from strangulated hernia, — an instance of which last has been observed by myself. In all such cases, the head is drawn more or less to one side, or backwards, or forwards; but similar flexures of the neck often are occasioned by the paralysis of muscles on the side from which the head is bent, the tonic or natural action of the unaffected muscles drawing the head from the paralysed side. In the one case, however, the muscles are rigid and strung like a cord on the contracted side, and more or less pain is complained of either in them or in the vicinity, particularly on attempts to bend or turn the head or neck in an opposite direction; whilst, in the other case, these symptoms are wanting. These are more properly cases of spasm than of local convulsion, as the contraction seldom alternates with relaxation, but is commonly more or less permanent. However, cases sometimes occur, which are intermediate between permanent spasm and convulsion, especially as a symptom of the diseases last referred to. *i.* Convulsive movements in the

pharynx and *œsophagus*, impeding or preventing deglutition, are frequent in hysteria, and in the last stage of several fatal diseases. *k.* They also affect the muscles of the *larynx*, the *diaphragm*, and other respiratory muscles, either separately, in rapid succession, or nearly simultaneously. Some of these affections are transient, and the result of slight causes; as in sneezing, coughing, sighing, sobbing, &c.: others are extremely dangerous, owing to the nature of the parts affected, the severity and continuance of the convulsive movements, and the circumstances in which they supervene; as in spasm of the glottis, spasmodic croup, certain states of asthma, with severe fits of coughing, singultus, &c. *l.* Convulsive actions also occur in the *muscles of the abdomen;* as in hysteria, common and lead colic, and in consequence of intestinal worms. The most remarkable instances of true convulsion of the abdominal muscles merely, that I have observed, have occurred in adult persons infested by the large round worm. *m.* The *muscles of the spine* sometimes experience convulsive actions, but more frequently spastic contractions, occasioned by hysteria, disease of the bodies of the vertebræ or membranes of the spinal chord, injuries of adjoining parts, strangulated hernia, acute rheumatism, the passage of biliary or renal calculi along the ducts, and inflammatory irritation of the uterus or ovaria. *n.* Either one or both of the *upper extremities* are occasionally affected by convulsions, more commonly both. The fingers are generally clenched around the thumb, which is drawn upon the palm; the arm being either extended forcibly, and the hand turned as in pronation, or the fore-arm bent upon the arm, or both these occurring in rapid alternation. Such are the more tonic convulsions of the upper extremities; but their muscles also experience slight and extremely clonic contractions; as the *subsultus tendinum* often observed towards the close of fevers and diseases of the brain; the more tonic or spastic convulsions, particularly when affecting one arm only, also arising from lesions of some part of the encephalon, or of the upper portion of the spinal chord. *o.* Convulsions of the *lower extremities* are characterised by analogous movements, and chiefly affect the flexor and extensor muscles. The toes are bent downwards, and the legs and thighs either drawn upwards or extended, or both the one and the other alternately.

9. Convulsions of voluntary muscles may occur as now described, or in two or more situations, or even in different or opposite parts, either simultaneously or in succession. They may affect one side of the body only, the other being in its natural state, or paralysed. They much less frequently attack either half transversely.

10. ii. GENERAL CONVULSIONS. — General convulsions observe no certain *mode* of accession. On some occasions they attack suddenly; but they are much more frequently preceded by premonitory signs, especially in children and chronic cases, — a knowledge of, and attention to, which may be made available in preventing their occurrence. They are also sometimes recurrent, or succeed each other, with more or less rapidity.

11. *A. The premonitory signs* are vertigo and dizziness, irritability of temper; flushings, or alternate flushing and paleness of the face; luminous or other spectra floating before the eyes; various noises in the ears; partial loss of sight or hearing; restless or unsound sleep, or uncommon weight or drowsiness; fulness or prominence, and rolling of the eyes; clenching, or grinding of the teeth, clenching of the hands, &c. during sleep; a tumid appearance of the countenance and hands; coldness or cramps of the extremities; slight tremors, shivering, horripilation, shudderings or horrors; nausea, retching or vomiting; or pain and distension of stomach and left hypochondrium; unusual flatulence of the stomach and bowels, or other dyspeptic symptoms; pains in the loins or back; frequent sighing or sobbing; numbness of various parts; stammering or impeded utterance, loss of memory, and absence of mind; palpitations, or slowness and irregularity of pulse; slow, laborious, or irregular respiration; and, sometimes, a copious discharge of limpid urine. In some instances, leipothymia, or threatened syncope, precedes the general convulsions.

12. *B. a. The more tonic seizure.* — The convulsive movements constituting the paroxysm generally follow rapidly upon one or more of the above signs, and vary remarkably as to violence and duration. During their continuance, the countenance is very much distorted; the eye-balls are prominent, full, wild, staring, and rolled in all directions; the eyelids are either open, or rapidly shut and opened; the patient grinds and gnashes his teeth, and sometimes foams at the mouth, or protrudes the tongue. The alternate contractions and relaxations of the whole voluntary muscles, and contractions and extensions of all the limbs, are performed with the utmost irregularity, rapidity, and with so great force, as often to require the united strength of several persons to preserve the patient from injuring himself. In these struggles, the teeth, or even the bones of the extremities, have been, in some instances, broken. The respiration is laborious, interrupted, and sometimes accompanied by a hissing noise. The countenance, and indeed the whole scalp, are sometimes tumid, bloated, or red, and often leaden or livid towards the close of the fit, particularly in plethoric persons, when the respiratory actions are much impeded, and the affection originates in cerebral disease. In other cases, the face is pale, and the pulse weak, or small and constricted. The urine and fæces are occasionally voided with violence during the paroxysm: occasionally large quantities of limpid urine are passed. In these, the pulse is generally full, strong, and commonly slow or irregular. In many instances, the general sensibility and consciousness are but very slightly impaired, particularly in the more simple cases, and when the proximate cause is not seated in the encephalon; but in proportion as this part is affected, primarily or consecutively, and the neck and face tumid and livid, the cerebral functions are obscured, and the convulsions attended by stupor, delirium, &c., or rapidly pass into, or are followed by, these states.

13. *b. The more clonic convulsions.* — Such are the common manifestations of convulsions, when they are not occasioned by inanition; the paroxysms, however, varying greatly in violence, duration, and frequency of recurrence, according to the degree of vital energy, and numerous other

circumstances. But when they arise from, or are associated with, exhaustion, excessive discharges, and evacuations of the vascular system, they assume a somewhat modified character. They are then not attended by sopor; the general sensibility and cerebral functions being but little, or not at all, affected. The pulse is frequent, small, weak, broad, or open; the features are but slightly distorted; the countenance is pale and collapsed; and the limbs and extremities cold, and much less rigidly convulsed than in the tonic or more spastic seizures. In many cases, the convulsive movements resemble a succession of general shocks, succussions, or shudderings, sometimes of great violence, and often of considerable continuance, occasioning the bed or room to shake, and terminating the life of the patient: in others, they consist of constant tossings of the limbs and trunk.

14. *C. Duration and recurrence.*—The paroxysm may cease in a few moments or minutes, or continue for some, or even many, hours. It generally subsides rapidly, the patient experiencing, at its termination, fatigue, headach, or stupor; but he is usually restored in a short time to the same state as before the seizure, which is liable to recur in a person once affected, but at uncertain intervals. After repeated attacks, the fits sometimes become *periodic* (the *convulsio recurrens* of authors). In adult females, they commonly accompany the menstrual periods. When they arise from organic disease within the cranium, each successive interval is generally shortened, until their recurrence is so frequent that the patient is scarcely recovered from the languor, or other symptoms, consequent on one seizure, until he has another, which at last either ends in profound coma, or terminates life.

15. *D. The modifications* of convulsions are extremely numerous. In some cases, the respiratory muscles are much affected, and the fit is accompanied with yelling and shrieks, evidently not proceeding from pain (the *convulsio ejulans*, or shrieking convulsion). In other instances, the abnormal movements shift from one part to another, or attack various muscles in succession. In these, the seizure is comparatively slight, and the cerebral functions not remarkably disturbed; the *convulsio erratica* of Dr. Good. In rarer cases, the seizure assumes the form of *convulsive tremor*, as remarked by Dr. Prichard; is attended with a hot perspiring state of the head, vertigo, and slight stupor; and continues one, two, or three hours.

16. *a*. Besides these, various other forms of convulsion occur, particularly in persons under the influence of a morbidly excited imagination, or religious enthusiasm; and in females endowed with the nervous and irritable temperaments, with great mobility of the muscular system, and who are affected by nervous or vascular excitement of the generative organs. On many occasions, these seizures have been propagated to a number of persons by sympathy. The convulsions which became almost epidemic in the west of Scotland, in 1742, and were occasioned by religious enthusiasm, are not only instances of a peculiar form of this affection, but also among the most striking on record of the influence of imagination, and of sympathy, or of imitation, in disordering the functions of the body. A number of persons were attacked nearly at the same time, when hearing the addresses directed to the imaginations and passions of their hearers by the followers of Whitfield; and always when impressed by the denunciations of vengeance, and hopes of salvation, which they set forth. The mental agony which was thereby induced, gave rise, in many, to the most violent tremblings and agitations of the body, which were frequently preceded by faintings, and followed by convulsions, and subsequently by sobbing, weeping, and crying aloud. In some cases, the convulsions produced epistaxis, which generally terminated the seizure. Such appears to have been the usual course of the paroxysm, according to the meagre accounts which have been furnished of it. (See *Edin. Med. and Surg. Journ.* vol. iii. p. 442.) The convulsions described by Mr. Cornish as having been prevalent in Cornwall in 1813 and 1814, owing to the same causes, hardly differed in any respect from the above.

17. *b*. The convulsions which were prevalent in some of the Zetland Isles during the middle and towards the close of the last century, but which have seldom occurred there since that period, seem to have had some resemblance to the foregoing, as well as to hysteria. Dr. Whytt has referred to the frequency of convulsions in these islands; and has adduced the extreme facility with which they were propagated among young women, as a proof of the existence of a wonderful sympathy between the nervous systems of different individuals. The convulsions now alluded to, commonly attacked adult females when at church; but men and young girls were not altogether exempted from them. They are described very nearly as follows, by gentlemen who had frequently witnessed them:—Persons affected, generally fall down in apparent fainting or swooning fits, and soon afterwards utter wild cries and shrieks, the sound of which puts all who are subject to the disorder in the same situation. Their limbs and bodies are tossed about, the most frightful screams being uttered by them all the while. Their heads are also thrown from one side to the other, and their eyes are fixed and staring. In this manner they roar and struggle for five or ten minutes, and then rise up without recollecting a single circumstance that happened to them, or being in the least fatigued by the exertions made in the fit. Females are most commonly attacked in a crowded church, and on occasions of public diversion and merriment.

18. Similar instances of the spread of convulsions, by the infection of sympathy or imitation have been recorded by writers, and cases of it have occurred within the observation of the author. Dr. Haygarth has adduced a remarkable occurrence of this description.—Twenty-three females, from 10 to 25 years of age, and one lad of 17, who had all intercourse with each other, were seized, in 1796, in Anglesea, with slight pain of the head, or of the stomach and left side, followed by twitchings or convulsions of the upper extremities, continuing with little intermission, and with much violence, for a considerable time. The disorder was not so violent in bed; but it continued in some cases during sleep. The pulse was moderate, the bowels costive, and the general health not much impaired. There was usually hiccup; and, when the con-

vulsions were most violent, giddiness, with loss of hearing and recollection. During convalescence, the least fright, or sudden alarm, brought on a slight paroxysm. (See CHOREA AND RELATED AFFECTIONS, &c.)

19. iii. INFANTILE CONVULSIONS. — Convulsions often attack infants of a delicate and irritable frame, and those who are seized by severe internal or constitutional disease, or are suffering some concealed visceral irritation. They occur most frequently in children under four or five years of age, and particularly during dentition. They decline in frequency from this epoch to the commencement of the second dentition, or about the seventh year, when they again are often met with. Mr. NORTH doubts that any increase takes place at the seventh year. The above is the result of my experience, which in great measure agrees with that of BEAUMES, TISSOT, and others. As infantile convulsions present various peculiarities in their causes, phenomena, complications, and consequences, and are besides among the most important morbid conditions which come before the practitioner, I shall consider them apart.

20. *A. Premonitory signs* often usher in the attack, but occasionally no such symptoms are observed. I suspect, however, that they are more commonly altogether overlooked, than entirely absent. They consist chiefly of manifestations of generally increased irritability. This is shown by the temper, if the child be a few months old or upwards; by want of sleep at night, and heaviness in the day, or by perfect insomnia; by a lighter and shorter sleep than usual, the child starting up on the slightest noises, or as from a frightful dream, with fits of screaming without evident or sufficient cause; by alternately flushed and pale countenance, or unwonted animation of the face and eyes, followed by languor and heaviness; by a half-closed or open state of the eyelids during slumber, with startings and twitchings; by fixed, vacant, staring eyes, the pupils being either contracted or dilated, or frequent oscillations of the iris, without being influenced by the admission of light, or contraction of one pupil while the other is dilated; by stretchings or rigid extensions of the limbs; by hiccup, or irregularity of breathing, or short gasps, followed by long laborious inspirations; by twitchings of the fingers, or clenching of the hands, or pressure of the thumb upon the palm, the fingers being extended and separated from each other, or frequently moved about; by the sudden relinquishing of the breast soon after having sought it eagerly, and the throwing back the head, with an expression of anxiety, and an appearance of difficult deglutition; and by fulness of the upper lip, with a pinched nose and countenance, and slight blueness below the eyes and about the mouth. Many of these symptoms, designated by the vulgar, "*inward fits*," may with justice be attributed to inflammatory irritation of the arachnoid, as indeed contended for by PARENT, MARTINET, LALLEMAND, &c.; and, in my opinion, especially of the arachnoid of the base and internal surfaces of the brain. BRACHET and NORTH have enumerated them as premonisary of convulsions, which they doubtless most frequently precede; but in a great many cases convulsions hold the same relation to inflammatory and febrile attacks in infants, as rigors do to the same diseases occurring in adults; and hence these signs must often be common to both, and also to some other infantile diseases. This is shown by their frequency in remittent fever, and other inflammatory irritations of the gastro-intestinal mucous surface of children.

21. *B. The paroxysm of convulsions* in children is similar to that occurring in adults. In the most severe cases, there is a violent, involuntary, and alternating or convulsive action of all the voluntary muscles extending to some internal or involuntary parts; in which, indeed, the affection often seems to originate, or which appear to be those first affected. In plethoric infants, the face and scalp are tumid, reddened, and subsequently livid; the eyes are distorted and staring, or turned up beneath the upper eyelid, leaving only the sclerotic visible; the respiration is impeded and laborious, but very rarely attended by foaming at the mouth and protrusion of the tongue, unless the paroxysm be epileptic. The whole surface often becomes slightly violet-coloured towards the close of the fit, and the hands tumid. In many instances, particularly in weak or exhausted children, the seizure is much less violent, the countenance being pale and collapsed, and the convulsions more clonic. There are sometimes only twitchings of the muscles of the face, and alternate contractions and relaxations, or rapid shocks, of a few parts, or of only one half of the body, or of various parts in succession, with slight blueness about the eyes and mouth; but more frequently the whole body is convulsed, and the countenance distorted and haggard. The mental faculties, and general sensibility, in the slight or clonic convulsions, are generally not interrupted. They are also, however, frequently obscured, but only during the height of the paroxysm; and sometimes even entirely abolished in the severe recurrent convulsions attending cerebral disease — the *eclampsia* of some authors (§ 24.).

22. *C.* The utmost diversity exists as to the *duration* and *recurrence* of the fit. In some cases it is only momentary, or of a very few minutes' duration. In other instances it continues for several hours, with frequent remissions. It may likewise cease, and shortly afterwards return, and thus subside and recur at short but irregular intervals for several times, and at last cease altogether, or terminate life. Or the first seizure may be so severe as to be fatal. These recurring fits are often at last attended by insensibility, which is not altogether, or even not at all, recovered from in the intervals. This form of the malady is more common in children than in adults, excepting as it occurs in the puerperal states, or towards the termination of tumours and abscesses in the brain. As the convulsive movements constituting the fit become less and less violent and constant, and respiration fuller and freer, the natural appearance of the surface returns, and the child is enabled to cry; it afterwards falls either into a refreshing sleep, or, if the convulsions have a cerebral origin, into a stupid or lethargic state of various duration.

23. *D.* There is a species of spastic or tonic convulsion, which is but rarely met with, affecting chiefly the extremities. It seems more nearly allied to spasm than convulsion, into which, however, it sometimes passes; and occurs, chiefly,

in very young children, and in those approaching to puberty, particularly those who are nervous and irritable. I have seen but few instances of it; but it has more frequently been seen by MM. Jadelot and Tonnéllé. It consists of rigid contraction of the upper and lower extremities, of the former only, but more frequently of both. The hands are slightly bent on the forearm, and the feet are stretched in the same axis with the leg. The spastic action of the muscles continues for several hours, or even days, then ceases, and returns, and often thus recurs frequently at short intervals. The intellectual faculties, the general sensibility, and the muscles of the trunk, are not affected; and the pulse and natural functions not materially disturbed. The cases of it which have occurred in my practice, have all been evidently owing to the irritation of worms, or morbid matters in the alimentary canal, or to dentition.

24. *E.* Another form of convulsions is much more frequently met with in children, to which the name of *Eclampsia* has been given by Rosen, Sauvages, Brachet, and others, and which has been considered as infantile epilepsy by some, and, with more justice, by others, as convulsions occurring in the more robust children as a consequence of cerebral congestion of an active form. But it differs from epilepsy, in the absence of foaming at the mouth, by the irregular and frequent recurrence of the attack, by its longer duration in most cases, and by its uniform connection with evident signs of fulness of blood, or acute disease in the brain. This form is seldom preceded by precursory symptoms of any continuance. The child cries, its face and scalp become red and tumid, it loses consciousness, and is seized with violent convulsions, or with tremor and rigidity, or a succession of spastic shocks of the limbs. In a few seconds, or minutes, or even hours, the seizure subsides; but is generally renewed at short intervals; the head remaining hot and pained after each return of the fit, which never terminates by a critical sleep of short continuance, and in restoration of the healthy functions, as in epilepsy, unless assisted by active treatment, but is frequently followed by profound stupor or complete insensibility. From the foregoing it will be evident that *eclampsia* is merely a more severe form of convulsion, differing from others only in respect of the severity or tonicity of the muscular contractions, the more complete abolition of sensibility and of the cerebral functions, and its more uniform dependence upon congestion of the brain and its consequences (§ 21.). The eclampsia of children is in every respect similar to the convulsions of the puerperal states (§ 29.).

25. *F.* There are certain phenomena connected with the accession and the course of the convulsive fit that require attentive observation, as they furnish indications of the pathological state occasioning the seizure, and, indeed, form the basis for rational indications of cure. These have intimate relation to the origin of the paroxysm either in repletion or inanition — in congestion, or in anæmia of the cerebro-spinal masses; in which latter the convulsions of children not infrequently originate, as shown by Dr. M. Hall, and subsequently by others, and as I have had frequent opportunities of remarking for many years. When the convulsion is attended with a congested state of the circulation in the head, it will generally be readily recognised, both from the history of the case, and from the premonitory and concomitant symptoms. The warm, tumid scalp and face; the flushed countenance; the contracted pupils and suffused conjunctiva; quick, full, or hard pulse, particularly of the carotids; are evident signs of an excited circulation in the brain, not infrequently either accompanied with, or running into inflammatory action. When the countenance and scalp are swollen, full, dark, or livid; the fontanelle elevated and tense; the eyes distorted, prominent, vacant, and stupid; the pupils dilated; the veins of the head and neck large and dark; the pulse slow, irregular, or oppressed; the respiration laborious; the vessels within the cranium are evidently congested. Dr. John Clarke, and many other writers, impute the convulsions of children to irritation or organic change, either directly or indirectly induced in the brain or its membranes, particularly in the arachnoid, according to M. Brachet. We shall see, when we come to treat of the proximate cause of convulsions, that, although this may be most frequently the case, it is by no means universally so. For we occasionally meet with convulsions consequent upon exhaustion, and even anæmia, as in the last stages of chronic diarrhœa or other diseases; and after large or repeated depletions, where there is no evidence of irritation of the arachnoid, or of organic change. In many such cases there may occur notwithstanding, especially during the height of the paroxysm, temporary and slight congestion of the head, as shown in the article Blood, (§ 54 — 61.); but, still, evidence of *anæmia* of the brain, and, indeed, of the general system, will be furnished in the depressed and relaxed fontanelle; in the pale, collapsed, and pinched features; in the retention of consciousness and unimpaired general sensibility; in the bloodless and dull appearance of the conjunctiva and cornea; in the state of the pulse in the carotids, and the low temperature of the head; and in the pale, shrunk, wasted, and often bloodless condition of the whole surface.

26. There is a disease to which infants are liable, that consists of a spasmodic contraction of the muscles of the larynx and of the extremities, and which has been confounded with convulsions, or with spasmodic croup, and variously denominated. As the muscles of the larynx are chiefly affected, and as the disorder consists of spastic rather than convulsive action, it is treated of in a separate article. (See Larynx, Spasm of.)

27. iv. Puerperal Convulsions. — Convulsions may come on (*a*) during the latter months of pregnancy; (*b*) during parturition; and (*c*) during the first fortnight after delivery. They may be partial or general, most commonly the latter; and they may assume various shades of tonicity, from a state of tetanic violence to the more clonic form, characterised by alternating contraction and relaxation; but they usually present very nearly the same phenomena as eclampsia — being attended by loss of consciousness, and recurring paroxysms, between which sensation is not restored.

28. *A. Premonitory symptoms* commonly usher

in the seizure; but, in some cases, they are either absent, or so brief in duration, or so slight, as to evade detection. CHAUSSIER thinks that they are scarcely ever wanting altogether. The patient usually complains shortly — sometimes for several days — before the attack, of lassitude, depression, and a feeling of indisposition which she cannot well describe; frequently of disorder of the stomach; often of weight or pain in the head, or of drowsiness, vertigo, and sparks, or various dark or bright objects, floating before the eyes. These symptoms are renewed at intervals during a day or two, and are occasionally attended by embarrassment of speech. To these usually are superadded, shortly or just before the seizure, a change in the expression of the countenance; partial or occasional failure of sight, or loss of sight; sometimes loss of hearing; haggard, vacant, and fixed state of the eyes, with a dilated pupil; ringing or other noises in the ears; sometimes most acute and splitting pains in the head, with a flushed neck and face; generally sickness, pain, oppression and anxiety at the stomach; thirst; a full and quick pulse; subsequently a slower pulse; and swelling of the neck and countenance; tetanic stiffness of the wrists; cramps in particular muscles or parts; twitchings of the muscles of the face; shocks or shudderings through the frame; altered respiration; loss of consciousness; and all the phenomena constituting the developed seizure. Dr. J. F. OSIANDER states that he has seldom observed a tumid state of the face and hands wanting as a premonitory symptom. If the convulsions occur during parturition, the pains often become feeble and frequent before the seizure.

29. *B. The complete seizure.*—To these succeed involuntary contractions of the muscles of the face and jaw, instantly followed by spasmodic succussions, or general convulsions of a violent or tonic character; sometimes approaching to tetanic, but commonly closely resembling eclampsia; or the universal convulsions of the epileptic or hysterical paroxysm. The respiration is laborious, imperfect, sonorous, and hissing, — frequently with foaming at the mouth, — and the tongue is often protruded; the eyes are injected, prominent, fixed, staring, or rolling; the countenance and head tumid, red, or livid; the limbs are strongly convulsed, and tossed about; the heart beats strongly; and sensibility and consciousness are entirely abolished. After a short time the convulsion subsides; respiration becomes less laborious, and the countenance less livid; but the comatose stupor continues, sometimes with slightly stertorous breathing; when, after an indefinite, but generally a short, interval, the spasmodic succussions and general convulsions return as before, or with slightly modified severity or duration, and subside into stupor as before. Thus they may recur two or three times — more frequently, several or many times — when the patient either quickly awakes, unconscious of what has passed, as if from a slumber; or passes into a more comatose state; or recovers partially; sight and hearing, or speech, or both, being lost for a time. Or she may experience some one of the unfavourable terminations hereafter to be noticed.

30. It may be generally remarked, that, upon the accession of puerperal convulsions, a flux of blood takes place to the head and superior extremities; the veins of the lower limbs becoming proportionately empty, and the pulsation of their arteries being comparatively small and weak. The worst forms of the attack are often attended by a firm spasmodic constriction of the cervix uteri, preventing the expulsion of the fœtus. M. MENARD states, that, in the majority of cases of death by convulsions previous to delivery, the child has been found dead, the contraction of the features and extremities denoting that it had participated in the affection of the mother: this, however, wants confirmation. In some instances, the child has been unexpectedly born during the violence of the convulsions, as if expelled by them with unwonted celerity.

31. *C. Modifications.* In persons of a nervous temperament, local pain or irritation, or even exhaustion alone, may induce that state of cerebral affection upon which convulsions are consequent, without the supervention of plethora, and active congestion of, or determination of blood tô, the brain characterising the great majority of cases. In these persons, the seizure is sometimes preceded by sinking, leipothymia, or fainting; the countenance is neither tumid nor livid; the eyes and face are unsuffused, but wild — often sparkling, staring, or rolled irregularly; the pulse is small, hard, or constricted; the urine is frequently copious and pale; and the agitations and tossings of the limbs greater, but less rigid or spastic, than in the mixed epileptic and apoplectic forms described above. In these cases, there is evidently cerebral irritation, or erithism; and, during the paroxysm, abolition of consciousness: but the patient generally either partially recovers her sensibility between its exacerbations or recurrences; or awakens out of this state entirely restored, and without experiencing any of those sequelæ which are left by the more congestive attacks. In other instances, seizures occur, presenting characters intermediate between these; but the first described state is by far the most common. From this it may be inferred that convulsions, in any of the three periods connected with child-bearing, will evince modified phenomena, according to the constitution, temperament, habit of body, predisposition, and previous ailments of the patient. In the plethoric, epileptic, irritable, sanguine, and robust, it will present the characters of eclampsia or epilepsy — the most common — or of apoplexy or coma; and in the hysterical, the nervous, the delicate, &c., it will assume these now noticed, which approach those of a severe hysterical attack. The convulsions which come on in the puerperal states from large losses of blood, are either of this kind, or of one closely resembling it, or intermediate between it and the epileptic.

32. v. CONVULSIONS ASSOCIATED WITH OTHER MANIFESTATIONS OF DISEASE.— Convulsions may occur on the *invasion*, during the *course*, and at the *crisis* or *decline* of a great number of acute diseases, particularly in children under eight years, about the period of puberty, and in females of a nervous and susceptible constitution. Their connection with irritations, &c. in the *prima via*, and with organic diseases in, or affecting the large nervous masses, is considered at another part (§37. 44, 45.); but their association with some other maladies require a more especial notice in a practical point of view. *a.* The *invasion* of various

acute distempers is often attended by convulsions. Indeed, in some of the severe diseases to which young children are liable, particularly the exanthematous fevers and inflammations, convulsions usurp the place of the cold stage or rigors which usher in these diseases in adults, and are generally preceded by coldness of the surface. When occurring in this manner, they should be regarded as indicating one of three things, viz. a morbid susceptibility of the nervous system, and predisposition to disease in the cerebro-spinal axis; or an approaching developement of febrile reaction and of eruption, if the patient be of a sound constitution; or else an imperfect evolution of both, with a disposition to visceral irritation, inflammation, or effusion, particularly of the brain or abdominal viscera, if the habit of body be in fault, or if there exist any hereditary disposition, or vice remaining after previous disease.

33. *b.* The *course* of various diseases sometimes becomes associated with occasional or recurring convulsive seizures; often of a partial, or of an irregular, peculiar, or anomalous character; but frequently, also, such as those described under general convulsions (§ 12, 13.). Children, and females about the period of puberty, are most liable to these complications. We observe these seizures in hooping cough and croup; in the remitting fevers of infants; in mania, and febrile insanity; in inflammatory and numerous organic diseases of the brain (§ 37. 44. 45.) and spinal chord; in verminous complaints, and other disorders of the alimentary canal; in organic lesions and calculi of the kidneys and urinary bladder; and in states of nervous and vascular excitement or irritation of the female organs. In all these complications, either active congestion or determination of blood to the head, or irritation of the cerebro-spinal axis and membranes, or both these states, may be presumed to exist; active congestion being occasioned by impeded return from, with increased impetus of the circulation to, the brain and medulla oblongata; irritation of these parts being generally propagated thither from some portion of the organic nervous circle, and through the medium of this circle, in which it had been primarily excited. We not infrequently observe convulsions attended or followed by *mania* and insanity, or even supervene in the course of these mental disorders. When this is the case, the convulsive seizure is commonly of a tonic and acute form, and approaches nearly to eclampsia and epilepsy, constituting the *maniacal convulsions* of authors. The convulsions which occasionally are observed in females, in connection with irritation of the sexual organs, are evidently owing to the propagation of disorder, through the medium of the organic or ganglial, to the spinal nerves, or to the chord itself, or even to the brain; as well as to the extent to which these various parts of the cerebro-spinal system are thereby influenced; and the various forms which the convulsions thus originating commonly assume, are to be imputed to the existing state of local or general plethora, or to the degree of determination of blood to the head with which the superinduced irritation is attended. When we reflect upon the connection of the organic nerves with the spinal, and especially on the mode of that connection with the brain itself and the rest of the cerebro-spinal system, we shall not be surprised that irritation of the extremities of the organic nerves, either in some one of the female organs, or in some part of the *primæ viæ*, excites in one person, according to peculiarity of temperament, hereditary predisposition, habit of body, or state of vascular plethora, convulsions of a spastic or tonic character in the limbs and trunk, the cerebral functions being undisturbed; in another person, convulsions either of a clonic or irregular form, consciousness also being retained; or either of these forms, or both of them variously or singularly mixed, with partial or complete deprivation of sense and mental manifestation, or with a comatose or maniacal delirium superadded. Nor should it be a matter of wonder that irritation thus originating gives rise to various other abnormal nervous and muscular phenomena, such as catalepsy, ecstasy, hysteria, &c.

34. *c.* Convulsions sometimes also usher in the *crises* of fevers and other acute diseases. This occurs most frequently in delicate or hysterical females, the abnormal contractions assuming a variety of forms, and often an hysterical character; but it also not infrequently is observed in the male sex, especially in young and delicate persons. This association of convulsions is generally dependent upon a severe affection of the brain in these fevers, and attended by either coma or delirium; and although they may indicate a favourable change, particularly when accompanied with, or immediately followed by, other critical phenomena, or when they put on the true hysterical form, yet they may be the outward signs of an exasperation of the cerebral or cerebro-spinal affection, particularly when the mental faculties and general sensibility are not soon afterwards restored. Other morbid associations, as with worms, diseases of the brain and spinal chord, &c., may be considered as causes of convulsions rather than complications.

35. II. Diagnosis. — Simple convulsions may with difficulty be distinguished from *epilepsy* and *hysteria*. They cannot readily be mistaken for *tetanus* or *rabidity*. There are many cases, which the nature of the exciting cause, and the history of the case, show to be different from true epilepsy, and yet they cannot easily be distinguished from it during the height of the paroxysm; and the remark applies equally to the hysteric fit. In fact, convulsions present so many and so slight grades of difference, as to the spastic contraction of the muscles, and the frequency and rapidity of its alternation with relaxation, — as to the presence of, or immunity from, cerebral disorder, as well as to the nature and extent of such disorder, — are so intimately allied in respect of their causes, of the particular system of the frame upon and by which these causes produce their sensible effects, and of the nature of these effects as far as they become symptoms or signs of the particular lesion which occasioned them, that the difficulty of diagnosis is very great in many instances, excepting to the acute and experienced observer, whilst it is sufficiently easy in others. *a.* Generally, however, simple convulsions will be readily distinguished from *epilepsy*, by the retention of consciousness and general sensibility in the former, excepting in the height of the paroxysm in the severer or more plethoric cases, as in eclampsia and puer-

peral convulsions, in which both are lost; by the general absence of the consecutive sleep or sopor of epilepsy; by the irregular and frequently recurring form of the seizure; by what is known of its origin and connection with obvious causes, and by the mode of its attack and of recovery from it. There are also various symptoms which, although common to eclampsia, puerperal convulsions, and *epilepsy*, are yet peculiarly characteristic of this last; and we find, in addition, other phenomena which simple convulsions seldom present, particularly the frightful scream on the accession of the epileptic fit, the antecedent aura or peculiar premonitory signs, the very sudden and unexpected seizure when the aura is wanting, the expulsion of the seminal and prostatic secretions, as well as of the alvine excretions; the more frequent occurrence of foaming at the mouth, and severer affection of the respiratory muscles; the more leaden appearance of the countenance, and the more common recurrence of the paroxysm at a stated time, than in convulsions, particularly after the first sleep, or when the patient awakens or is rising in the morning. (See EPILEPSY—*Diagnosis.*) β. Convulsions are readily distinguished from *hysteria*, by the antecedent copious discharge of pale urine, the globus hystericus, and the borborygmi; and by the alternate crying and laughing attending the seizure of the latter. Some instances of simple convulsion, arising from irritation of the female organs, will, however, very nearly approach, if not altogether run into, the hysterical character; as we also see many cases of puerperal convulsion differing but little from epilepsy, excepting in the frequent recurrence of the paroxysm in the former before the patient has recovered from the sopor consequent upon the antecedent fit, and in one or two of the diagnostic signs noticed above. γ. The continued or permanent nature of the spasms in all the forms of *tetanus*, and the absence of any tendency to obscuration of the general sensibility and mental faculties, during the whole unremitting duration of this dreadful disease, are sufficient diagnostics between it and convulsions. δ. *Rabidity* cannot be mistaken for this affection, if the history of the case, the uncommonly increased sensibility of the whole frame, the dread of fluids, and unimpaired cerebral functions, characterising rabies, be attended to; for, although convulsive seizures occur frequently in it, they are produced by so slight external or mental causes — by every attempt at swallowing liquids — that their nature and origin cannot be for a moment doubted. (See RABIDITY.)

36. III. TERMINATIONS OR CONSEQUENCES, AND PROGNOSIS. — *A*. Convulsions, in any of the forms now placed before the reader, may *terminate*, (*a*) in health; (*b*) in some other disease; or, (*c*) in immediate dissolution. *a*. Their *termination in health* may be marked by no peculiar phenomenon, beyond the non-recurrence of the seizure. In other cases they are followed by critical evacuations, particularly hæmorrhage from the nose, mouth, or ears, after which they may never recur, or which may produce an immunity from them for a time. Vomiting and diarrhœa, or the accession of the catamenia, may likewise prove critical.

37. *b*. They often are *followed by other diseases*; or rather the original disorder or change of structure, of which convulsions are merely a part of the sensible and outward signs, may, from its increase, or extension to adjoining parts, occasion other or additional phenomena more or less intimately allied to convulsion, as palsy, apoplexy, coma, loss of speech or of sight or hearing, chorea, or mania, delirium, idiotcy, &c., each of which may pass into the other, or be variously associated with one another. Thus loss of sight, hearing, speech, and idiotcy, may be the consequences in the same case. Also, either of these consecutive phenomena may arise from the cerebral congestion, and its effects, produced by the frequent recurrence or by the severity of the fit, particularly when the respiratory functions are much impeded in it, and the system is plethoric and relaxed. My limits will not admit of illustrations of these facts, either from my own experience, or from the other sources which are referred to at the end of the article; but they are of common occurrence, and may, after continuing for a longer or shorter time — in some cases for many years — in others for a very short period, either be recovered from, or terminate existence. In some cases, convulsions are followed by a state of leipothymia, trance, or complete syncope, which, when profound and continued, may be mistaken for dissolution, and endanger premature interment. There is reason to suppose that, in some countries where interment usually follows death at a much shorter period than in Great Britain, this dreadful fate has overtaken the patient. In other instances, lethargy, or torpor, terminates the paroxysm, which, in rare instances, has been of long duration, and also may be mistaken for death. Whilst the convulsions of childhood more commonly give rise to, or terminate in, loss of one or more of the functions of sense, in chorea, in idiotcy, or in hydrocephalus; those attacking adults are more disposed to pass into either apoplexy, coma, palsy, or mania: and whilst the convulsions of the former class of subjects are more frequently the consequence of irritations affecting the abdominal viscera, those of the latter, excepting in females, are more generally the result of disease within the cranium or spinal column, often at a certain stage of its progress.

38. *c*. Their *termination in death* takes place either through the intervention of one or more of the diseases noticed above as their consequences, or, more directly, from the extension of convulsion or spasm to the respiratory muscles, inducing asphyxy, or from an overwhelming congestion or effusion of blood in the brain. This sudden unfavourable change more commonly occurs in puerperal convulsions than in other forms, excepting when they proceed from abscesses or tumours within the cranium. Death may also occur from accidental suffocation during the paroxysm.

39. *B*. The PROGNOSIS of convulsions depends chiefly on what is known of their *causes*, on the antecedent and consecutive phenomena, on the history of the case, and the degree in which the functions of the brain and nervous system are affected during and after the fit. *a*. If the convulsions occur in *children*, without fever or any primary or cerebral disturbance, and apparently from worms, disorder of the prima via, &c., a *favourable* opinion may be entertained.

But when they are preceded by head-affection, by fever, followed by strabismus, stupor, or loss of one or more of the functions of sense; when they are prolonged or recurrent; or are followed by signs of any of the unfavourable terminations noticed above, much *danger* should be apprehended. Indeed, all cases depending upon cerebral disease are attended by more or less danger, which in some instances become most imminent, particularly when the symptoms of hydrocephalus are present. *b.* In *adult persons* the prognosis is equally *unfavourable*, when the affection is evidently the result of cerebral disease, or of organic changes — and when the fits become more and more frequent, or severe, with more marked cerebral disturbance either attending upon or following them. On the other hand, when they are symptomatic of disorders of the prima via, or of the generative organs, a *favourable* opinion may be entertained. *c. Puerperal convulsions*, however, should never be considered devoid of *danger*, more especially when they occur after delivery; or in consequence of great exhaustion of vital power, or of uterine hæmorrhage. When they are slight, are unattended by stertorous breathing, or by paralytic or apoplectic symptoms, and when parturition is so far advanced as to readily admit of its completion by art, less danger may be feared. But the *prognosis* of convulsions generally must be inferred from a careful review of the diversified circumstances of individual cases, especially in respect of their remote and efficient causes, and of their disposition to terminate in either of the ways pointed out.

40. IV. Appearances on Dissection of fatal Cases. (See Brain, § 4—133.), Epilepsy, and Spinal Chord.

41. V. Remote and efficient Causes. — i. *The remote causes of convulsions* are numerous; but they often require a certain *original* or *acquired predisposition* of system to ensure their operation; and various influences which may only predispose to them in some persons, may even excite them in others. *A. Predisposing.* There is every reason to suppose that the offspring may derive constitutional predisposition to convulsions from the parents. Persons of a nervous and irritable temperament, — of a delicate frame, and largely developed head (Desessartz), — of a relaxed and soft fibre, and plethoric vascular system, — children whose fontanelles are very late in closing, — those who are naturally of a quick, sensitive, and unstable disposition, and whose physical and moral constitutions are readily impressed, — are predisposed by original conformation. Those infants who have experienced injury of the cranium during parturition (Smellie); persons who have early, prematurely, or inordinately indulged in venereal pleasures — who have placed no restraint on their passions, particularly anger, — who have become debilitated by any cause (Autenreith), — who have had their cerebral organs unduly and too early excited, and before the process of developement was sufficiently far advanced; the present state of civilisation and precocious mental improvement; the greater irritability of the system accompanying the epochs of dentition; the irritable and plethoric states attendant upon pregnancy; habitual determination of blood to the head; previous attacks of convulsion, either before or after puberty, or in a former pregnancy; attempts to conceal pregnancy, and the mental distress and shame attending it in unmarried women; exhaustion of nervous or vital power by increased discharges, long continued pain, or want of sleep; all luxurious indulgences; too much sleep; inanition and want; prolonged lactation; fluor albus, &c.; and certain electrical states of the air, by which the nervous system is influenced, and rendered more susceptible of impressions and excitement; are the chief causes which generate a predisposition in the frame. It has been remarked by Dr. Ramsbottom, and other writers, that puerperal convulsions were most frequently produced during warm electrical states of the atmosphere.

42. *B.* The *exciting causes* of the various forms of convulsion are very numerous; and they act in different ways in producing their effects. I have already stated, that irritation of a part of the organic or ganglial nervous system will be transmitted by the communicating branches to the spinal nerves, and produce convulsive actions of the muscles they supply, without the brain experiencing any evident lesion; whilst, in other cases, the irritation may be conveyed to the brain, either directly by the organic nerves, or through the medium of the spinal chord, the cerebral functions suffering accordingly. But irritation or organic change of any of the parts contained within the cranium will also occasion convulsions, the general sensibility and mental manifestations being then more or less obscured or perverted during the paroxysm or subsequently. These facts, which might be illustrated by numerous cases, the history and results of which I have attentively observed, naturally point to a division of the causes, *first*, into those which act upon some portion of the organic nervous circle, or the viscera which it supplies; and, *secondly*, upon the cerebro-spinal system itself. But, although it is useful to make this distinction, particularly for practical purposes, yet it should not be overlooked, that irritations affecting the former would rarely be followed by convulsions, unless the latter possessed a marked disposition to disease, as far as regards increased susceptibility and proneness to experience alterations from the healthy condition of its circulation.

43. *A.* The exciting causes which act more immediately upon the *organic nervous system*, and through it upon the spinal nerves or brain, or both, are the following: — *a.* In *infants* and *children*, the retention of the meconium; a morbid state of the umbilical chord; unwholesome milk, or improper feeding; acid or acrid sordes, and various diseases of the alimentary canal; an overloaded stomach; suppression or retention of the urine; accumulated flatus, or morbid secretions, and the presence of *worms*, occasioning irritation of the bowels; the ingestion of acrid substances — as very irritating purgatives (Gohl and Lentilius), or emetics (Riedlin), — acrid enemata; noxious or indigestible substances taken as food; acidity of the prima via; dentition at either of its epochs, particularly cutting the eye and molar teeth; the irritation of pained or carious teeth; and calculi in the urinary organs, &c. *b.* In persons about, *or subsequently to, puberty*, and occasionally in children, organic diseases of

the stomach, bowels, or collatitious viscera; affections or lesions of the heart; constipation, colic, ileus, and intus-susception; incarcerated or strangulated hernia (Graaf and myself); organic change of the kidneys, and suppression of urine; manustupratio or inordinate sexual intercourse; and nervous and vascular excitement, or other diseases of the female organs, particularly the ovaria and uterus. *c.* In *puerperal females*, a loaded stomach, or disorder of this organ brought on by indigestible or unsuitable articles of diet, particularly shell-fish (Clarke); rapid or premature distension of the uterus during pregnancy; long continued and exhausting labour; excessive, frequent, and inefficient pains; distension of the urinary bladder during or after parturition; a loaded state of the bowels; excessive depletion or flooding; venereal indulgences during the last two months of utero-gestation.

44. *B.* The *causes* which act more directly on *the cerebro-spinal nervous system* are, *a*, the improper exhibition of narcotics, and of spirits and various quack medicines, by the lower classes, to *infants* and *children*; the admission of a strong light, or the impression of loud noises, on very young infants; the continuance or excess of pain; injuries received on the head during or subsequently to birth; fear, and sudden fright, or fearful dreams. *b.* In *adults* more especially, and in children also, the most common causes of this description are, the influence of imagination and imitation; the action of the sun's rays on the head; excessive mental labour or anxiety; extreme bodily sufferings, or long watching; injuries of the brain, spinal chord, or nerves; irritation of nerves by tumours, abscesses, or by ligatures in operations, or injuries of them by wounds and accidents; incipient curvatures of the spine (Wichmann, Bonet); the impression of excessive or long continued cold, or of a cold bath; the influence of particular odours on some constitutions; the abuse of spirituous liquors; the influence of various poisonous substances on the nervous system, belonging to the animal, vegetable, and mineral kingdoms, as nux vomica, and nearly all the class of narcotics; deleterious gases and metallic fumes, as the nitrous oxide, sulphuretted hydrogen, &c., the vapours of mercury and lead; and the irritating and inflammatory operation of many mineral preparations and acrid vegetables (see Poisons); all emotions of the mind which excite the nervous power, and determine the blood to the head, as joy, anger, religious enthusiasm, excessive desire, &c.; or those which greatly depress the nervous influence, as well as diminish and derange the actions of the heart, as fear, terror, anxiety, sadness, distressing intelligence, frightful dreams, &c.; numerous lesions of the encephalon or its membranes, particularly effusions of fluid, abscesses, tumours, ossific deposits, and various other adventitious formations — indeed, nearly all the organic changes described in the articles on the Brain, Epilepsy, and Spinal Chord; also exhaustion from previous disease, particularly by large losses of blood (Schroeder); inanition and want (Amatus Lusitanus); the erect position suddenly assumed; lightning (Grapengiesser); abscesses about the neck; the suppression of eruptions and discharges, particularly on the head or from the ears; the syphilitic poison; and repulsion of gout or rheumatism. *c.* In *puerperal females*, many of the causes now mentioned are especially productive of convulsions, particularly anxiety or distress of mind in unmarried females; violent straining during labour; and sudden changes from the horizontal to the sitting or erect postures.

45. ii. The *efficient causes* have been partially alluded to. Their nature may be in some measure inferred, from what has been stated above. It seems evident, from a careful consideration of the exciting causes, of the character and progress of the symptoms, and the lesions usually detected on dissection, that convulsions arise from several pathological states, the grosser or more palpable parts of which only we are enabled to recognise by the senses; and that, in addition to these, a certain susceptibility of the nervous system, particularly of the cerebro-spinal centres, is requisite, nevertheless, to the full developement of the seizure. It is extremely probable that convulsions frequently arise from some considerable change in the state of the circulation within the cranium; and that such change may be either active cerebral congestion, — in some cases connected with general plethora, but in others not thus associated, and, even in a few, accompanied with marked deficiency of blood, — or local or general anæmia. Moreover, it may be presumed that the seizure very often is accompanied with but little disturbance of the cerebral circulation or functions at its commencement; and that it chefly depends upon irritation, in some manner induced in the organic nerves, and, through them, in the spinal nerves, either partially or generally. We have no proof of the circulation of even the spinal chord or its membranes being disordered in these cases, although it may be affected in convulsions, either primarily or consecutively. In cases which more manifestly proceed from disease within the cranium, and that of an organic kind, as from tumours, abscesses, aqueous effusion, &c., it by no means follows that the circulation in the brain is generally, or even at all, either accelerated or congested, although these lesions may safely be assumed in many instances. In some cases even of organic change, the general amount of circulation in the head seems, as far as we can judge from symptoms, much below the natural standard, and yet convulsions will supervene; whilst in others, signs of inflammatory action of the membranes are apparent. In many cases, moreover, judging from the states of pre-existing disease, from what is known of the operation of various causes, and from the symptoms connected with the head, — the weak and small pulsation of the carotids, the antecedent fainting or leipothymia, the low temperature of the scalp, and pale, sunk, and pinched features, — it may be inferred that the vital endowment and the circulation of the brain are momentarily deficient both in activity and in quantity.

46. Therefore, while I subscribe to the justice of the aphorism of Hippocrates, that convulsions arise from repletion or inanition as respects the circulation within the cranium, I would qualify it, and add, that they often originate thus, but that either of these states forms a part only of the changes that produce them, even when most irrefragably present, — that in many cases the circulation in the brain is not materially disturbed, whilst the spinal nerves are affected either by irritation conveyed to them from the organic nervous system or from the spinal chord itself, more

frequently the former, — that even when the brain is disordered, general convulsions will arise only when the disorder extends to, or influences the parts more immediately related to, the locomotive actions of the body, as the spinal chord or its membranes, — and that we cannot contemplate the origin of convulsions in any way, and leave out of view changes primarily induced in the organic nervous or ganglial system — which changes will more readily produce, than be produced by, disordered circulation in the cerebro-spinal organs. We know that the movements of the fœtus in utero are automatic — are the consequence of irritations affecting the organic nerves, extending to the spinal nerves, and, through them, inducing motions of the limbs. To the production of these, any change in the brain or spinal chord is not required; and a great many cases of convulsion have a similar origin, the difference being only as to the grade of irritation relatively to the susceptibility of the patient, and to the effect produced. As to the opinion entertained by the older humoral pathologists, from GALEN to WILLIS, that a morbid state of the fluids also occasion convulsions, some importance may be attached to it. We do not, however, find convulsions much more prevalent when the blood is manifestly morbid, unless in those cases where a previous, and, at least, an equal change has been produced upon either the organic, or the cerebro-spinal nervous systems. The convulsive movements that occur in common and pestilential cholera, in malignant fevers, in rabidity, and in organic lesions of the kidneys, with suppression of urine, are proofs of this position. That, however, a morbid state of the blood sometimes constitutes a concurrent proximate cause of certain diseases, in which convulsions either incidentally occur, or form a part of the circle of advanced phenomena or effects, may be admitted, in the absence of sufficient evidence to the contrary; for, when the blood itself is primarily changed, we may with reason infer that convulsions will sometimes manifest themselves as a part of the effects thereby produced upon the nervous system; but I believe that convulsions seldom arise from this cause only.

47. VI. TREATMENT. — i. OF CONVULSIONS GENERALLY. The means of cure in all cases of convulsions, are directed with the view, 1st, of subduing the fit, when called to a patient labouring under it; and 2d, of preventing its return. *A.* To *subdue the paroxysm,* it is necessary to have prompt recourse to active measures: but these should not be employed indiscriminately, and without taking quick cognizance of the cause, and the existing pathological states, as far as they may be readily ascertained. The circumstances principally to be observed by the practitioner, are the presence or absence of active cerebral congestion and sopor, the existence of general vascular plethora, the temperature of the head and lower extremities, the pulsation of the carotids, and the character of the countenance and of the convulsive motions. These may be ascertained in a very few moments, and at the same time that enquiry is being made into the cause of the seizure, and the peculiarities of the case, as respects the age, constitution, and habits of the patient.

48. *a.* A person in convulsions ought to be placed so as to breathe *an open cool air,* and to facilitate the restoration of one of the earliest functions disordered; and no more attendants be permitted than are absolutely necessary. Those susceptible of, and liable to, nervous affections, should not be allowed to remain in the same room, or even in the same house, with the patient while in the fit. — *b.* When the habit of body and the cerebral symptoms, &c. present no contra-indication, *general or local blood-letting,* or both, should be resorted to, and carried as far as circumstances may warrant. When the cerebral congestion is very active and extreme, the jugular vein may be opened; but the depletion should never be pushed too far, with an expectation of stopping the convulsions; nor should it ever be carried to deliquium, for the system may be thereby injured, and a return or immediate recurrence of the seizure be favoured by it. *Revulsive bleedings,* as from the feet while they are held in warm water, may be preferred, if the seizure be connected with difficult or suppressed menstruation. *Local depletions,* in other instances, are best practised by cupping behind the ears, particularly in children, and upon the nape of the neck, and between the shoulders. In other instances, when the brain is not affected, — when the head is cool and the carotids are pulsating neither more fully nor more strongly than natural, — the state of the spinal column should be carefully enquired after, by pressing a warm sponge along and between the vertebræ; and the abdominal regions and the evacuations ought to be daily examined. If signs of inflammatory action exist in either of these quarters, particularly if they be connected with plethora, general and local depletion — preferably the latter, when plethora is wanting — should be resorted to. But there are many cases, especially those produced by copious evacuations, by inanition, and the exhaustion of painful and protracted disease, where depletion would be most injurious; and there are intermediate grades, in some of which local blood-letting might be either beneficial or of no advantage, according as the case approaches nearer to the one extreme than the other. When the convulsions are *partial,* then local depletions are to be preferred.

49. *c.* There are certain states of convulsion, in which it at first seems difficult to determine as to the propriety of resorting to blood-letting in any way. One of the most common of these, is that characterised by a pale and somewhat sunk countenance, and by tonic convulsions. This appearance may mislead the practitioner, if he do not examine carefully into other symptoms. If, in addition to these, the carotids pulsate strongly, the temperature of the head be increased, the pupils contracted, and the brows knit, we should suspect inflammatory irritation of the arachnoid — notwithstanding the absence of all plethoric or sthenic signs — and resort to depletions, and the means about to be noticed. (See also BRAIN — *Treatment of Inflammation of its Membranes.*) Another state sometimes occurs, with very violent general convulsions; a broad, open, throbbing, and frequent pulse; pale countenance and surface, often with sopor or delirium, or both. These symptoms may mislead the inexperienced, and depletions — occasionally the very cause of the mischief — may be improperly employed to relieve it. But when the history and symptoms of the case are more minutely examined, we shall

find precisely that state which is described in the article BLOOD (§ 53—60.), and that, instead of congestion, there is general anæmia, with cerebral irritation, combining with the physical condition of the brain, to determine to it the greater part of the blood in the system. In other cases, there is apparently anæmia of the brain, at least at the commencement of the fit, and either consciousness is retained, or it is lost from the state of the cerebral circulation. These forms of seizure may be called *anæmial*; inasmuch as they arise either from a general deficiency of blood, or from anæmia of the brain, although the vessels of this organ soon become partially congested from the impeded respiration, and interrupted circulation through the lungs and heart, at the commencement of the paroxysm. In these, a very opposite treatment to depletion is required. The observations of LATHAM, HALL, GOOCH, NORTH, and the author, on this important practical topic, have, however, induced the practitioners of the present day to resort to blood-letting in convulsions in a much more discriminating manner than formerly.

50. *d*. Next in importance is the judicious employment of *cold* and *heat* — of cold in the form of cold affusion on the head and spine, and of heat in that of warm bath or semicupium. An appropriate use of these is more generally serviceable, and often less dangerous, than depletions. The *cold affusion* to the head, and, in cases where there seems to be irritation of the spinal envelopes, along the vertebræ; and cold, in the form of epithems, evaporating lotions, pounded ice to the head, when convulsions are produced by inflammatory action in the brain or spinal chord; are among the chief forms in which this agent is admissible. The *cold bath*, although advised by CURRIE, LOEFFLER, BEAUMES, BAYNARD, and others, is, in my opinion, a hazardous experiment during the paroxysm, and sometimes even in the interval. The *warm* bath, or *semicupium*, is frequently of much service, and particularly when there is either high nervous irritation, a dry harsh skin, or cold surface or extremities; and my experience accords with that of HEILBRONN, HENRISCHEN, DOERNER, and STUTZ, respecting the propriety of adding a quantity of the fixed alkalies, or their sub-carbonates, to the water. When the head is much affected, either by inflammatory irritation of the membranes or active congestion, cold affusion, or cold epithems or lotions, may be employed whilst the patient is in the warm bath, or is using the semicupium or pediluvium. In slight cases of convulsion, the aspersion merely of cold water over the face, head, or neck, is often of service. Large draughts of cold water were recommended by HOFFMANN; and they, as well as water ices, and cold clysters, have been several times employed by myself with much benefit. Cold injections are praised by LANGHANS and MARX. Cold affusion, cold aspersion, and cold epithems, have been prescribed by CURRIE, DUPONT, DOEMLING, and others; but the two former were usually directed by them to the surface generally, instead of to the head, — a circumstance which accounts for the disuse into which it had fallen, when the practice was revived some years since by the author.

51. *e*. If the patient can swallow, and the muscles of the jaw are not much affected, *cathartic* medicines should be given by the mouth; but in most instances it will be preferable to delay them until after the seizure. But I have under no circumstances been prevented from directing a cathartic and *antispasmodic* enema to be thrown up. Either of F. 131—136. may be employed and repeated, if it be not retained, as is frequently the case. When purgatives can be taken, a full dose of *calomel*, either alone or with jalap, followed soon afterwards by an active cathartic draught or mixture, consisting of senna, tincture of jalap, carminatives, and antispasmodics, particularly the preparations of ammonia and camphor, is, upon the whole, the most appropriate. But under every circumstance the operation of these should be promoted by enemata. When we wish to produce an active derivation from the head and spine, as well as alvine evacuations, the croton oil, elaterium, ol. terebinthinæ, &c., may be employed. But, where the object is chiefly to bring away offending secretions, and other causes of irritation, and at the same time to allay disordered action in the *prima via*, calomel, jalap, rhubarb, and senna, are, perhaps, the best purgatives we can employ. Their action will, in all instances, be much increased, and a marked change be often produced in the disease, by an occasional dose of the ol. terebinth. and ol. ricini, assisted by the enemata already recommended. If convulsions arise from *worms* in the intestines, *anthelmintic* purgatives, during both the paroxysms and interval, should not be omitted. Calomel may generally, with due address, be exhibited during the fit, and subsequently other anthelmintics may be given. BERGIUS and BARTON prefer the *Spigelia Marylandica* in such cases; but the other means adopted in verminous disorders may be employed according to circumstances. *Emetics* are sometimes of service, when exhibited upon the first intimation of the seizure, particularly if there be indications of gastric irritation from offending or noxious ingesta, and acid sordes, or if the paroxysms assume a periodic form. SCHENCK, SCHÆFFER, RIOEL, CONRADI, HUFELAND, and SMITH, advise them chiefly in such cases. THOM recommends them to be exhibited to the nurse, when convulsions attack infants.

52. *f*. *Antispasmodics* are sometimes productive of instant relief, when employed in large doses, early in or upon the first intimation of the fit, particularly when it arises from debility, or irritation in the prima via, or morbid nervous susceptibility; but they seldom can be taken in the paroxysm, unless it be slight, or arise from exhausting causes, and then they are often of great service, especially if they be combined with restoratives and opium, conium, or hyoscyamus. The æthers, camphor, musk, assafœtida, valerian, the preparations of ammonia, bismuth, zinc, &c., are amongst the most efficacious in these cases. When inflammatory irritation seems to exist in the membranes of the brain, they are obviously contra-indicated; but congestion of a passive nature, especially when the pulsations of the carotids are not strong or hard, and the temperature of the head is not increased, should be no reason for omitting them. An extensive experience, however, of the effects of the spirit of turpentine in convulsive diseases, has convinced me that it is the most efficacious

and the safest antispasmodic that can be employed for their removal. If it be given in doses so large as to act as a purgative, and seldom or rarely repeated, it is remarkably beneficial in the cases which arise from cerebral congestion or irritation; but when the seizure is connected with anæmia, or exhausted vital power of the brain, or general debility, it ought to be exhibited in small doses, often repeated, and be combined with restoratives and aromatics. MICHAËLIS, SCHMALZ, ALBERS, HARGENS, CONRADI, HEILBRONN, and WIEDEMANN, strenuously advise, in all convulsive affections, large doses of the *fixed alkalies*, either alone or alternated with *opium*. Of the antispasmodic action of these substances, as well as of their soothing operation on the digestive mucous surface, there can be no doubt. If the convulsions arise not primarily from organic disease within the head, I believe that opium thus combined will often be of great service, and particularly when they proceed from the nervous susceptibility and muscular irritability often connected with debility, exhaustion, and excessive evacuations. The good effects of alkalies in disorders of the digestive functions, and the frequent origin of convulsions in these disorders, or their connection with them, must be admitted. Moreover, the alkalies, combined with opium, or hyoscyamus, conium, or belladonna, and ipecacuanha, &c., are among the surest means we possess of allaying irritations affecting the nervous system. STUTZ, BRUNINGHAUSEN, DOERNER, and HENRISCHEN, employ them also in fomentations to the abdomen, in baths, and in enemata; they using an ounce of the caustic alkali to about a quart of water for the fomentation. I have prescribed the alkalies frequently and largely in the convulsions of children with much benefit. Other antispasmodics, and different modes of applying those in common use, have been adopted by various writers; but as these are better suited to fulfil the second intention of cure, I will notice them hereafter.

53. *g. Anodynes* and *narcotics* are often of the most essential benefit, when appropriately prescribed and combined, or preceded by other suitable remedies. They are seldom of service in the convulsions proceeding from active congestion and organic disease within the head; but when the affection is connected with irritation in other parts, or when the disorder of the brain or its membranes consists chiefly of irritation, they should not be omitted. They are seldom of use, — sometimes even injurious, in puerperal convulsions, and ought to be given with caution to very young children. In cases where the propriety of exhibiting them is doubtful, any unpleasant operation will be prevented by combining them with camphor, or with aromatic tinctures or spirits. I have derived great advantage from employing them *externally*, selecting for this purpose *opium* or *belladonna*, in the form of embrocation or plaster—generally the former — applied during the paroxysm, over the epigastrium and abdomen, and combining them with rubefacient and stimulating substances, as camphor, ammonia, Cayenne pepper, &c., or with any of the liniments or plasters in the Pharmacopœias, or in the *Appendix*, suited to the case (F. 108. 297. 307.). The practitioner should, however, be cautious in the employment of the more active of these narcotics, even externally, as very dangerous effects have resulted from them. Dr. THACKERAY found that *tobacco* steeped in brandy, and placed over the epigastrium, produced a most dangerous state of vital depression.

54. *h. Revulsants* and *counter-irritants* are of great service in all states of the disease accompanied with cerebral congestion, or irritation of the membranes of the brain or spinal chord. Sinapisms to the extremities; rubefacient liniments (F. 299. 305.), and embrocations, particularly those with Cayenne pepper, horseradish, &c.; the turpentine fomentation; the immersion of the hands and feet, or the lower extremities, in a salt and mustard bath; *dry cupping* on the nape of the neck, occiput, between the shoulders, or along the spine; are the preferable means of this description. These will often, of themselves, shorten the seizure; but if they fail of having this effect, after slight redness of the skin has been produced, advantage will frequently arise from placing over it a liniment or embrocation containing opium, or the acetate or muriate of morphine, or any of the other anodynes in use, either of which may also be employed in the form of plaster, combined with antispasmodics, &c.

55. *i.* Convulsions arising from *exhaustion*, *hæmorrhagy*, *inanition*, &c. require restoratives, stimulants, &c. in small quantity, and frequently exhibited, with strict attention to the temperature of the head, which should be lowered whenever it rises above natural, by cold applications. (See ABSTINENCE—*Treatment of*; and BLOOD—*Deficiency of*, § 48, 49.) The combination of hyoscyamus with gentle tonics; the preparations of opium, conium, or hop, with those of ammonia and camphor; the preparations of valerian or assafœtida with the sub-carbonates of the alkalies; the muriate or acetate of morphine, with the aromatic spirits and tonic tinctures; and emollient and antispasmodic enemata, are most appropriate to those cases. In these, as well as in the more clonic forms of convulsions, the preparations of *iron*, particularly the *ammonia-tartrite of iron**, alone or combined with hyoscyamus, will be of much service. The occurrence of these affections towards the close of *febrile* or *acute diseases* (§ 13. 33.), particularly when they manifest signs of greatly *depressed vital power*, requires nearly similar remedies, or such as exert a still more stimulant and antispasmodic operation. The sulphate of quinine, with hyoscyamus and camphor; the decoction of cinchona, or infusion of arnica or serpentaria, with liquor ammoniæ acetatis and æther; warm negus, with aromatics; and stimulating embrocations or liniments over the epigastrium, may be resorted to in these cases. If convulsions occur in *the course*, or towards *the crisis of fevers*, the treatment must altogether depend upon the state of the cerebral functions, and the disposition that may be evinced towards spontaneous or critical evacuations, to the promotion of which our means should be directed; taking care, at the same time, to guard the head from mischief, by employing local depletions, cold affusion, cold

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* A most valuable and beautiful preparation very lately introduced by Mr. AIKEN; and from its very pleasant, sweet taste — resembling that of liquorice — extremely well adapted for children. Dose from half a grain to five or six grains.

epithems, and internal and external revulsants, if it exhibit appearances of congestion or inflammatory irritation; and warm diaphoretics, gentle tonics, and antispasmodics, and other means of supporting the manifestations of vital power in the nervous systems, and of promoting the secreting and excreting functions.

56. *k.* When convulsions are produced by *narcotic* or *acro-narcotic poisons*, the immediate evacuation of the noxious substance by the stomach pump, or by emetics, the cold affusion on the head, followed by stimulants and antispasmodics, green tea, or coffee, stimulating enemata, and frictions of the surface, are chiefly to be depended upon. If they proceed from the *fumes of lead* or *mercury*, antispasmodics, tonics, stimulants, strychnine, or nux vomica, with purgatives, are most serviceable, particularly when assisted by the warm bath, and by frictions of the surface afterwards with stimulating liniments. Serpentaria, the arnica montana, and camphor, are often beneficial remedies in those cases.

57. *l.* Convulsions either of a partial, a general, or irregular and anomalous form, arising from *irritation of the female organs*, require local depletions, cooling aperients, and antispasmodics; the internal use of soda and nitre; cold clysters; the cold affusion or aspersion; the tepid bath, or the shower bath, while standing in warm water; and draughts of cold water. In a case of general convulsions arising from inflammatory irritation about the neck of the uterus, with leucorrhœa, I directed the patient to take a lemon ice, or to drink as much as she could of cold spring water upon the intimation of the seizure; and she has hitherto done so with uniform benefit. Having seen her during the paroxysm, and perceiving that she retained her consciousness, cold water was given, and swallowed with some difficulty. The benefit was almost instantaneous. If the convulsions be connected with difficult, or suppressed menstruation, general or local depletions, and afterwards the warm general or hip bath, full doses of the preparations of assafœtida and ammonia, particularly the spir. ammon. succin., the spir. ammon. fœtid., or the spirit. guaiaci ammon., also camphor and the boracic acid, or the sub-borate of soda, have proved the most effectual remedies in my practice. But the means already advised to prevent congestion or irritation within the cranium should be resorted to upon the first intimation of the fit. Bleeding by leeches from the inside tops of the thighs are indicated in these cases; but it can be practised only in the interval.

58. *B. The prevention of the paroxysms* is to be attempted, with due attention to the remote and proximate causes, the former of which should be removed as completely as possible, and the latter energetically but cautiously combated; recollecting always that convulsions are the outward manifestations of certain lesions of the nervous, acting on the muscular, functions; and that our knowledge of such lesions extends not beyond the inference that they consist of depression or exhaustion of vital power, or of irritation, or of congestion, and, occasionally, of two or all these states conjoined, some one of them predominating over the others, and being associated with additional, and even opposite changes. Many of the means already noticed are requisite in the intervals, as well as in the paroxysm, especially when judiciously modified to the circumstances of the case. *a. Vascular depletion* is often required, and in similar states of disease to those already pointed out; but it should be directed with great circumspection, and to a moderate extent, unless the signs of active cerebral congestion, or of inflammatory irritation, or of general plethora, be unequivocal. If, however, opposite states obtain, viz. exhaustion, and deficiency of blood, very different means must be employed. In most instances of convulsions, the quantity of the circulating fluid is not so frequently either much above or much below the usual proportion, as the influence, — vital or nervous, or by whatever name it may be called, — by which the distribution of blood throughout the frame is regulated, is disturbed so as to determine or attract a larger proportion to one part than to another. In no peculiarity of constitution is the old doctrine, "*ubi irritatio, ibi fluxus*," more frequently illustrated than in that in which convulsive complaints are most commonly observed; and, in these diseases, we are continually finding fluxion one of the earliest consequences of irritation. I have long thought, and on several occasions contended, that, in the common routine of practice, blood-letting is too indiscriminately employed to remove such determinations or irregular distribution of the circulating mass; and that, although it sometimes succeeds, owing to its being associated with other and more appropriate means; it often fails, or even augments the mischief, by increasing the debility and susceptibility of impressions from exciting or irritating causes, that generally characterises the nervous system of persons subject to convulsive seizures. Therefore, when the abstraction of blood is really necessary, it should be performed in such a manner, and be accompanied with, or followed by, such medicines as are most likely to equalise the circulation; and it is chiefly in this way that many of those about to be noticed are productive of any service in the disease. Local depletions, in moderate quantity, repeated according to circumstances, — from the nape of the neck or occiput, when the head is affected, and along the spine, if irritation of the membranes of the chord is suspected,—and assisted by such other means as the case may require, are more generally applicable in the intervals than large venæsections.

59. *b.* There are few remedies more beneficial in convulsions than *mild purgatives*, or aperients, taken daily, and conjoined with tonics and antispasmodics. Active purgation, if long persisted in, will lower the vital energy, and thereby favour the return of the fits; but the more deobstruent and eccoprotic medicines of this class, particularly when thus combined, may be given, so as to procure two or three fæculent evacuations daily. Thus prescribed, purgatives will increase the patient's strength, and often procure a prolonged immunity from the seizures. *Aloes*, with quinine or iron, and camphor; or with myrrh, assafœtida, the tonic extracts, &c., and occasionally with blue pill, or with extract of hop, hyoscyamus, or conium (F. 450—471.); *senna*, with gentian or bark, the preparations of ammonia, æther, &c. (F. 266, 872.); and either

of these with the liquor potassæ, or the alkaline sub-carbonates, are most to be relied on. But advantage will accrue from changing the forms and mode of combination and exhibition of purgatives from time to time, and from assisting them with such other remedies as the special characters of the case may require. A full dose of calomel, followed by the turpentine draught (§ 51.), may occasionally be resorted to; and enemata will also be of service. In every instance, the appearance and quantity of the discharges, intestinal and urinary, should be examined; and when the sensibility of the bowels seems to be increased, oleaginous or mild purgatives, with alkalies and hyoscyamus, ought to be preferred. Morgagni recommended, as an aperient, two ounces of the ol. amygdal. dulc. to be taken every night, — a medicine well suited to cases of this description; but the ol. olivæ, ol. lini, or the ol. ricini, and even the cod or tusk-liver oil, may also be thus used. Where we find the tongue much loaded or furred, active purgatives, particularly full doses of calomel, with cathartic extracts, &c., are especially required in the first instance; and mild laxatives, with tonics and antispasmodics, subsequently.

60. *c.* In many cases, particularly when the convulsions proceed from inflammatory irritation of the membranes of the brain or spinal chord, *bleeding* and *purgatives* will be advantageously followed by an *alterative course of mercury*, pushed as far as to affect the gums, and by low diet. Much tact is, however, required in determining as to the cases and period of treatment, in which this practice should be adopted. It is admissible only when the disease proceeds from the pathological state just mentioned, or is connected with a syphilitic taint, or has originated in the abuse of spirituous liquors, &c., and the too great indulgence of the appetite for food; and it will be injurious in cases of exhaustion, unless combined with active tonics and nutritious diet. Plummer's pill, the hydrarg. cum creta, or the blue pill, may be given, in small and frequently repeated doses (from half a grain to a grain of the last, thrice a day), with anodynes, as conium, hyoscyamus, ext. humuli; and small quantities of camphor. In more doubtful cases, or when we suspect that effusion of fluid has supervened upon disease of the membranes; the corrosive sublimate may be prescribed, either in the compound tincture of cinchona, or with the compound decoction of sarsaparilla, or diuretic infusions or spirits, according to the symptoms and circumstances of the case.

61. *d.* Various *antispasmodics* and *tonics*, besides those already adduced, have been directed, chiefly in the intervals; and others in more common use have been employed in novel forms. The *cuprum ammoniatum* has been prescribed by Home, Duncan, and Bianchi; the *nitrate of silver*, by Powell and Hall; the *animal oil of dippel*, by Herz; the oil of *rue*, by Abrahamson; *cajeput oil*, by Thunberg; the *misletoe*, by Colbatch and Home; and the preparations of *zinc*, by Goodsir, Bell, Beaumes, Duguid, White, and many more. Krebs has advised the trunk of the body to be enveloped in *camphorated cloths*, if we suspect convulsions to arise from intestinal worms. Warburg has recommended *musk* in large doses, combined with *nitre;* and Sidren and Frankfurter the internal use of *nux vomica*, apparently upon the principle of Hahnemann, that *similes similibus curantur.* Cazals directed about half a drachm of *bismuth* to be taken in the twenty-four hours, with *castor.* Vogel thought that benefit has been derived from the flowers of the *white lily;* and Baker, Pallas, Thom, and Home, entertained a similar opinion as to the effect of the *cardamine* and *anemone pratensis, artemisia*, and the *radix pæoniæ. Digitalis* was employed by Shaal; *emollients*, by Kortum; *ipecacuanha*, by Plenk; and various *narcotics* by the majority of authors, chiefly in combination with stimulating antispasmodics, in order to ensure their effect. Of the substances now enumerated, the most deserving of notice seem to be the preparations of zinc, bismuth, musk, and the misletoe. Of the former of these I have had much experience; but, upon the whole, they are inferior to *camphor, valerian, assafœtida, ammonia*, and the *æthers*, judiciously combined and assisted by other remedies, particularly when taken upon the first intimation of the seizure. If the disease be the result of exhaustion or inanition, and particularly if it assume a periodic form, the preparations of *cinchona*, the sulphate of quinine, *iron* (Buechner, Reidlin, Loeffler, Hutchinson, Elliotson, &c.), especially the sub-carbonate in large doses, or the ammonia-tartrite, and the *arsenical* solution with *potash*, are the most appropriate remedies, either alone, or with aperients, or antispasmodics, or anodynes and narcotics, according to the peculiarities of the case. I have, for many years, employed the *infusion of green tea*, if the convulsions arise not from inflammatory action within the head, and generally with great success. The good effects of the medicines now mentioned, when they produce any, are to be imputed chiefly to their influence in overcoming the susceptibility of the nervous system, giving tone and energy to the moving fibres, and increasing the secreting and excreting functions. In order to ensure their effects, they should be varied and changed from time to time, and differently combined with one another.

62. *e.* There is scarcely any *anodyne* or *narcotic substance*, that has not been employed in convulsions. The preparations of *opium*, of *poppy*, of *belladonna* (Stoll, Bergius, &c.), of *conium* (Stoerck, &c.), of *hyoscyamus, stramonium* (Stoerck, Sidren, Wadenberg, &c.), and *tobacco* (Riverius, Currie, Thackeray, Haygarth, &c.), have been prescribed in various modes and states of combination — with aperients, or stimulants, or tonics, &c. — internally and externally — in enemata, and in suppositories. The most successful modes of exhibiting either of these substances, in convulsions, are *internally* with camphor, assafœtida, or the sub-carbonates of the alkalies; and *externally*, either in the form of liniment, embrocation, or plaster on the epigastrium, or along the spine, combined with the substances just mentioned, or with any of the liniments or plasters in the Pharmacopœias, or in the Appendix.

63. *f.* Various *derivatives* or *revulsants* have been used in the intervals, as well as in the paroxysm. Blisters may be employed; but they are not so generally appropriate as the production of a number of pustules by means of the tartar emetic ointment or solution (F. 749.), or of the croton oil, rubbed

upon the inside of the thighs, or on the epigastrium, or along the spine. Several writers have directed blisters to the head; but the pathological states admitting of their application in this situation are comparatively rare, and require the most intimate knowledge of disease, and appreciation of symptoms for their recognition. It is only when the vital energy of the brain is profoundly sunk or exhausted, and not suppressed by congestion, or active determination of blood, or the pressure of effused fluids, or adventitious formations, that a blister on the scalp can be of any service. When applied to the nape of the neck, or behind the ears, or between the shoulders, they are seldom of much use, unless kept open for some time. The pea or mezereon issue in the insides of the thighs, and antispasmodic liniments or plasters along the spine, or over the epigastrium, are sometimes useful auxiliaries.

64. *g. Electricity* and *galvanism* have been proposed in convulsions; but I agree with Grapengiesser in thinking them hazardous. *h. Cold bathing* has been very commonly recommended; but it requires discrimination. It will benefit chiefly those cases which are unconnected with organic lesion, and which depend upon general debility and susceptibility of the nervous system. In these the salt water bath should be preferred, and its use commenced in the tepid state, the temperature of successive baths being gradually reduced. The *cold shower bath* is more generally applicable, particularly upon getting out of bed; and when it cannot be resorted to, the patient ought to sponge or bathe the whole head with cold water every morning. The strictest attention should, at the same time, be paid to the state of the digestive functions, and of the alvine evacuations. Cutaneous excretion also ought to be promoted; for, not only are all the other functions thereby improved, but contingent disturbance of any of them, and the irregular distribution of blood, in which convulsions often originate, are less likely to take place whilst the circulation in the surfaces is uninterrupted. It is probably from this mode of operation, as much as from their antispasmodic action, that service has been obtained from several diaphoretics, particularly the *kermes mineral*, and other antimonials, recommended by Unzer, Gulbrand, Struve, and Harder. *i. Warm baths, hip baths, semicupium*, &c., when any advantage is derived from them in the intervals, act chiefly in this manner. But I believe that they will seldom be productive of much benefit, unless in cases connected with suppressed eruptions, or the exanthemata, or with irregular or difficult menstruation, and with disorders of the digestive canal in children; and in these the effects of warm baths will be much enhanced by stimulating or irritating frictions of the surface immediately upon coming out of them.

65. *k.* The almost epidemic prevalence of convulsions during states of religious enthusiasm and mental excitement, as shown by the occurrences already referred to (§ 16—18.), and by the seizures that affected many of the Jansenists who made pilgrimages to the grave of Deacon Paris, during the persecution of this sect in 1724, as well as by the convulsions at one time so uncommonly frequent in the Methodist meetings in various parts of Cornwall, as described by Mr. Cornish, should lead the physician to recommend such moral regimen as the circumstances of particular cases may seem to require. The above facts, as well as the circumstance recorded by Boerhaave, of almost all the girls and boys in the hospital of Haerlem being seized by convulsions from their seeing a girl who had been frightened into them, will alone show the importance of separating the affected from females or other susceptible persons. There can be no doubt that simple hysterical or epileptic convulsions occurring in one among a crowd of females will often occasion convulsive seizures in others, particularly in those of a delicate frame and nervous temperament, although they may have never previously been similarly disordered. I have met with such an occurrence more than once. Indeed, the number of these attacks on the public occasions referred to, is a sufficient proof both of the influence of the mind in producing them, and of the propriety of the immediate separation of a person thus seized, as was judiciously and successfully practised by Dr. Haygarth. The propensity to become affected by convulsions from seeing one in a fit appears to have been well known to the Romans, and from its frequency on occasions of public assembly, as much as from other considerations, they obtained the name of *Morbus Comitialis*, which has been understood as applying only to epilepsy, but which I believe had a much wider signification, and comprised all convulsive seizures. That fear or terror will not only occasion convulsions, but also remove them, or at least often prevent their accession, might be inferred *à priori*, even if it were not proved by experience. The actual cautery employed by Boerhaave soon put a stop to them in the hospital at Haerlem: and their prevalence in certain of the Zetland Isles was said to have been arrested by the unceremonious ducking inflicted upon two or three of those affected; the fear of being treated in the same way having effectually prevented others from being attacked.

66. *l. Regimen.*—The circumstance of those convulsions which arise in crowded assemblies from mental excitement and religious impressions being often ushered in by faintings, and signs of congestion of the cavities of the heart, of the large vessels, of the lungs, &c., should suggest the avoidance, by susceptible persons, of warm and crowded assemblies, where the foul and moist air conspires with moral emotions in depressing the nervous power, and in favouring congestions of the heart's cavities and large vessels; as well as the propriety of removal to the open air, and of having recourse to antispasmodic stimulants upon the approach of the sinking and oppression at the epigastrium and præcordia, which often usher in the fit. The importance of administering to the mental affections and emotions — of relieving as much as possible anxiety or despondency — ought to be pointed out to those concerned, and the patient encouraged strenuously to resist the invasion of the paroxysm. Persons subject to convulsions should never receive indulgence on account of *them*, but be made to know that they may be warded off, by not yielding to the feelings which often favour or produce them. Regular hours of rest, of recreation, and of eating, should be adopted; seden-

tary habits avoided; exercise in the open air taken daily, and both the mind and body duly occupied without fatiguing either the one or the other. In some cases, depending upon disease of the brain or its membranes, the appetite is morbidly increased, and much more food is taken than is requisite to the wants of the frame. Others are connected with indulgence in spirituous liquors. It is almost unnecessary to add, that unless these excesses be guarded against, and the diet and regimen duly regulated, medical treatment will not be efficacious.

67. ii. Treatment of Convulsions in Infants and Children. — *A.* Many of the measures already recommended *in the paroxysm* may be also employed in this class of patients; but in a suitable form, and with strict reference to existing pathological states. Where we observe the indications of cerebral irritation and congestion (§21, 24.), *cupping* on the nape of the neck, behind the ears or occiput; the *warm bath* or semicupium, with *cold affusion*; cold epithems, &c., on the head, the hair having been removed or cut close; a dose of *calomel*, or of calomel and scammony if the child can swallow, and a *cathartic and antispasmodic injection*; are suitable remedies. The jugular vein may be opened in robust or well-grown children; but care should be taken not to bleed them to syncope, as a return of the convulsions may be thereby occasioned. Children ought to be blooded with great caution during a fit; for although I cannot go so far as to say, with Harris, that it is dangerous to bleed in the paroxysm, yet I believe that the convulsions will occasion a hurtful quantity of blood to flow without any immediate effect, if the evacuation be pushed with the view either of subduing them, or inducing syncope. It is as improper as it is futile to lay down any rules as to the extent to which depletion may be carried. It is obvious, that when the child is plethoric, the head large and hot, the eyes suffused and prominent, the carotids throbbing, &c., it may be practised freely, even in the fit, without risk.

68. *a.* Convulsions sometimes proceed from the nature of the ingesta. If this be the case, and if the abdomen be distended, an *emetic* should be exhibited without delay. Seizures not infrequently arise during the period of dentition, from indigestible or irritating substances in the *primæ viæ*, and in such cases often commence in simple flatulent colic. After an *emetic* has been exhibited, or even independently of it, a *purgative*, if it can be taken, should be prescribed, along with carminatives or antispasmodics, and a clyster thrown up. In cases of this description, I have found a dose of calomel, with soda or potash, or the hydrarg. cum creta, followed by either of the following mixtures, a carminative enema, and friction with an antispasmodic liniment on the abdomen or spine, the most successful means: —

No. 158. ℞ Magnes. Ustæ ʒss.; Sacchari Albi ℈j.; Olei Anisi ♏v.; tere bene simul, et adde Aquæ Fœniculi Dul. ℥jss.; Spirit. Ammon. Fœtid. ♏xv.; Pulv. Rhei xvj.; Syrup. Papaveris ℥ij. Fiat Mist., cujus capiat coch. unum, vel duo minima, tertiis vel quartis horis.

No. 159. ℞ Olei Ricini ʒiij.—℥ss.; Olei Terebinth. ʒj.—ʒij.; tere cum Vitel. Ovi, et adde Aq. Fœniculi ℥ss.—℥j.; Syrup. Papaveris et Syrup. Rosæ āā ʒij. M. Fiat Mist., cujus sumat partem quartam vel tertiam, tertiis vel quartis horis.

69. *b. Clysters*, containing valerian, assafœtida, or a terebinthinate substance, triturated with the yolk of egg, and any of the carminative waters, to which oleum ricini or ol. olivæ may be sometimes added, are the most appropriate to those cases. Much discrimination is required as to the choice and continuance of cold applications to the head, particularly if the warm bath or semicupium be simultaneously resorted to. These combined means should never be left to the discretion of a nurse, at least without the personal superintendence of the practitioner in the first instance. In general, as soon as the temperature is reduced, and the features become pale and shrunk, or the fontanelle (if unclosed) level, or at all depressed, whether the convulsions, or sopor, when present, disappear or not, the application of cold to the head, in any form, should be left off, to be again resumed when the symptoms requiring it recur.

70. *c.* During dentition, or even before the teeth approach the margin of the gums, free *scarifications* ought to be practised, and repeated as soon as the scarified parts cicatrise, otherwise the obstacle to the passage of the teeth will be thereby increased. If general or cerebral plethora be not present, or has been removed, and the bowels have been fully evacuated, any of the alkaline or earthy sub-carbonates, with aqua fœniculi, or aq. pimentæ, æther, camphor, &c., with the extract of conium or hyoscyamus, or the syrup of poppies, or small doses of laudanum, may be prescribed with the view of soothing the susceptibility and irritability of the frame at this period. Form. 347. 442. 865. have been ordered by me very generally in such cases, at the Infirmary for Children. In very young infants, convulsions may be occasioned solely by the retention and accumulation of acid and acrid sordes in the *primæ viæ*. These are readily removed by a dose of calomel, followed by oleaginous or other purgatives, the semicupium, and clysters. Tissot and Sharp state that they have been produced by the retention of the meconium owing to spasmodic stricture of the sphincter ani. This is, however, a rare occurrence. Emollients, oleaginous laxatives, the semicupium, clysters, and anodyne liniments, are appropriate to such cases. It has been repeatedly contended for by most of the older, although denied by many modern writers, that the anxieties, the more violent passions, and the irregularities of the nurse, may change her milk so as to disorder the digestive organs, and thereby give rise to convulsions in delicate infants. This fact is established by repeated observation. I perfectly agree with Mr. North, who has taken a very judicious view of this subject, that it should never be overlooked. The obvious remedy in such cases is to change the nurse; and, if this cannot be done, to remove as far as may be the cause of disorder; to promote her digestive and excreting functions; to tranquillise or subdue any mental disturbance or febrile action that may affect the state of the milk, and to prescribe for the infant aperients with soda or ammonia, or other antacids and antispasmodics. I have often employed the oxyde of zinc or of bismuth with soda, or the pulvis cretæ compos., and either the pulvis ipecacuanhæ comp., or small doses of conium or hyoscyamus, with much advantage in these cases; or simply the sub-borate of soda in camphor mixture or aq. fœniculi.

71. *d*. The *cold bath* is a very doubtful remedy in the seizure: it is much less efficacious than the cold affusion on the head; and, when the child retains its consciousness, it even sometimes aggravates the mischief. Of the recommendation of Dr. BROWN, to employ gradually increased *pressure* on the epigastrium during the fit, I have had no experience: it, however, deserves a trial.

72. *e*. Of the use of *blisters* in convulsions, as well as of alkaline rubefacients, as the liquor ammonæ, no favourable idea should be entertained, as they require the utmost discrimination, and are far from being unattended by risk: for, although they will often cut short the paroxysm, yet they will also occasionally produce so violent irritation and inflammation as to be rapidly followed by sphacelation of the integuments. This is liable to happen particularly in ill or insufficiently fed, in delicate and irritable children; in those of a gross or fat habit of body, who have been allowed to feed upon the richer sorts of animal food too exclusively; in the state of vital exhaustion observed in the latter stages of disease, as well as in the early periods, when the pulse is very quick, irritable, or sharp, the skin dry and burning, and the cerebral organs much excited or oppressed; — under such circumstances, I have usually directed a liniment composed of equal quantities of the liniment. saponis et opii (*Ed. Phar.*), and of the liniment. terebinthinæ, or either of F. 308. 311. to be rubbed on the epigastrium and abdomen, or along the spine. THUNBERG advises the cajeput oil to be applied to the epigastric region during the fit; HERZ directs the animal oil of dippel to the same region, and ABRAHAMSON the oil of rue. Either of these will frequently cut short the paroxysm, but I can assert, from a very extensive experience, that the liniments I have recommended are the safest and most efficacious.

73. *f*. When convulsions occur in the invasion of any of the *exanthematous fevers*, or upon the retrocession of the eruption, the treatment must depend, in a great measure, on the habit and strength of body, and the extent to which the brain is affected. If cerebral congestion or irritation, with general heat of surface, exist, local depletions, the cold affusion on the head, whilst the patient is plunged in a warm bath, to which some vegetable or mineral alkali has been added, cooling aperients, cathartic injections, the tartar-emetic ointment and solution F. 749. rubbed on the spine, and diaphoretics, are generally most serviceable. After the bowels have been freely evacuated, the carbonate of soda and nitrate of potash, given in mucilaginous vehicles; the spirit. ætheris nitrici, with the liquor ammoniæ acetatis, in camphor, jalap, &c.; may be prescribed. If the skin be cool, and the pulse weak, or if the fit have occurred after the disappearance of the eruption, salt and mustard may be put in the bath; and if the countenance be pale and collapsed, and the cerebral functions not materially disturbed, warm and cordial diaphoretics, as the preparations of ammonia, camphor, serpentaria, &c., exhibited from time to time. Frictions of the surface, immediately after the patient is taken out of the bath, will generally promote its good effects.

74. *g*. If convulsions occur in the course of *hooping cough or croup*, we may conclude that congestion, or inflammatory irritation of the membranes of the brain, has supervened, and should direct local depletions, the cold affusion on the head, semicupium, and the sub-carbonates of the fixed alkalies, with opium, hyoscyamus, or belladonna, in minute doses, unless the patient is already much reduced by repeated or large evacuations, when we may infer that the convulsive seizures are connected with anæmia, and should prescribe the treatment already described in relation to this state (§ 55.).

75. *h*. The convulsions which occur so frequently as a consequence of chronic or *severe bowel complaints*, and of exhaustion from other diseases, and which have been too frequently imputed to dropsical effusion in the ventricles, require cordial antispasmodics, tonics, and light nutritious diet. Although sometimes attended by more or less effusion, arising from the physical condition of the cranium and its contents, and serving to prevent any vacuum from being occasioned by the deficiency of blood in the cerebral vessels, yet the convulsions should not be viewed as proceeding from the effused fluid, but rather from the irregular and imperfect supply of blood to the cerebral structure.

76. *i*. The seizures that follow great *losses of blood* in children are generally characterised by too active determination of this fluid to the cerebral structure; and require the head to be kept cool and elevated, the bowels to be acted upon, and restoratives, antispasmodics, cordials, and tonics to be administered, with the extract of poppies, conium, or hyoscyamus, according to the peculiarities of the case.

77. *k*. If convulsions follow the disappearance or *repulsion* of *chronic eruptions*, we should dread the existence of inflammatory irritation of the membranes of the brain or medulla oblongata or spinalis, with a tendency to serous effusion. Local depletions, the warm bath; frictions of the surface, particularly of the part whence the eruption had disappeared, with irritating liniments; the use of sinapisms, and deobstruent purgatives, as calomel, &c.; are chiefly to be confided in.

78. *l*. When the seizures have recurred several times, particularly in infants, and are attended by dilated pupil, squinting, slow pulse, &c., their connection with *hydrocephalus* may be inferred. In such cases, even local depletions should be employed with caution: but in many instances they may still be resorted to, in small quantity; and followed by alterative doses of calomel or hyd. cum creta, diuretics, small doses of digitalis with spirit. æther. nit., and the use of the liniment (F. 311.) to the head and loins both in the fit and in the interval.

79. *B*. The *preventive treatment*, *a*, in *plethoric*, fat, and gross-living children, should chiefly consist of a proper regulation of diet, as advised by BEAUMES. Farinaceous food ought to be adopted, with only an occasional indulgence of the less stimulating meats. No rational plan of treatment, however, can be attempted with the view of prevention, without strict reference to the remote and proximate causes of the affection; the former of which should be carefully avoided, and the latter removed by suitable treatment. When we detect cerebral irritation, or determination of blood to the brain, or active congestion,

cupping, as already directed; the daily affusion of cold water on, and a constantly cool state of, the head; a moderate, but continued, action on all the secreting and excreting organs; tranquillity, and the abstraction of all excitement of the mind and senses; a bland and low diet; the use of revulsants, and warm clothing on the lower extremities; are the most appropriate remedies.

80. *b*. In very *delicate children*, where no evident inflammatory irritation within the head exists, a tonic treatment is obviously requisite. The sub-carbonate or ammonia-tartrite of iron may be given, either alone, or with other antispasmodics, or any of the other preparations of this metal. The sulphate of quinine, or the preparations of cinchona, with liq. ammoniæ acetatis, and a little of any of the compound spirits of ammonia; suitable diet, attention to the state of the bowels, and change of air, will also be of service. Calomel, in frequently repeated doses, either alone, or with purgatives or anodynes, has been most injuriously resorted to by practitioners, upon the mistaken notion that convulsions are always connected with irritation within the cranium, and that this medicine alone can remove this state; whereas, if calomel be prescribed in small and frequently repeated doses, it will actually increase the susceptibility and irritability of the body generally. When, however, it is given in full doses at distant intervals, or only occasionally, and either combined with jalap or some more active purgative, or followed by cathartics and enemata, it is a valuable remedy. Where the bowels are thus judiciously acted upon from time to time, and particularly if this be accomplished by a terebinthinated draught, tonics, combined with antispasmodics and anodynes, will be of the greatest benefit, especially if there be no disorder of the cerebral functions to forbid their exhibition. The sulphate or oxide of zinc, or the sulphate of quinine, or the oil or other preparations of valerian, or assafœtida, musk, &c., with either conium, hyoscyamus, or the extract of poppy; the tonic decoctions and infusions, with the alkalies; and various other remedies already recommended in the intervals (§ 61. 75.), may be severally employed, according to circumstances, after purgatives have been duly prescribed, and the stools have become natural.

81. *c*. When we have reason to infer that the convulsions proceed from *intestinal worms*, calomel with camphor, and the other cathartics noticed above; the occasional exhibition of an active terebinthinate draught, followed by enemata, containing aloes, assafœtida, camphor, &c., and subsequently, by the preparations of iron, as well as any other of the remedies and modes of combining them described in the article WORMS, may be directed. It is generally remarked by the German writers, that worms never form in the alimentary canal previously to weaning, if the milk be healthy; and the observation is confirmed by my experience. It is, therefore, after this period that convulsions can be referred to this cause.

82. *d*. The marked *hereditary* and *constitutional tendency* to convulsions in the same family of children, and the very frequent connection of this affection with cerebral irritation, or with dropsical effusion in the ventricles, or between the membranes, in such cases, have presented difficulties to every practitioner. I believe that the disease, when occurring in this manner, has been too frequently ascribed to inflammatory action, and a too lowering treatment adopted. Mr. HILL recommends the arsenical solution, with musk, in these cases; and I doubt not their utility, if carefully employed; but other tonics and antispasmodics, particularly the weaker preparations of bark, or calumba, with the liquor potassæ, and small doses of conium, or syrup. papav., or opium, if the child be not too young, and if the watchfulness or erithism of the brain be present, will be found still more serviceable, especially if the head be kept cool, the secretions and excretions carefully promoted, and the kidneys occasionally excited by the addition of diuretics to the tonics, as the spir. æther. nit., digitalis, syrup. scillæ, &c., or by the application of a suitable liniment (F. 311.) to the loins. In several cases of this description, I have directed, after other means had failed, and while tonics, as now prescribed, were given, the hair to be cut off, and the liniment to be rubbed upon the head immediately after the cold affusion. In cases connected with inflammatory irritation of the membranes, local depletions, the cold affusion, &c. (§ 67.) should precede the above treatment.

83. *e*. The *diet and regimen* of children that have once experienced a seizure of convulsions, ought to be carefully attended to. The stomach ought never to be overloaded, either by the mother's milk or by its ordinary food, which should be always recently prepared, and easy of digestion. As crying often brings back the seizures in infants and young children, it should be prevented as much as possible. When the bowels have been sufficiently evacuated by the medicines suggested, from one to three grains of the *hydrargyrum cum creta*, either alone, or with the sub-carbonates of the fixed alkalies, may be given at first every night and morning, and afterwards every night, or every other or third night. The head should be always elevated; and whilst in bed or indoors it ought to have no other covering upon it than that with which Nature has provided it. On no occasion should the warm fur or beaver hats, which are very improperly worn by children, be used; nor ought the mental powers to be prematurely or inordinately excited. In a word, the head should be kept always cool, the mind tranquil, the lower limbs warm, and the bowels open. A free, temperate, and healthy atmosphere, with occasional change of air, is also as necessary as medical treatment.

84. iii. TREATMENT OF PUERPERAL CONVULSIONS. —The more frequent occurrence of convulsions in a first pregnancy, during a protracted labour, in those who have experienced them previously; the period of the puerperal state, and the progress of the labour and state of the os uteri when they do occur; the characters they assume—whether those of eclampsia, of epilepsy, of hysteria, or of simple clonic convulsion; the causes which induce them, the circumstances connected with them, and the fact that they, more than any of the other forms of convulsion, are the result of active determination of the blood to the head—which, however, is merely the effect of irritation primarily seated in the abdominal viscera; are

all to be taken into consideration in the treatment of them. The *intentions of cure* are the same in this as in the foregoing states of convulsion; and they should be promptly fulfilled.

85. *A. In order to cut short the seizure*, — *a*. After having resorted to suitable means to protect the tongue, as the introduction of a cork between the teeth, &c., blood-letting from the arm, but preferably from the jugular vein, when it can be easily performed, should be employed, and carried at once to a decided extent relatively to the vigour and habit of body of the patient; and it should be repeated after a short interval, if the convulsions recur, and there be no circumstances to forbid it. Simultaneously with the flow of blood, or immediately after it, the affusion of *cold water* or the application of a bladder of *pounded ice* on the head, and the exhibition of ten grains of *calomel*, and from five to ten grains of *camphor*, previously reduced to a powder by a few drops of spirit, with or without an equal quantity of musk, and shortly afterwards of two or three drops of *croton oil*, should never be omitted. These medicines may readily be administered, by mixing them in sweet butter, and introducing a portion from time to time over the root of the tongue, upon the end of an ivory letter folder, or upon the handle of a spoon. A *cathartic* and *antispasmodic enema* (F. 141. 149.) should also be thrown up without delay; and immediately repeated, if it be returned. The combined effects of these will seldom fail of producing a solution of the paroxysm. My experience of the excellent effects of camphor is fully confirmed by Dr. Hamilton, although Chaussier expresses an unfavourable opinion of it, and of all heating antispasmodics; and the recently published observations of Mr. Michell are strongly in favour of musk, which he gives in doses of from one to two scruples. Depletion may be carried further in those states of the disease which assume the characters of eclampsia, or which are attended by great fulness about the head, or stertorous breathing, than in almost any other malady. Chaussier advises, after general depletion has been practised, local bleeding from the nape of the neck and occiput, or from the epigastric region.

86. *β*. As to the propriety of prescribing *opium* in puerperal convulsions, very opposite opinions have been given. Petit, Hamilton, Merriman, and Dewees consider it most injurious; Manning and Bland recommend it; and Leake and Burns, with a judicious discrimination, state, that when the disease is not accompanied with fulness of the vessels of the head, it may be exhibited with advantage after blood-letting. In this decision I concur, and add, that it should always be given either with camphor, as directed by Stoerck, or with the sub-carbonates of the alkalies, as advised by Stutz and Bruninghausen, or with both; more particularly when the convulsions occur from excessive irritability, or previously to the period of full gestation, or after delivery, or when they assume chiefly the characters of hysteria. Rinck applies it to the abdomen, and Hufeland to the soles of the feet.

87. *γ*. Some difference of opinion exists as to the propriety of exhibiting *emetics* in this disease. Denman is in favour of them, but Mauriceau, Chaussier, and Hamilton condemn them, unless after blood-letting, and when the seizure has been excited by improper ingesta, — the only circumstances under which, in my opinion, they should be given, and in which Dr. Blundell also recommends them. Of the good effects of *active cathartics* there cannot be the least doubt. I have always observed, as Dr. Merriman has stated, that the stools procured by them are morbid and offensive.

88. *δ*. The next practical point of importance is, whether or not the patient should be *immediately delivered*; and on this the sentiments of the most eminent accoucheurs are at apparent, rather than actual variance. No person will deny that the state of the uterus is connected with the cause of the seizure; therefore it would obviously seem requisite to remove that state. But the objecters reply, that convulsions also occur after delivery, when this state of uterus no longer exists: I have, however, never met with any, of several cases of convulsions after delivery for which I have prescribed, that did not arise from analogous causes of irritation, viz. an over-distended urinary bladder, the retention of the placenta or of coagula in the uterus, or the accumulation of fæcal or irritating matters in the bowels. I therefore would adhere to the opinion I have often given, namely, if the above means have failed, and if the labour be so far advanced as to enable the accoucheur to deliver immediately without force or injurious interference, then let it be done. If the labour be not so far advanced, but yet the *os uteri* is considerably dilated, then the membranes may be ruptured, particularly if they be very tumid, — if, indeed, they have not been already ruptured, which is often the case, — and either full doses of the *sub-borate of soda* (℈ j. to ʒ ss.) given, or the *ergot of rye*. If the os uteri be rigid or undilated, the former of these will be preferable. If, however, the labour has not proceeded far, then any interference, excepting by the exhibition of medicinal substances, may be more injurious than beneficial. La Motte, Osborne, Leake, Hamilton, Dubois, Ashwell, Nauche, Miguel, Burns, Osianders father and son, Duges, and Ramsbotham, are favourable to as early delivery as possible without violence; whilst Bland, Garthshore, Baudelocque, Hull, Gardien, Denman, and Blundell, are against forcible dilatation of the os uteri, and attempts at delivery in the early stage of labour. After all, the difference is more in words than in intention; for the general object is to hasten delivery, without injurious interference, if the labour be so far advanced as to render the attempt prudent; and those who have espoused either side have stated their opinions with such exceptions and limitations, and with so little precision, as to leave the subject nearly where they found it, and to render it no easy matter to ascertain under what circumstances they would either have recourse to art, or trust to nature. When the treatment already recommended fails, or is followed by an exasperation of the convulsions, — which will very seldom occur if it have been judiciously directed, — then I conceive that the active interference of art should be called to our aid. There is, perhaps, no subject on which opinions are stated to be so much at variance as on this, — each succeeding writer placing those of his predecessors in opposition, even where no real

difference exists, and thereby bewildering the inexperienced, in order that he may have the credit of giving a decision respecting it.

89. ε. Chaussier recommends, in rigidity of the uterine orifice, the application of a pomade containing *belladonna*, with the view of relaxing the spastic contraction, which, he states, is not limited to this part, but extends to the whole of the organ. I believe, however, that the body of the womb is generally free from spasmodic contraction. This preparation consists of two drachms of the extract of this narcotic, softened with an equal quantity of water, and triturated with about an ounce of prepared lard. A piece, the size of a small nut, is to be introduced into a female syringe, open at the extremity, and conveyed to the os uteri, where it is to be applied by pushing onwards the piston. In about half an hour the rigidity subsides, and the labour proceeds. Of this practice I have no experience. M. Chaussier discourages any other attempt at dilatation of the os uteri, as irritating the parts, and inducing a recurrence of the convulsions.

90. ζ. I have never omitted, in any case treated by me since 1819, to employ the affusion of a stream of cold water on the head, and the injection of turpentine clysters, sometimes with camphor, assafœtida, or valerian, and the results have been most satisfactory,—a much less quantity of blood having been detracted than is usually required in such cases. I am not aware that either of these two remedies had ever been employed in puerperal convulsions, until long after I had given publicity to the practice,—a practice which I know to have been recommended very recently by those, who, at that time, ridiculed it. In the more rare states of the disease, which are attended by a weak quick pulse, pale features, and hysterical symptoms, enemata containing valerian, assafœtida, or camphor, are very serviceable. In those which assume the comatose or apoplectic characters, *blisters* applied to the nape of the neck, and *sinapisms* to the ankles and calves of the legs, are useful adjuvants of the measures already recommended.

91. η. In all cases occurring previously to, during or after parturition, the state of the bladder, and of the bowels, ought to be carefully enquired into. Early in 1823, I was called to the Queen's Lying-in Hospital, by the house pupil, to a patient who had been seized with puerperal fever on the second day after delivery, but was convalescent from it, when she was attacked by convulsions, brought on by a distended urinary bladder. I found that the urine had been drawn off, and that she had been blooded once largely. The case was one of extreme severity and danger; the convulsions were unremitting, and attended by profound coma and asphyxy. The vein was re-opened, and, while the blood flowed, a stream of cold water was kept playing upon the vertex, and, at the same time, a clyster with turpentine and camphor was thrown up. Thus, the three most powerful — the almost only, remedies to be confided in, were simultaneously in operation. The patient rapidly recovered. Purgatives were given by the mouth, upon the solution of the convulsions; deglutition having been entirely abolished during the whole seizure. This was one of the earliest cases in which I had ventured upon the *simultaneous* employment of these powerful agents, the use of them in succession having been generally adopted by me previously. I allude more particularly to this case, because of its uncommon severity; of its occurrence soon after a most dangerous disease, as late as nine days after delivery, in a public institution, and at a time when my public recommendation of the practice apparently received but little attention; although it will not now be looked on with scepticism.

92. ϑ. Of *other remedies* but little may be said, as they should be viewed as auxiliaries merely. I have already expressed myself favourably of *camphor* (§ 85.). Burns condemns it; but, when exhibited after depletion, and at the same time with the cold affusion on the head, and cathartic and antispasmodic clysters, it is a valuable medicine. Under the same circumstances, musk, assafœtida, and the other antispasmodics, will also be of use; for all risk of their injurious action on the brain is prevented by the cold affusion, whilst they co-operate with the terebinthinate injections to excite the contractions of the body of the uterus, and remove spastic constriction of its neck. Of the *ergot of rye*, my experience is limited. I have given it only in one case of this disease, and then it was combined with *borax*, — a medicine undeservedly fallen into disrepute — but which I have prescribed for many years. The labour in that case proceeded rapidly, and the patient recovered. Much difference of opinion exists as to the effects of, and propriety of giving, the ergot in convulsions. If the os uteri be dilated, and the external parts free from rigidity, blood-letting, the cold affusion, and cathartic injections, having been actively but unsuccessfully employed, there can be no doubt of the propriety of exhibiting it. Opinions will always be at variance as to the benefits derived from substances recently introduced into practice; for, as all medicines are remedies only from their appropriate use, experience of their operation is required to ascertain the circumstances in which they are truly of service. In a case of puerperal convulsions — I believe the first in which the ergot was exhibited — Dr. Brinckle gave it after the means usually adopted had failed. Twenty minutes after the first dose had been taken, uterine action came on, and the patient recovered. It is strongly recommended by Dr. Waterhouse, of Philadelphia, and by Mr. Michell.

93. ι. In cases of unyielding rigidity or callosity of the os uteri, Van Swieten advised an *incision* to be made through its margin. Dubosc, and, subsequently, Lauverjat, Bodin and Coutouly, who considered it perfectly justifiable after blood-letting, the warm bath, and other means usually employed, had failed, have had recourse to this operation. M. Coutouly has recorded four cases (two of which are quoted by M. Miquel), in which it was resorted to; three of these recovered. The death of the fourth he imputed to the circumstance of it having been too long delayed. M. Nauche also favours this operation in the above circumstances, especially if emollient and narcotic injections into the vagina have failed to relax the rigidity.

94. κ. The *warm bath*, and emollient *fomentations*, followed by the use of an anodyne liniment on the abdomen, have been recommended by Denman and Nauche; and the *tepid bath* by

Capuron, after bleeding has been practised. Much advantage will accrue from assiduous frictions of the abdomen, more particularly if they be performed with an anodyne and antispasmodic liniment (§ 53, 54.), independently of the use of a warm or tepid bath; for either of these can seldom be used with advantage in the circumstances of puerperal patients. In every case the hair should be cut closely off. This may be done in a very few minutes; but shaving the head is merely a loss of time. Burns, Ryan, and Clarke advise the application of a *blister* on the head; but I believe that it will be required only in extreme cases; it certainly ought to be ventured upon only in such, where the coma is profound, and the pulse weak, and the patient sinking. The advantages stated to have been derived by Dr. Clarke from *acrid cathartics*, and clysters, are confirmed by my own experience. If the convulsions occur immediately after delivery, the placenta should be removed, and the existence of internal hæmorrhage enquired after — if at a later period, the state of the urinary bladder and bowels, as well as of the womb, demands attention. In all such cases, active purgatives and cathartic clysters are especially required, but the choice of them should be made with due reference to the state of constitutional power, and to the presence or absence of cerebral congestion, or of exhaustion and nervous susceptibility.

95. λ. When the convulsions attack *epileptic* females, they generally have all the characters of epilepsy or eclampsia, generally with unremitting sopor and stertorous breathing passing almost into asphyxy; and they require the treatment described above. When they occur in *hysterical* females, they may also assume the same forms, and demand the same method of cure; or they may present the features of simple hysteria, particularly borborygmi, quick pulse, &c., with very slight cerebral affection. In these latter cases, the nervine remedies mentioned in the next paragraph will be adopted with advantage, especially after the cold affusion on the head. Cold enemata may be also thrown up, as advised in Hysteria. In the majority of these seizures, neither bleeding nor artificial delivery is required, unless cerebral congestion supervene, or the patient be strong or plethoric.

96. μ. Convulsions in the puerperal states may occur from *great exhaustion*, from want and inanition, and *losses of blood*. In these, the practitioner should trust chiefly to the cold affusion, performed only momentarily; to the keeping of the head cool and elevated; to sinapisms on the lower extremities; to the exhibition of camphor, ammonia, the vegetable alkalies, and musk, with small doses of opium, or of the æthers with hyoscyamus or conium; to the administration of valerian, assafœtida, or turpentine clysters; to the warm bath; to anodyne frictions of the abdomen; and to as early delivery as may be safely attempted; the vital energies being supported by gentle cordials during the remissions. If the seizure be complicated with *hæmorrhage* from the uterus, or hæmatemesis, prompt artificial delivery, the turpentine clyster in the first instance, and turpentine draught in the second, are the most certain means.

97. *B.* The *prevention of puerperal convulsions* is of great importance. The means calculated to attain this object can be put in practice only when the premonitory symptoms (§ 28.) manifest themselves. — *a.* If these indicate fulness of the vessels of the head, *bleeding* from the arm, or cupping on the nape of the neck, will be necessary; and in every instance the bowels are to be freely evacuated. There are few cases of the disease, at whatever period it may occur, entirely unconnected with fæcal accumulations; and although this state of the bowels may not excite the attack, it certainly remarkably disposes to it. *Cathartics* should therefore be given by the mouth, and their action promoted by clysters. Dr. Blundell advises an ipecacuanha *emetic* to be taken in the first instance; and, where there is a loaded or disordered stomach, this practice may be adopted. In addition to these, the *warm bath* may be used; and if, notwithstanding, signs of active determination continue, the *cold affusion on the head*, or cold applications, should be also resorted to, either previously, at the same time with, or subsequently to, the warm bath. Dr. Home and Dr. Blundell favour the exhibition of *digitalis* in such circumstances.

98. *b.* If the premonitory symptoms be characterised by leipothymia or *sinking*, rapid weak pulse, particularly of the carotids; coolness of head, sunk features, &c., — the internal use of camphor, or musk, ammonia, assafœtida, the æthers, the warm bath, with small doses of opium, purgatives, sinapisms, blisters, and the turpentine fomentation applied on the abdomen, are the most approved means of prevention.

99. *c.* If the patient have had two or three attacks at some former period, and if the above preventive treatment have not rendered the accession of the disease less probable, Dr. Blundell advises the membranes to be punctured.

100. *C.* During *convalescence*, the states of the urinary bladder and of the bowels should be carefully watched, and evacuated; the diet regulated; and both body and mind kept tranquil. If cerebral symptoms continue for some time afterwards, the head should be preserved cool, and sponged with cold water night and morning, and a blister applied to the nape of the neck, and kept open for some time, whilst a course of eccoprotic and deobstruent purgatives is continued for several days.

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CORPULENCY. See Obesity.

COUGH. — Syn. Βήξ, Gr. *Tussis*, Lat. *Bex*, Good. *Pneusis Tussis*, Young. *Der Husten*, Germ. *Toux*, Fr. *Tossa*, Ital.

Classif. — 2. *Class*, Diseases of the Respiratory Function; 2. *Order*, Affecting the Lungs (*Good*). II. Class, III. Order (*Author*).

1. Defin. *Violent and sonorous expulsion of air from the lungs, preceded, rapidly followed by, or alternating with, quick inspiration.*

2. I. Pathology. — Dr. Cullen and several other nosologists have considered cough as chiefly a symptom, which undoubtedly it is most frequently; but I agree with Dr. Young and Dr. M. Good in believing that it is entitled to be viewed, on some occasions, as an idiopathic affection. Dr. Good, however, has ranked it as a genus, and comprised under it various affections, which are either merely slight forms of Bronchitis, or the results of organic changes in the Lungs, and which I have treated of in these articles, and in those on Bronchorrhœa, Catarrh, and Influenza. He has, moreover, subdivided it into more varieties than can easily be recognised in practice, and has viewed Hooping-cough as a species of the genus, instead of a distinct disease.

3. Causes. — Cough, in either of the forms about to be particularised, commonly attends disorders of the air-passages, and of parts in their vicinity, particularly of the larynx; also those of the lungs, and their membranous coverings; and sometimes diseases of other organs by which the respiratory functions are affected sympathetically — or rather, from continuity of tissue or nervous communication. It is thus occasioned by affections about the fauces, tonsils, pharynx, and neck; by the irritation of dentition; by diseases of the œsophagus, particularly when inflammation and ulceration of this part extends to, or penetrates, the membranous part of the trachea (Kappelhout, Mr. Byam, and myself); diseases of the spine and its contents (Wichmann); by cretaceous or calcareous formations in the ramifications of the bronchi (Morgagni, Bonet, Baillie, Portal, and myself in several cases, two of which occurred in gouty subjects); by all organic changes of the thoracic viscera; by the accidental passage of foreign substances, solid or fluid, into the air-passages; by the lodgment of the eggs or larvæ of insects in the same situation (Vogel and Percival, &c.); by the irritability of parts attendant upon the nervous temperament and debility; by the influence of irritation and imagination, — a cause which did not escape the observation of the acute Montaigne; irregular or misplaced gout; the irritability of the parts continuing some time after measles, or inflammations of the air-passages or lungs; disorders of the digestive organs, particularly the stomach and liver, &c. (Winther, Stein, Percival, &c.); by accumulations of bile in its receptacle; by the irritation of worms; by the repulsion of cutaneous eruptions, and the healing of old sores, and suppression of chronic or accustomed discharges. From this enumeration it is evident that cough is chiefly a symptom of numerous pathological states, which will be found very fully described under different heads, as indicated above. The *epidemic cough* noticed by some writers falls under the article Influenza. In the act of coughing, the

lungs are passive; and in the *idiopathic* states of the disorder they are not organically affected; the disorder being chiefly seated in the *trachea*, *larynx*, and vicinity. In very many cases, the irritation occasioning the cough exists chiefly in the posterior *fauces* and *pharynx*, and extends no further than the epiglottis and *rima glottidis*.

4. i. *A*. DRY COUGH occasionally occurs in an *idiopathic form*, — *a*. From exposure to cold in any form; the attendant symptoms not amounting to complete CATARRH; and it may, or may not, in a very short time terminate with slight mucous expectoration. When, however, it arises from this cause, it usually runs the course described in that article. *b*. It is occasionally produced by acrid or acid fumes and gases, or by various foreign substances inhaled, or accidentally passed, into the trachea, and from several of the other causes enumerated above (§ 3.). *c*. It also, in some cases, — first noticed by MONTAIGNE, and well described by WHYTT, — presents a strictly *nervous* character, particularly in nervous, hysterical, and irritable persons. *d*. In those especially, and also in feeble or delicate constitutions, a short, frequent, and dry cough is sometimes met with, without any disease of the lungs, air-passages, or other organs; and the only change that can be detected is slight redness at the margin of the soft palate, or in the posterior *fauces*; sometimes only in the *pharynx*; and occasionally near the *tonsils*; but this is not uniformly, although frequently, observed. Here it is obvious that the irritation of these parts extends to the glottis, or to the epiglottis only; and that it is either strictly local, or connected with slight derangement of the stomach and prima via. In the former case it is idiopathic, in the latter symptomatic, or at least a complicated ailment.

5. *B*. *Dry cough* is more frequently *symptomatic* — *a*. Of the first stage of diseases of the larynx, trachea, and lungs; of organic changes of the large blood-vessels of the chest; and sometimes of complaints of the more superior of the abdominal viscera. *b*. It is frequently occasioned by *elongation* of the *uvula*, and the irritation this part produces about the root of the tongue and epiglottis. But when the uvula is elongated, there usually is also more or less coexisting irritation about the posterior *fauces* and *pharynx*, extending to the glottis or epiglottis. And it should be, moreover, kept in view, that these ailments are principally dependent upon, even although they may not be always produced by, disorder of the stomach and digestive organs generally. *c*. In many instances, also, it will be found that the cough is owing to irritation of the *mucous surface* of the *stomach* and *œsophagus*, although it may not extend so far as to be apparent in the pharynx, or be so severe as to occasion redness of this part. *d*. Cough is often produced by *diseases of the liver*, and by collections of bile in the *gall-bladder* and hepatic ducts. In many of such cases, the cough is severe and spasmodic, often very obstinate and of long duration; the symptoms of hepatic disorder being sometimes so slight as to escape detection, unless the attention of the practitioner is awakened to the connection; the chief indications of its existence being the loaded or furred tongue, pains about the diaphragm, fulness at the epigastrium, and indigestion. *e*. Lastly, dry cough is often occasioned, in young and delicate patients, by the irritation of *worms* in the prima via. The more particular consideration of these associations will be found in the articles on the diseases of which the cough is merely a symptom.

6. ii. HUMID COUGH, — *a*. may follow upon the preceding; or it may occur primarily from the usual causes of catarrh. In such cases, it is merely a slight form of that affection, the matter expectorated being mucous or serous, and the cough unattended by manifest febrile or constitutional disturbance. This form of cough is very liable to recur, or become chronic, in delicate persons, during the winter (*winter-cough*); or from vicissitudes of season and weather; and, like the former variety, the irritation exciting it may be chiefly seated in the pharynx and vicinity, or in the larynx and trachea. In many cases the serous, or sero-mucous secretion, following the cough, entirely proceeds from the fauces and vicinity. *b*. In old persons, however, it is secreted chiefly by the bronchial surface, and is then, particularly in its more severe forms, the affection described under the name of *Bronchorrhœa*. *c*. Humid cough is generally less frequent, but more prolonged, and recurs in severe paroxysms. It is sometimes complicated with rheumatism and gout. It also presents the same pathological relations as described in connection with the dry variety; but it is not so often symptomatic of diseases of the abdominal viscera, as the foregoing. *d*. In the old and weak, humid cough is usually very severe, owing chiefly to the want of vital power of the respiratory organs, and of the system generally, to throw off the mucus secreted in the air-passages; and which is either very abundant, from the relaxation of the extreme vessels; or very tenacious, from absorption of its more fluid parts during its retention on the surface that secreted it, or from both conjoined. In such cases, the paroxysms of coughing are very severe and prolonged; and the affection is liable to be exasperated upon every change of season and weather. *e*. In other cases of humid cough, the exacerbations are also very severe, particularly in the morning; but the excretion is thin and frothy. This is observed most frequently in persons addicted to intoxicating beverages; and in those debilitated by sexual indulgences. When humid cough depends upon hepatic disease, it often assumes this form.

7. II. TREATMENT. — i. *A*. The *idiopathic states of dry cough* require demulcents, emollients, with diaphoretics and narcotics or anodynes (see F. 238. 244. 389. 426., and ℞ 98. and 99. at p. 297.). The conium, hyoscyamus, solanum, œnanthe, and phellandrium aquaticum (THEUSSINK and FRANK), may severally be employed, and the functions of the abdominal viscera improved by suitable means. But the pathological states, as well as their causes, on which this form of cough depends, should be investigated, and the treatment modified accordingly. *a*. If it follow the impression of *cold* in any form, the treatment described in the article CATARRH (§ 15.) will be appropriate. *b*. If it be produced by the inhalation of *irritating fumes*, or the molecules of either mineral, vegetable, or animal matters floating in the air, the removal of the cause, and the use of demulcents, emollients, and emetics, and subsequently narcotics, are most to be depended

upon. *c.* When it assumes a *nervous* character, particularly in hysterical and delicate females, the state of the uterine functions, and the existence of irritation in some part of the digestive tube, or in the sexual organs, or spinal chord, should be enquired after, and the treatment directed according to the information acquired. In many such cases, the exhibition of a gentle purgative, and afterwards small doses of camphor, ipecacuanha, ammonia, oxydes of zinc and bismuth, hyoscyamus, extract of hop or poppy, the sub-carbonate of soda, &c. variously combined, will be of service. If there be evident debility, and the cough assumes a periodic form, the preparations of bark or of iron, the sulphate of quinine, or gentle tonics, with anodynes and narcotics, will be required. The cold bath, which has been much recommended by WHYTT, will also prove beneficial. *d.* When it proceeds from irritation of the *fauces* or *pharynx*, demulcents, emollients, &c. with ipecacuanha, or with diaphoretics and anodynes, will be required. But the greatest advantage will be derived from the use of cooling and astringent gargles, and stomachic purgatives (F. 266.).

8. *B. The symptomatic occurrence* of cough must be treated as pointed out in the articles on the primary affections occasioning it.— *a.* If it be referred to the respiratory organs, the means appropriate to their diseases must not be departed from. *b.* When we observe elongation of the uvula, either with or without signs of irritation of the pharynx, disorder of the digestive functions may be inferred; and, after having had recourse to purgatives, cooling and astringent gargles, prussic acid, and mild stomachics will be useful. *c.* The dependence of cough upon diseases of the *biliary organs*, whilst it suggests a treatment chiefly directed to these diseases, will also indicate the propriety of ascertaining, with as much precision as possible, their nature. If indications of accumulated bile in the gall-bladder and hepatic ducts are detected, calomel or blue pill, with, or followed by, purgatives, and a course of alteratives, taraxacum, &c. will be requisite. In some cases, a gentle dose of either of these chologogues will produce copious discharges of morbid bile, and the immediate disappearance of a constant, severe, dry, and harsh cough, of which alone the patient has complained. In others, repeated and large doses will be required to accomplish this object. In all these, purgatives should be exhibited until the tongue becomes clean. If tenderness or pain exist in the region of the liver, with febrile symptoms towards evening, or restlessness through the night, blood-letting, general or local, ought to precede other measures; and the hepatic disease should be treated with reference to the form it presents, and as described in the article on *Diseases of the* LIVER. *d.* When the cough is attended by a tumid abdomen, and other signs of *worms*, the treatment recommended in such cases, according to their numerous modifications, must be employed.

9. In almost all the idiopathic and symptomatic forms of dry cough, more advantage will be obtained from demulcents, than from heating or stimulating expectorants, which should always be laid aside when there is evident vascular excitement of a sthenic or tonic kind. Those expectorants, however, which are of a mild nature, or which act chiefly by exciting slight nausea, will generally be of service, particularly when combined with emollients, diaphoretics, and narcotics; and there are few conditions, in which the preparations of antimony or ipecacuanha, with liquor ammoniæ acetatis, and the warm bath, will not be extremely beneficial. In this variety of cough, also, appropriate medicines, exhibited in such a manner as will favour a prolonged impression on the palate and pharynx — as in the form of *lozenge* or linctus — will thereby have their effects manifestly promoted; and advantage will also accrue from wearing warm, antispasmodic, or rubefacient plasters between the shoulders, both in this and the humid variety of the affection.

No. 160. ℞ Confect. Ros. Canin. et Confect. Ros. Gal. āā ℥j.; Olei Amygdal. Dulc. ʒvj.; Syrup. Papaveris Albi ℥ss.; Spirit. Æther. Nit. ʒij.; Acidi Sulphur. dil. ʒjss.; Pulv. Ipecacuanhæ gr. ij. M. Fiat Linctus, de quo sumatur pauxillum subindè.

No. 161. ℞ Emplast. Picis Comp. part. ij.; Emplast. Ammoniaci (vel Emp. Ammon. cum Hydrarg.) et Emplast. Opii āā part. i. M. Fiat Emplastrum perlargum inter scapulas impositurum.

10. ii. *Humid cough*, when it presents the characters of slight *cutarrh*, requires the treatment described in that article. *a.* If it frequently recur, or become *chronic*, or assume the form of winter cough, the more tonic demulcents, as the decoction of Iceland moss, or of the sea moss, with lemon and candy, — the mistura ferri compos. with a decoction of liquorice root, — attention to the digestive and excreting functions, — warm clothing, — and careful avoidance of exposures to the vicissitudes of season or weather, — are most to be depended upon. *b.* When the cough occurs in old persons, with increased secretion obviously from the bronchi, gentle tonics, and expectorants, as myrrh, galbanum, assafœtida, benzoin, the oxide or sulphate of zinc, the terebinthinates, camphor, ammonia, the balsams, and, indeed, the whole of the treatment described in the articles on Chronic BRONCHITIS (§ 91.) and BRONCHORRHŒA are most appropriate. *c.* When it is complicated with *gout* or *rheumatism*, purgatives, combined with tonics or stimulants, in order to carry off collections of morbid bile, and other vitiated secretions; and afterwards the medicines now enumerated, or the preparations of ammonia or camphor, combined with colchicum will generally afford marked relief. The dependence of this variety upon the diseases already noticed as occasioning the other form of cough, requires the several measures pointed out with reference to each of them (§ 8.). *d.* If the cough be very severe, in *old and exhausted persons*, and in those who have injured their constitutions by venereal indulgences, a tonic and stimulant treatment, and the remedies instanced in this paragraph in increased doses, will be requisite. It will be found in these, as well as in *broken-down drunkards*, that the cough will be aggravated by remedies which in any way depress the vital energies. In these last, the cough is frequently connected with hepatic disease, the treatment of which will depend upon its nature; but, although depletion may be occasionally required for the primary malady, the powers of life must be at the same time supported.

11. In this variety, generally, the mild expectorants, with demulcents; the jelly of sub-acid fruits; the inhalation of emollient, stimulating, or astringent vapours (see BRONCHITIS, § 76. 98.);

the use of acid beverages; warm, rubefacient, stimulant, and tonic plasters; the warm bath, made gently stimulating by salt and mustard; a light, demulcent, and nutritious *diet*, with strict attention to the functions of the stomach and bowels; change of climate, or of air, and a judicious choice of residence according to season, with gentle but regular exercise, and warm clothing; are severally of advantage, and some of them of the utmost importance. (See Bronchi, § 104.)

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COW-POX. See Vaccination.

CRAMP. See Convulsions (§ 4.), Spasm, and Tetanus.

CRANIUM. — Syn. Κρανίον (from κρανος, a helmet, as defending the brain from injury). *Die Hirnschale*, Ger. *Le Crâne*, Fr. *Cranio*, Ital. *The Skull.*

Classif. Pathology. — *Special Pathology — Morbid Anatomy.*

1. The cranium and its envelopes, the scalp and the pericranium, are often the seat of diseases which are of much moment, not only as respects these parts themselves, but also as regards the important organs and membranes which they contain.

2. I. Diseased Appearances of the Envelopes of the Cranium. — These are principally the same as are observed in analogous structures in other parts of the body. Nearly the same changes are remarked in the *scalp*, and subjacent cellular tissue, as in the integumental coverings of other parts; and in the *pericranium*, as in other parts of the periosteum. These structures, forming the envelopes of the cranium, will, therefore, require but little remark.

3. *A.* The *scalp* is subject to the same inflammatory states as other parts of the body; and these require the attention of the physician, from their occasional extension to the bones of the cranium and membranes of the brain. Inflammations of the scalp vary in character with the condition of the vital energies and digestive and biliary organs. Sometimes this structure is the seat of active *phlegmonous inflammation*, but more generally of the erysipelatous. When erysipelas attacks the scalp, a copious exudation of a serous or sero-albuminous fluid takes place in its subjacent cellular tissue. Occasionally this tissue is affected by inflammatory action of an unhealthy kind, but limited in extent, and closely resembling *carbuncle*, and of which I have met with some cases in children. The scalp is also particularly liable to certain specific inflammations of a chronic kind, especially to pityriasis, porrigo, sycosis, lepra, psoriasis, eczema, rupia, and syphilitic ulceration. Tumours, generally encysted, sometimes form beneath the scalp, most frequently between it and the tendinous expansions of the occipito-frontalis, and other muscles attached to the pericranium. These expansions, and the muscular structure attached to them, and perhaps occasionally the pericranium also, are often the seat of rheumatism and rheumatic inflammation. They are not infrequently, also, affected by common inflammation and its consequences, particularly after external injuries. Dropsy of the cellular tissue beneath the scalp, independently of inflammation, is very rare. It has, however, been observed in young subjects, and received the appellation of *hydrocephalus externus*, and *œdema capitis.*

4. *B.* The Pericranium is subject to the same changes as the periosteum in other parts of the body; amongst these are chronic and specific inflammations, giving rise to thickening of the membrane; to nodes, frequently terminating in suppuration and exfoliation of the subjacent part of the bone; and, in cases still more chronic and slight, to unnatural deposits of bone upon the external surface of the skull. (See Periosteum — *Inflammation of.*) Inflammations of an acute or sub-acute character sometimes, also, attack this structure, and, when not arrested in their progress, give rise to its separation from the bone; and not infrequently, owing to the extension of the morbid action through the tables of the cranial bones, to a corresponding separation of the dura mater from the diseased part of the skull. It seems probable that morbid action of any kind is seldom continued long in the pericranium, without the dura mater, which performs the office of an internal periosteum, suffering in a corresponding degree, and ultimately transmitting the disease to the subjacent membranes, and even to the brain itself. Specific inflammation also of this structure, of a most painful and dangerous kind, occasioning death of the portions of bone beneath the parts chiefly affected, is produced by syphilis and the inordinate and prolonged use of mercury.

5. II. Morbid Changes in the Cranium. — The bones of the cranium are subject to various diseased appearances, many of them having a close reference to the state of the system, and its morbid dispositions, and still more so to those slowly formed lesions which frequently affect the brain and its membranes. — *A. Enlargement, or rather distension*, of the bones of the cranium, is frequently an attendant upon chronic hydrocephalus, and the hypertrophy of the brain sometimes accompanying rickets. When the accumulation of fluid is great, and has taken place before ossification is far advanced, this process frequently commences at several more distinct points than in the healthy state, thus generating as many distinct bones. In the majority of these cases, although the surface of the cranial bones is greatly extended, there is a general deficiency of the ossific deposit, rendering the skull more than usually thin. The Museum of Guy's Hospital contains the cranium of an hydrocephalic man, who lived to the age of 29 years. Its circumference is 33½ inches. There is also in the

Museum of St. Thomas's, the skull of a child of two years, that measures 29 inches.

6. *B. Deficient deposit of bone*, as now remarked, is often connected with the foregoing lesion; in which case it is commonly general, the whole cranium being more or less thin as well as enlarged: but the thinness may also, although less frequently, accompany a natural-sized skull. The deficient deposit, or thinness of bone, may also be partial. In this case, partial or circumscribed accumulations of serum, or tumours, generally exist beneath the part of the cranium thus changed; and we have reason to believe that it is to the pressure exerted by these that the unusual thinness is to be imputed. It should, however, be kept in recollection that the cranial bones vary exceedingly in thickness, without having seemingly diverged from the healthy state.

7. *C. Imperfect ossification* is chiefly a lesion of early age, being merely a slow or impeded developement of the bones, arising from one or both of the following causes:—*a*. From deficient powers of the constitution, in which the process of ossification either generally or locally in respect of the cranium participates; *b*. From the distension arising from the accumulation of fluid. The imperfect ossification in such cases may continue to the age of three, four, or five years, and generally consists merely of a more than usual openness of the sutures, or a deficient deposit of bone at the parts most remote from the centres from which the ossific process proceeds. In some cases, however, the imperfection exists in about the middle of one of the bones; a patch of membrane, or a narrow stripe being surrounded by bone. When these patches or clefts in the bone are considerable, or remain for any time unfilled up, a portion of the membranes often protrude, forming large watery tumours, owing to the pressure of fluid effused between or underneath the membranes,—a circumstance which occasionally obtains. An interesting case of this description, successfully treated by ligature, has been recorded by Mr. E. Thompson. The majority of these cases are congenital, but the protrusion is often not noticed until long subsequent to birth. Sometimes a portion of the brain itself protrudes, forming a congenital hernia cerebri.

8. *D.* The bones of the cranium may be *insufficiently evolved*. In this case they are generally formed with more than sufficient rapidity, and their sutures are closed prematurely, so that they cannot give way before the growing brain, which thus becomes, with the case enclosing it, imperfectly evolved. The cranium may thus appear *unnaturally small*, as is sometimes observed in idiots and epileptics; but this state may arise not only from early closing of the sutures, but also from imperfect developement of the brain itself. *Microcephalia* was considered by Hippocrates as a cause of idiotcy; and facts, showing that great diminution of the size of the head is very generally connected with weakness or privation of intellect, have been adduced by Gredino, Gall, Spurzheim, Georget, and many others not believers in the doctrine of Gall.

9. *E.* The *shape* of the cranium is often somewhat changed by these and other causes. When the cranium is much *deformed*, it is more commonly a congenital vice arising either from the pressure in utero of a deformed pelvis, pelvic tumours, &c.; or from deficient developement, early disease of the embryo, and monstrosity; or from congenital change of the structures which it contains. But deformity of the cranium may also take place after birth, from deficient or irregular developement of the brain, or from the effusion of fluids in the cranial cavity. The early closing, also, of some sutures, and the protracted closing of others, whereby the yielding of the bones is prevented in one part, and facilitated in others, are often productive of deformity. Rickets, dropsy of the brain, softening of some of the bones, particularly of the base, whereby it is thrust up into the cavity (Otto), cretinism, &c., are all often productive of deformity. A species of deformity has several times come before me, and generally attended by epilepsy, and idiotcy, which I have seldom seen noticed. This consists of *obliquity* in the halves of the cranium; one half being much more depressed, both at the top and base of the skull, than the other. This deformity is sometimes thus simple, consisting only of comparative elevation and depression of the sides of the cranium. But I have observed it more commonly connected with an equal obliquity posteriorly and anteriorly; the elevated or depressed half, either receding or advancing much more than the other. In cases of this description, the cranium has also presented a certain angular form, so that I have been led to denominate the appearance, the *diamond-shaped obliquity* or deformity of the skull.

10. *F. Hypertrophy, thickening, or enlargement of the bones*, assumes two principal forms. 1st, That of a *superabundant deposit* of the ossific matter, giving rise to uncommon density, and to the disappearance of the diploe, and converting both tables of the skull into one dense bone, resembling, but much harder than, ivory. This appearance of the cranial bones is almost natural to the negro. It is observed, also, in persons advanced in life, who have been subjected to laborious employments, physical and mental; and it is often seen in epileptics, in maniacal epileptics, and in some who have been long insane. It may or may not be accompanied with increased *thickness* of the bone. Gredino found the skull too thick in 151 out of 196 insane persons; and Georget observed it one twentieth and upwards too thick in 480 out of 500, belonging to the same class of patients. The second form of enlargement is rather the result of a loose or spongy formation of the bones, in which, although most remarkable in the diploe, both tables of the bone often participate more or less. In this form, the actual quantity of bony matter is not much augmented. Increased thickness of the bone generally obtains here, and sometimes reaches an enormous extent, and closely resembles in appearance a piece of pumice stone.

11. *G. Irregular deposits of ossific matter* are very frequently observed on both the internal and external surfaces of the cranial bones, particularly the former. They are often found adjoining the sutures, sometimes with a mammilated appearance on the external surface. On the internal surface, they frequently assume an irregular botryoidal form; sometimes they present large masses, particularly on the frontal bone, and encroach considerably upon the cavity. Not

infrequently these deposits are prolonged into the form of irregular processes: occasionally the prolongation is in the seat of particular parts or processes, as in the clinoid process. These exostoses are sometimes very prominent and acute. In some instances they encroach upon the foramina through which the nerves and vessels pass. In these cases, symptoms of pressure or of irritation are present, and vary according to the seat, form, and extent of the ossific deposit. Epilepsy, insanity, irregular convulsions, spasmodic contractions, and neuralgia, are amongst the most prominent effects of these productions.

12. *H. Vascular engorgement* is sometimes observed in the cancellated structure forming the diploe, in cases where great congestion, or very active inflammation, has existed in the head, membranes, or pericranium; the vessels passing from or into the bone being congested, and the diploe of a deep or purplish red colour.

13. *I. A softened state of the diploe* is not infrequently observed in cases where active inflammation has affected the pericranium, or dura mater, and extended to the bone. In these cases the tables of the bone are more friable than natural. A similar appearance is also observed when the system has been much contaminated by carcinomatous disease.

14. *K. Ulceration* of the cranial bones is also not uncommon; and is generally attended with more or less absorption, exfoliation, and the deposit of irregular bony spiculæ. Ulceration and absorption result very frequently from lupus, and the formation of bony spiculæ generally attends upon osteosarcoma.

15. *L. Caries, or death, of the bone* is not infrequently observed to follow upon inflammation extending from the pericranium, or dura mater, to the bony structure. It is a very common consequence of inflammation of the ear long neglected, or imperfectly treated. It may be limited to either of the plates, or it may extend to the whole thickness of the bone. In either case, the dead part is detached from the living by the absorption which takes place around it, and in the surrounding inflamed and ulcerated parts. Owing to this process, a distinct line of separation is frequently formed, and the dead portion is completely exfoliated. While the dead bone is being removed in this manner, or after its removal, if the dura mater, which acts as the periosteum of the internal table, is not destroyed, new bone is deposited, and thus the mischief is often repaired. — I have met with two such cases in children.

16. *M. Fungus cranii*, or *medullary sarcoma* of the bones of the skull, is occasionally observed. It has been described as occurring on the top of the cranium by Crell, Sandifort, Wishart, Abercrombie, Landmann, and Otto. A distinct tumour is often produced by it on the internal as well as the external surface of the skull, — the part forming a spongy growth. It is more rarely met with about the base of the cranium. It may originate in the bones, or their internal or external periosteum; but, in whichever of these it may commence, it soon involves them all. When originating in the bones, it usually assumes the characters of *osteosarcoma*, and those of *fungus* when it commences in the pericranium or the dura mater.

17. *N. Perforations* of the cranial bones are also observed, generally as a consequence of the pressure of internal tumours, of an encysted, scrofulous, or fungoid description, attached to the membranes underneath, or of aneurisms, &c. Cases of this description are recorded by Palletta, Le Clerc, Richter, Pelletan, and Otto. After artificial perforations of the skull, as after trephining, and fractures with loss of bone, osseous matter is sometimes regenerated, radiating from the surrounding divided surface of bone. The exuberant formation of ossific matter after fractures of the cranium is sometimes productive of serious effects. (See § 11.)

18. *O. Depressions and fractures* require little notice further than that they are the most frequent causes of inflammation, and its consequences in the surrounding membranes, and contained organs, and of irregular bony depositions. Depression of the superior and lateral bones of the skull may take place in early age to a very great extent, and remain through life, without affecting the mental manifestations. Several instances of this have come before me, in some of which the depression was fully larger and deeper than the bowl of a large table-spoon. One of my earliest and most talented friends has a depression to this extent in one of the parietal bones, from an accident in childhood.

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CRETINISM. — Syn. *Cagots*, *Struma Tyrolensium*, Gautier. *Crétin*, *Crétinisme*, Fr.

Classif. — 6. *Class*, 1. *Order* (*Good*).
I. Class, IV. Order (*Author*).

1. Defin. — *Imperfect formation or developement of the cranium, and the whole of the body, with mental imbecility, and physical imperfection, varying chiefly in degree.*

2. This state of imperfect physical and mental developement, rather than of diseased action, was first noticed by Plater among the poor of Carinthia and the Valais, where, and in the valleys of the lower Alps and Switzerland, it is endemic. But it is not peculiar to these places; for it has been observed in the valleys of the Pyrenees by Raymond, in some parts of Salzbourg by Knolz, and in various other localities in the central and southern countries of Europe, as well as in Chinese Tartary, according to Sir G. Staunton.

M. De Saussure, Ackermann, Fodéré, Iphof, Erhard, the Wenzels, and Knolz, have given us the best descriptions of this state of mental and bodily deformity, in respect both of its nature and causes. The brief account of it by Dr. Good is both imperfect and erroneous, and must have been written in perfect ignorance of the descriptions of the above eminent observers, as well as of others deserving of perusal. He very inaccurately associates it with bronchocele on the one hand, and with rachitis on the other; with the former of which it is not necessarily, although very frequently, connected, and from the latter it is totally distinct.

3. I. Description.— Cretinism presents various modifications in kind, and every intermediate grade between that extreme degree of physical and mental debasement which is characterised by the utmost deformity and entire absence of mental manifestation, the organic or vegetative functions only being performed, and that condition which may be considered as very nearly approaching the healthy constitution of man. There are certain circumstances which distinguish cretins from other idiots, viz. *a*. They present certain bodily deformities, which are seldom or never observed in other idiots; and, *b*. Their physical and mental infirmities are always the result of endemic causes.

4. In general, some degree of goître is attendant on cretinism, but not invariably. Professor Knolz states that it is sometimes absent, and occasionally slight, the thyroid gland being enlarged in no greater proportion than several other glands are in the same subject. The stature is seldom above four feet and a half, often much less; the cranium is deformed and has a conical shape — the forehead being thrown backwards, narrowed, and flattened, and the occiput being nearly on a line with the neck; the flesh is soft and flaccid; the skin wrinkled, yellowish, or pale and cadaverous, dirty, and covered by chronic eruptions; the tongue is thick, and hanging out of the mouth, which is open, large, and slavering; the lower jaw is elongated and prominent; the eyelids are thick, the eyes red, small, but prominent, watery, and frequently squinting; the nose is flat; and the whole countenance is idiotic or expressive only of lasciviousness. The belly is large and pendulous; the neck either short and thick, or long and thin; the limbs crooked, short, distorted, &c.; and the gait imperfect and waddling. The senses are more or less defective, or altogether abolished; the cretin being often deaf and dumb, and those who possess the faculty of speech expressing themselves imperfectly and with difficulty. The intellectual functions are either entirely absent or imperfectly developed, whilst the organic or vegetative functions are in a state of increased activity; cretins being voracious, lascivious, and addicted to masturbation. They appear to have no other enjoyment than eating and sleeping; and their insensibility is often so great, that they obey not the calls of nature. In some instances, the bodily deformity is not so remarkable as that now described; imbecility, flaccidity of the soft solids, with bronchocele, constituting the extent of infirmity.[*]

5. The cretin, like most idiots, seldom attains an advanced age; indeed, few of them reach upwards of thirty years. Clayton remarks, that although they die early, they soon present the appearance of age. They are usually of the lymphatic temperament, with light hair and grey eyes; the female cretin having enormously large and pendulous breasts. The less debased among them marry, rarely with one another, but do not propagate cretinism, the predisposition only to it being derived by the offspring from the parents. Malacarne (*Mém. de l'Acad. de Turin*) attributes the mental debasement to the contraction of the bones of the cranium, which prevents the cerebral organs from acquiring their natural dimensions and functions; and Ackermann espouses a nearly similar opinion. The conformation of the body is generally stated not to be congenital, although, at birth, the cretin may appear weak, puny, or sickly. It usually comes on gradually from birth; and M. De Saussure states, that children who, living in the localities where it is endemic, and are not affected at eight or ten years, generally escape it; and that infants who are brought into these districts at a very early age, are equally subject to it with those who are born in them.

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[*] The following account of the "*Fexes*," or cretins of Salzbourg, is abridged from that given by Professor Knolz: — The whole body is stunted, its height not exceeding four feet. There is a total want of due proportion between its different parts: the height of the head, with reference to the rest of the body, being 1-4th or 1-5th, instead of 1-8th, the natural proportion. The neck is strong, and bent downwards. The mammæ are very voluminous and pendent; the upper limbs reach below the knees; the arm is shorter than the fore-arm; the chest narrow; the abdomen hemispherical, and of a length not exceeding the height of the head; the penis and scrotum come down to the knees; the thighs are, with the haunches, of a greater width than the shoulders, and are shorter than the legs, the calves being almost wanting; the foot is small, and the toes partly distorted; the lower extremities are shorter than the upper half of the body. In the head, the masticating organs, the lower jaw, and the nose, preponderate considerably over the organs of sense and intelligence. The skull is depressed, and forms a lengthened and angular ellipsis; the receding forehead presents, internally, large frontal sinuses, to which the brain has yielded a part of its place; the top of the head is not vaulted, but flattened; the occiput projects but slightly, and runs almost even with the nape of the neck, as in ruminating animals. The face is neither oval nor round, but spread out in width; the parts of which it is composed being wide and short, and the maxillary bones projecting greatly. The forehead is narrow, flattened, and low; the eyes are unusually far apart, diverge slightly, and are small, and seated deep in the orbit; the pupil is contracted, and not very sensitive to light; their external angles are situated higher than the internal; the eyelids, unless when dropsically swollen, are flaccid and pendent; the look is a fixed stare without expression, and turns with indifference from all that is not eatable. The root of the nose is widened and depressed, the bones of the nose square; the zygomatic bones are wide, and extremely projecting: the external ear is large, stands out from the head, and hearing is very defective. The elongated form of the lower jaw of the cretins, and their thick and padded lips, make them resemble ruminating creatures more nearly than man. The tongue is thick, and rather cylindrical than flat; the saliva is continually running from the angles of the mouth. Enlargement of the thyroid gland is recognised as one of the signs of cretinism; but its size is no sure guide to the extent of the existing infirmity. The throat presents, also, other obstructed glands. The thorax is generally narrow and flat; the abdomen is usually distended with gases, and largely developed towards the chest; the flesh of the extremities is flabby; the knee of an irregular shape, and usually bent; the fingers are very long and lank, and the nails very small. The upper part of the vertebral column being directed more or less forward, and the lower part, with the basin, being pushed backward, the sacrum assumes a more horizontal, and the other pelvic bones a more vertical position, than in the healthy formation. Besides the masticating and digestive organs, those of generation are also strongly developed, especially in the male. (*Medecin. Jarbucker des k. k. Æsterr. Staates*, b. 1. st. 1. 1829, p. 86.)

6. II. Causes.—The principal, if not the only, cause of cretinism is dwelling, during infancy and childhood, in deep, narrow, moist, and malarious valleys, situated at a lower level than 3000 feet above the ocean, where the air is stagnant, and the solar beams intercepted by the mountains. MM. Ferrus, Georget, and the authors already referred to, state, that cretins become numerous in proportion as the valleys sink below this elevation. In addition to those causes, may be added the poverty, ill-feeding, drunkenness, indolence, dirtiness, sensuality, and low debauchery of the parents,—circumstances tending to the production of an infirm and deformed offspring; the inactivity and filth into which children who begin to evince signs of cretinism are allowed to sink, and the influence of water holding calcareous and other mineral substances in solution. MM. De Saussure and Fodéré, however, deny that the water is concerned in the production of this infirmity; but MM. Bally and Rambuteau show that much is owing to it in the causation of cretinism, as well as Bronchocele (see that article). The last named authority states that the offspring of the natives of Valais, who intermarry with persons from the Italian side of the Alps, are more subject to cretinism than those born of native parents; that females who have husbands from the higher Alps seldom have children affected by this infirmity; that wherever cretins are seen, goître is also prevalent; but that the latter is found in places where the former does not exist; and, consequently, that the same causes that occasion goître, when present in an intense degree, also produce cretinism.

7. III. The Treatment of this infirmity is necessarily preventive rather than curative, and consists of the amelioration of the physical and moral condition of the parents; of the removal of infants, as soon as signs of the malady manifest themselves, to more elevated and open localities, and to mountainous districts, to enjoy a purer air and stronger light; of obliging them to exert themselves in some useful and suitable employment, and to pay attention to personal cleanliness; of frequent ablutions, followed by active and stimulating frictions of the whole surface of the body; of the use of stimulating tonics (Erhard); and of allowing them a stimulating and strengthening diet, with a large proportion of animal food. Josias Simler, who wrote in 1574, states that the malformation, constituting the physical infirmity, is sometimes congenital; and probably it is so occasionally. In such cases, it is not likely that much advantage will accrue from any means. M. Rambuteau, however, states that it is scarcely ever congenital; but it is not unlikely that experienced observers may predicate, from the appearance of the newly born infant, whether or not it is likely to become the subject of this dreadful infirmity—may observe that state of developement and formation, which, if not actually the incipient malady, is predisponent to its occurrence.

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CRISIS.—Syn. Κρίσις, a judgment or decision (from κρίνω, I judge or determine). *Judicium*, *Judicatio*, Lat. *Entscheidung der Krankheit*, Ger. *Crise*, Fr. *Crisi*, Ital.

Classif.—Prognosis.

1. Crisis may be defined *a sudden change during the height of a disease, tending either to recovery or to death*. Critical changes have been much regarded in the prognosis and treatment of diseases, from the time of Hippocrates, who first mentioned them, and the days on which they occur, down to the present period. Asclepiades, and the methodists, however, denied their influence, and disputed the existence of critical days. Galen and his followers attached great importance to them. It is recorded, that, having been called to a patient—a young man—with two disciples of Themison, Galen prognosticated a favourable change by a critical hæmorrhage. The opinion was ridiculed by the two methodists, who advised blood-letting; but it was soon verified, for the patient had a copious epistaxis, after which he recovered. It is unnecessary to allude to the writers who have contended for the importance of this subject: they comprise most of the eminent names in medicine, from Hippocrates to Cullen, Pinel, Frank, Hildenbrand, and Kreyssig. The titles of many hundred volumes that have been written upon it might be adduced in proof of the consideration attached to it: and although much more has been imputed to critical evacuations, and days, particularly by the humoral pathologists, than legitimately belongs to them, and granting that too devoted an attention to them has induced many to adopt injudicious indications, and weak measures of cure, yet some reputation will be acquired from the prognosis which an acquaintance with them will enable the physician to give; and much benefit will result to the patient from the treatment which this knowledge will suggest.

2. Since the overturn of the humoral pathology, the doctrine of critical evacuations has undeservedly fallen into disrepute, although the eminent writers who contributed most to the overthrow are amongst its most rational and warm espousers. In our own country, at the present time, too little attention is paid to these evacuations, and still less to the periods at which they occur. There can be no doubt that the former is the most important; but the latter part of the subject should not be disregarded. After all that has been urged in favour of, or in opposition to, the doctrine, I may conclude that, in temperate climates, a number of diseases, particularly fevers, run on for certain periods with regularity, and, after an exasperation of the symptoms, or some violent perturbation of the economy, terminate by evacuations of different kinds, which tend to remove the train of morbid actions, and to restore the healthy functions. In other cases, the exasperation of disorder is followed by imperfect evacuations, occurring in an irregular manner; whilst in some it gives rise to

additional phenomena of a dangerous or fatal character: hence crises have been denominated *salutary* and complete, *imperfect* and *fatal*. It was considered by the older writers requisite to a salutary crisis, that the evacuations constituting it should be attended by favourable symptoms, and be copious and manifest; and not only appropriate to the disease, but also consistent with the state of the patient. An imperfect crisis was considered *better* or *worse:* the better state alleviating the malady; the worse rendering it more severe and dangerous, from the supervention of metastases and complications. Having described the phenomena which are critical, I shall next notice the periods of disease at which they are most frequently observed.

3. I. CRISES manifest themselves,—1st. ON THE SKIN: *A.* by sweats; *B.* by acute or chronic eruptions. 2d. IN THE CELLULAR TISSUE: *A.* by swellings in various parts; *B.* by boils and carbuncles; *C.* by gangrene; and *D.* by purulent collections. 3d. IN THE GLANDS: *B.* by buboes; *B.* by swelling of the parotids; *C.* by salivation; *D.* by a flux of urine. 4th. ON THE MUCOUS SURFACES: *A.* by increased excretion — *a.* from the nose; *b.* from the bronchi, &c.; *c.* from the stomach (vomiting); *d.* from the bowels (diarrhœa); *B.* by sanguineous exhalation — *a.* by flux — *α.* the hæmorrhoidal; *β.* the menstrual; *b.* by hæmorrhagy; *α.* from the nose (epistaxis); *β.* from the bronchi (hæmoptysis); *γ.* from the stomach (hæmatemesis); *δ.* from the intestines; *ε.* from the uterus (menorrhagia); *ζ.* from the urinary organs (hæmaturia).

4. 1st. *A. Sweats* are salutary crises in continued and bilious fevers, in inflammations of the lungs and liver, in bronchitis, and less frequently in rheumatism. FRACASTORI describes an epidemic putrid fever which generally terminated favourably in this manner. Acute dropsy, particularly anasarca, when caused by interrupted perspiration, sometimes disappears after copious sweats. This evacuation is usually preceded and *indicated* by a soft, full, open pulse; by a diminution of the alvine evacuations; by softness, and occasionally slight itching, of the skin; and by increased colour of the cheeks. A salutary sweat should be distinguished from such as are limited to the forehead or face, and the neck or breast, whilst the rest of the body is dry; or those which cover only the lower extremeties: these constitute merely partial or incomplete crises, and merely diminish the violence of disease.

5. *B. Eruptions.*— Miliary and vesicular eruptions only are critical: the others are merely symptomatic, or even form a part of the disease; as erysipelas, purpura, petechiæ, &c. A miliary eruption is favourable, if the symptoms subside, if the patient feels an itching or pricking, if they be general, and do not appear before the seventh day: if they be unattended by fulness of the surface; and if their subsidence be followed by vomitings, hiccup, or convulsions, they indicate a fatal termination (LANDRÉ-BEAUVAIS). Sometimes a miliary eruption comes out at different periods, and prolongs the disease, when partial relief follows it, each appearance being an incomplete crisis. Many chronic eruptions may not only be complications of visceral disease, but occasionally imperfect crises,—they alleviating the internal malady. They are more rarely completely salutary.

6. 2d. *A. Swellings of various parts*, as of the face or neck, the hands, the lower extremities, &c., have been considered as partial crises in ataxic and gastric fevers, and in exanthematous diseases. *B. Boils* are critical in some complaints, particularly towards the termination of acute diseases, especially small-pox. *C. Gangrenous* pustules or *anthrax* occur in malignant or pestilential fevers; *gangrenous escars* also are met with in similar cases, as well as in typhoid or adynamic fevers, particularly about the sacrum, and in places which have been blistered, or pressed upon. If, in such cases, the febrile symptoms subside upon the sphacelation, and if the grangenous change be rapidly and distinctly circumscribed, it may be favourably critical; but if the symptoms continue, and the pulse becomes more frequent, weak, small, and soft, the local mischief is entirely symptomatic, and indicative of an unfavourable termination. *D. Purulent collections* are *indicated* by the continuance of the disease without any considerable evacuation, or exhaustion; by a sense of chill, horripilation or rigor, occurring at intervals, without any manifest cause; by the discharge of much clear urine; by partial sweats; by a softness of the pulse; by a remittent or hectic fever, and by flabbiness of the soft solids. The favourable changes of this nature occur in the extremities, and suppurate easily and rapidly. Those that are unfavourable take place in some internal viscus.

7. 3d. *A. Buboes* chiefly belong to pestilential fevers; but they are occasionally observed in the adynamic fevers of temperate climates. They indicate a favourable or fatal crisis in the manner stated with respect to gangrenous escars. *B. Swellings of the parotids* occur in low or malignant fevers; and appear either alone, or with other critical changes. They are commonly *preceded* by a slight rigor; by severe headach, stupor, noises in the ears, and deafness, with paleness, swelling, and sometimes redness of the countenance. This occurrence is rarely critical, and, of itself, furnishes no sure indication of the issue: if accompanied with favourable changes, it becomes an additional sign of returning health; but if the swelling is slow, or disappears in a very short time, the other symptoms still continuing, it is a dangerous circumstance. *C. Salivation* was noticed by SYDENHAM as a principal critical evacuation in the fevers of 1667 and 1668; and it occurred in the epidemic that prevailed at Breslaw in 1700. It occasionally supervenes in some forms of cynanche, and in bilious and gastric fevers. *D. The urine* is sometimes discharged copiously at the height of febrile and inflammatory diseases; and is to be viewed as a favourable occurrence. It is usually clear when recently evacuated, but deposits soon afterwards a whitish or rose-coloured sediment. The *symptoms* indicating this discharge are very obscure. Some authors have noticed the "*pulsus myurus*," which consists of every three or four successive pulsations being progressively diminished. A sense of weight below the hypochondria; of gravative tension in the hypogastrium, and of heat in the urinary organs, is stated by M. LANDRÉ-BEAUVAIS to precede this evacuation.

8. 4th. *A. a. Coryza*, or sero-mucous excretion from the nose, is sometimes critical in continued fevers; but little importance is to be attached to

it. *b. Mucous excretion* from the *bronchi* is frequently a partial crisis in several fevers, and in inflammations of the thoracic viscera (see Bronchi and Lungs). *c. Vomitings* are rarely indications of a perfect crisis; they occasionally, however, favour the developement of those changes which precede a favourable termination of disease. They are sometimes *ushered in* by a bitter taste in the mouth, yellowish fur on the tongue, suborbitar pain, and headach, nausea, salivation, coldness of the extremities; and frequency, and occasionally intermissions, of the pulse. *d. Diarrhœa* and copious alvine evacuations are favourable crises in nearly all acute, and even in some chronic diseases. But it is necessary that they should be fæculent or bilious, and homogeneous — not watery or flocculent: if they approach to a natural, or have a yellowish brown, colour, and are followed by abatement of fever, &c., a favourable crisis may be confidently looked for. The chronic diseases, in which they indicate a change tending to health, are congestions and inflammations of the liver and spleen, hypochondriasis and melancholy, slight or incipient dropsies, rheumatism, and gout. They are usually *preceded by* borborygmi, with slight flatulent distension of the abdomen; flatulence and eructation; a sense of tension and uneasiness in the lumbar region; flying pains in the extremities; and a developed but unequal pulse, occasionally with irregular intermissions.

9. *B. Sanguineous exhalations* are often critical in the more inflammatory states of fever, and in the phlegmasiæ. According to Hoffmann and Landré-Beauvais, discharges of blood from the nose, the hæmorrhoidal vessels, or the uterus, are equally salutary in ardent fevers. In general, these hæmorrhages are *preceded by* depression of the morbid temperature, and erethism of the skin; by slight horripilations of the limbs; by a more open and rebounding pulse; and a sense of heat, pruritus, and tickling, in the part whence the evacuation is about to proceed. *a.* The *menstrual flux* is sometimes a rapid crisis in fevers and phlegmasiæ. It is *indicated* by dull heavy pains in the loins, groins, and tops of the thighs; by tension in the hypogastrium; heat and pruritus of the genitals; pallor of the face, and a dark circle round the eyes; swelling of the breasts; pale, scanty urine; horripilation, and erethism of the skin; and by a quick, sharp, and unequal pulse. Very frequently the menses appear at the regular period, or a little earlier, or later, in fevers and inflammations, without affording any, or but imperfect relief. In these cases, they should not paralyse the activity of the treatment. When they occur at or before the usual time, are abundant, and are attended by evident benefit, they should be considered as critical: but if they are delayed, or are difficult or scanty, they are imperfect crises, and should not interfere with the measures which the circumstances of the case may require. *b.* The *hæmorrhoidal flux* is often critical in inflammatory fever, pneumonia, hepatitis, and other phlegmasiæ. Stahl states that a return of this discharge is sometimes favourable in inflammations of the brain, and particularly in hepatitis, nephritis, melancholia, hypochondriasis, and mania. The observation is certainly correct. This evacuation is *indicated* by pains in the loins and the groins; by a sense of uneasiness and pressure towards the anus and perineum; by frequent desire to pass the urine and go to stool; by flatulence and borborygmi, slight pallor of the face, and fulness of the hypochondria; and by fulness and inequality of the pulse as to strength. *c. Critical epistaxis* was considered of great importance by the older physicians, who paid much attention to the symptoms indicating its *accession:* these are, redness, with slight tumefaction of the face and eyes; reddish or brilliant objects floating before the eyes; the involuntary shedding of tears; weight of the temples, and beating of their arteries; deafness, or noises in the ears; slight delirium, or vertigo; a sense of tension in the neck, with distension of its veins; a dull pain in the forehead, and at the root of the nose, or an itching and tickling in the nostrils; a quick, hard, full, and an unequal pulse; frequent and slightly laborious respiration; sometimes with tension or oppression, without pain, at the præcordia. Occasionally, pallor, and constriction of the whole surface, coldness of the lower extremities, and horripilations, also *precede* a critical epistaxis. This crisis is most common in young persons, and adults whose vital energies have been previously unimpaired, and who have been subject to this evacuation. It occurs most frequently in summer and autumn; in the more inflammatory states of fever: in the acute phlegmasiæ affecting the super-diaphragmatic organs; and rarely in hepatitis. If the discharge consists of a few drops only, it is an alarming symptom; and although it be copious, if not soon followed by amendment, it is unfavourable. When excessive, and attended by syncope, convulsions, loss of power, partial or cold sweats, and cold extremities, it is a fatal sign. A syncope, however, which terminates the epistaxis, is often followed by recovery (Landré-Beauvais).

10. *d. Hæmoptysis, hæmatemesis, hæmaturia, and intestinal hæmorrhagy,* are always false or unfavourable crises. They are generally *preceded* by tension and tenderness of the hypochondria; and supervene most frequently in adynamic, malignant, and pestilential fevers; in confluent small-pox, scarlatina maligna, and in scurvy: they occur less frequently in females than in males.

11. *A.* The above are the phenomena which have usually been considered critical by the older, and which are admitted by the best modern, medical writers; as well as the symptoms which indicate their accession. There are, however, still some circumstances connected with them deserving of notice. *a.* The *hæmorrhagic* evacuations occur most frequently in the spring, or in dry summers, in persons from 15 to 35 years of age, of a sanguine or irritable temperament, and in acute complaints. *b.* The *cutaneous evacuation* is most common in summer and autumn, in robust and fat persons upwards of 30 years of age, and in continued, remittent, and intermittent fevers. *c.* A *critical diarrhœa* is most frequent in autumn, in persons of a bilious temperament, and in remittent and intermittent fevers. *d. Discharges* of *urine* are observed in all ages, in all seasons, particularly winter and spring, and in all acute diseases.

12. *B.* Critical evacuations are — *a. rare,* in persons enfeebled by age, or by some other antecedent disease; in very moist and very cold, or very hot climates; during remarkably sudden and great vicissitudes of weather; and especially

when the vital energies are much reduced by a lowering and an evacuating treatment. *b.* They are not always similar in the same diseases; and they *vary* in respect of the nature of the discharges, and of the periods at which they take place, as well as of the organs by which they are produced. A favourable change in gastric, bilious, and adynamic fevers, is often attended by alvine discharges of a homogeneous, fluid, yellowish, yellowish brown, or brownish black appearance,— in inflammatory fevers, in young men, by epistaxis, often occurring on the seventh day, — in these diseases, in young women, by a copious flow of the catamenia taking place on the same day, — and in men of middle age, by sweats, or by some other discharges coming on the fourteenth, or at a subsequent period. Catarrhal and bronchial complaints terminate with expectoration, or with sweats, or a copious flow of urine, &c.

13. *C.* The *duration* of critical evacuations is very uncertain. The hæmorrhagic, the alvine, and the urinary, seldom continue longer than twelve or twenty-four hours, sometimes even much less. Sweats and expectoration are occasionally of no longer duration; but, in the majority of instances, these two evacuations are prolonged several days before the disease is entirely subdued. Purulent collections and gangrene may take place in a few hours, but they generally require a much longer period.

14. *D.* Critical discharges cannot be *changed* or *determined* in their route or period of eruption, by art; and when they supervene, they cannot be safely interfered with, unless they threaten life by their excess. If they be interupted by accident, or by an injudicious and meddling practice, they are followed by unfavourable metastases and complications, or sequelæ, sometimes terminating in organic change, and death. Thus, when the perspirations which occur upon the change in fevers, and some of the exanthemata, are interrupted, effusion often takes place from serous surfaces, or into the cellular tissue. The most active vascular depletions can never compensate for the suppression of an abundant menstrual or hæmorrhoidal flux, occurring at the acmé of acute diseases; — the effects of art are here unequal to those produced by nature. Hence the advantage of recognising critical evacuations, even although we may not otherwise confide in them. Although it is thus important to attend to them in our prognosis, and especially in the treatment, when signs of their accession appear, or when they are actually present, yet the expectation of their occurrence ought never to interfere with or prevent the adoption of judicious intentions and means of cure. Even granting, with **Hahnemann**, that they are not to be imitated by art, still they furnish several useful indications. "*Quo natura vergit, eo ducendum est*," may occasionally be adopted, after a careful consideration of the changes of which they are the effects, but not the causes. Much mischief has accrued from considering critical evacuations as the causes, and not as the consequences, of changes that take place in the economy at the acmé of acute diseases. **Reil** has touched upon this fallacy, but has not considered the nature of the changes of which critical evacuations are the effects, or attempted to explain the manner of their accession.

15. II. **Causes,** &c.—*A.* We have seen that crises take place chiefly from eliminating or excreting surfaces and organs; and that they consist of a copious irruption of either previously suppressed secretions and excretions, or an accustomed sanguineous evacuation; but the causes which occasion, and the changes which precede them, are not so readily recognised. When we consider of what they consist, especially in relation to the fact of their occurrence only in maladies characterised in their earlier stages by interrupted secretion and excretion, and by morbid excitement of the vascular system — the vascular excitement being perpetuated and variously modified by suspension of the visceral functions now mentioned, or by local irritation, or by both — we shall arrive at a tolerably accurate inference respecting the causes of crises, and the importance that ought to be attached to them. There are few facts in pathology better established than that vascular excitement, when it reaches a certain height, or assumes an inflammatory form, impedes, interrupts, or even arrests, the natural functions of secreting or glandular organs; whilst a lower grade of excitement, unattended by inflammation, generally increases the functions of the organ thus affected. Therefore, when excitement continues to be expressed chiefly in the vascular system generally, secretion and excretion continue impeded or entirely suspended; and the effete materials, which, under other circumstances, are continually being removed from the circulation, accumulate in it, perpetuating and modifying the vascular excitement until it becomes exhausted, and until the accumulated noxious materials in the blood irritate the viscera destined to remove them, and thus incline the balance of excitement from the general vascular system to eliminating organs. Hence the occurrence of critical evacuations at the acmé of acute diseases; and hence their importance as indications of change in the states, — 1st, of vital power; 2d, of vascular action; 3d, of the circulating fluid; and, 4th, of the functions of secreting and excreting viscera. As crises have been neglected or confided in according as they agreed with the doctrines of the day, and have, in modern times, shared the fate of the pathology on which they had been so long grafted, I shall attempt to illustrate this view by a reference to one of the very common circumstances in which they are observed. A person exposed to the causes of autumnal fever of a bilious and remittent form, experiences during the earlier stages the usual symptoms of impeded or interrupted secretion and general vascular excitement, with evening exacerbations. In consequence of interrupted action of the emunctories, the blood contains an increasing proportion of effete materials, particularly of the elements out of which bile is formed. These for a while increase and modify the vascular excitement, or, when excessive in quantity, or especially noxious in quality, even tend to exhaust or depress it; but they, at the same time, being appropriate stimuli to the biliary and depuratory viscera, serve to restore their impeded functions, to turn the balance of excitement in favour of them,—thereby to reduce the morbid vascular action, to cleanse the circulating fluid from its impurities, and to change in other respects its condition; and thus the disease terminates with an apparent collapse,

followed by a copious discharge from the bowels, consisting of morbid bile, and of the excretions from the intestinal mucous surface — the products of the noxious matters which had accumulated in the blood, but which is now being eliminated from it by a renovated, as well as an increased, secreting and excreting function. Now, this procession of morbid phenomena is consistent with what I have repeatedly observed in both temperate and warm climates; and shows that the ancients were not so far wrong as many of the moderns suppose, when they believed that critical evacuations were beneficial chiefly because they conveyed a morbid matter out of the system; and therefore could never be perfectly compensated for, or imitated by, art.

16. But it may be objected, that this explanation is based entirely upon the opinion that the circulating fluid becomes altered, owing to interruption of the various secreting and excreting functions; and that it cannot obtain in those cases wherein no such interruption appears to occur. In this case, it is very probable that critical changes are effected in a great measure by the vital influence of the frame. Even according to the foregoing view of the subject, the agency of the vital endowment must not be left entirely out of consideration; for, without its reaction, through the instrumentality of the different internal organs with which it is associated, upon the morbid matters affecting it, those matters could not be separated from the circulation and expelled from the system. It seems, therefore, more than probable that crises consist, in the majority of cases, of more than the simple excretion of the accumulated effete matters from the circulation — such excretion being merely the effects of an anterior and still more important and more constant change. The attentive observer of the phenomena successively occurring during the progress of disease must have sometimes remarked, in those maladies especially, wherein the vital manifestations are particularly implicated, certain perturbations or struggles occurring at their acmé, either followed by recovery, but without any very manifest evacuation — at least to the extent of explaining the circumstance; or passing into exhaustion and death, sometimes without any organic change to account for the issue. In such cases, we can merely infer, that the vital endowment of the frame resists or opposes changes in the state of the structures with which it is associated; that it does so successfully in the former, and unavailingly in the latter, of these cases; and that, unless its energies are overwhelmed by very powerful and noxious causes, as occasionally is observed, it thereby tends to prevent the dissolution of this association to which such changes might directly or indirectly lead. This vital manifestation —whether denominated the "*vis medicatrix naturæ*," or vital resistence, or vital reaction, &c. — most certainly obtains in a very large proportion of diseases, and is instrumental in the developement of those changes, which immediately or mediately conduce to recovery, and which, in the more extreme cases, are attended by various phenomena indicating the vacillating predominancy of vital and functional power, or of organic disease; the acquired ascendency of either over the other occasioning, as the case may be, a favourable or an unfavourable crises. That such a struggle for the ascendency should manifest itself favourably at certain periods, or on determinate days, in preference to others, can be explained only by considering it a law of the living economy identical with, or related to, the periodicity of vital action observed in the healthy, and still more apparently in the diseased functions.

17. *B.* Numerous illustrations of the following propositions might be adduced, in addition to that now advanced: — *a.* Evacuations occurring at the height of acute diseases are often among the first indications of, and are, indeed, occasioned by, the subsidence of local or general vascular excitement. *b.* In many febrile diseases, crises are brought about by the excretion — under the influence of vital reaction or resistance of the secreting viscera — of the effete matters accumulated in the blood, or upon internal organs and surfaces, owing to interrupted excreting function, as shown above. *c.* When a crisis is attended by apparent collapse or change of action, this may arise either from the vital reaction of internal secreting organs occasioning a derivation from the periphery to the more central parts of the frame, or, from the previous exhaustion or subsidence of the vascular excitement allowing the secreting and excreting organs to resume their functions when excited by their appropriate stimuli in the accumulated elements of their respective secretions. *d.* When crises consist of sanguineous fluxes or discharges, they are occasioned, in great measure, by the vascular plethora consequent upon impeded secretion, together with local determination to, or congestion of, such mucous surfaces or organs as are most disposed, by original conformation, previous disease, or established function, to these changes. *e.* That a favourable crisis may manifest itself in one organ or function, or in two or more, either simultaneously or successively, as by sweats, or by alvine or urinary discharges, or by expectoration, &c. *f.* When, during the progress of disease, the aqueous and albuminous elements of the blood become excessive, or when noxious matters accumulate, and are not eliminated in the form of crises as above stated, or by medical aid, they may so affect the capillaries in the parenchyma of the organs, or in serous surfaces, as to give rise to various organic changes and effusions. These may be viewed as *unfavourable* crises, determined to vital organs and internal cavities, arising from deficient vital energy, or vital resistance and reaction, or predisposition, or constitutional vice of some organ or part; each of which may obtain either alone, or with local or general plethora produced by interrupted secretion, &c.

18. *C.* Critical terminations are observed most frequently in the more inflammatory, the bilious, the gastric, and the intestinal forms of fever; in the different phlegmasiæ, in some hæmorrhagic diseases, and more rarely in chronic maladies. They are more commonly remarked in some epidemics than in others; and are seldom apparent, as justly remarked by Lentin, in putrid or malignant diseases, and, I may add, in the pestilential fevers of warm climates. In these, the depressing and contaminating influences of their causes, and of the states of the secretions upon the nervous energy, on the circulation, and subsequently upon the soft solids, so far subdue the vital influence as to render its resistance unavail-

ing in the morbid strife; and it becomes insufficient to separate and throw off the polluting matters, which ultimately increase so as altogether to overpower it. The chronic maladies in which crises are sometimes met with are — mania, hypochondriasis, melancholy, and idiopathic dropsies. But there are numerous circumstances which prevent their occurrence in the above diseases. In this country they are more rarely observed than they would otherwise be, if the treatment of the diseases in which they commonly occur were left more to nature.

19. *D.* Amongst the most frequent *causes that prevent the developement of crises*, particularly such as are favourable, may be enumerated — old age; the lymphatic temperament, and leucophlegmatic habit of body; previous disease, and disposition of structures or organs to organic change. Constitutional or local vice; the scrofulous, gouty, or rheumatic diathesis; exhausted vital power; inanition or general cachexy, particularly from innutritious or unwholesome food; and a too lowering or depletory mode of treatment relatively to the constitution and circumstances of the patient, not only obstruct the developement of regular or favourable crises, but render them imperfect or unfavourable. The large depletions, and the copious and repeated alvine evacuations, very generally resorted to in the early stages of acute diseases, even although they may frequently ward off a fatal issue, often manifestly prevent the accession of regular crises,—1st, by debilitating the patient, and thereby rendering the vital resistance insufficient for their full evolution; and, 2d, from the circumstance of these means of cure being substituted or artificial evacuations or crises, and preventing by anticipation and substitution those which are natural.

20. And here a most important question suggests itself, viz. *Whether or not it is better thus to substitute artificial, for the mere chance of the accession of natural evacuations?* As respects the phlegmasiæ, and many diseases, — particularly those, on the one hand, in which vascular action is excessive, and those, on the other, in which it is insufficient, and the vital powers are greatly depressed, — there can be no doubt of the propriety of resorting to artificial means to preserve an organ from the disorganising tendency of excessive action, and to raise the prostrate powers of life. Besides, it is excessive, and not moderate and judicious measures, which obstruct the evolution of favourable crises: the latter are even requisite aids to nature, in bringing about salutary changes, and a felicitous termination of disease. In respect, however, of many forms of fever, I believe that the *nimia diligentia* of the practitioner is as often injurious as it is beneficial, and that it disturbs those changes which can be effected only by time, and sometimes disposes to metastasis, complications, and unfavourable crises, by depressing the vital energies, and checking salutary changes at the early periods of their evolution, and before they become fully manifested. This fact was established by Hildenbrand in respect of the typhoid and adynamic fevers which were epidemic through Germany from 1810 to 1816. He observed, that a much greater number of cases recovered when left in a great measure to nature, the physician interfering no further than to preserve vital organs from dangerous congestions, than when a *medicina perturbatrix* was adopted.

21. III. The Critical Days (*Dies indicatorii*) are those on which favourable changes usually occur. They are either *simply* or *especially* critical. The third, fifth, *seventh*, ninth, eleventh, *fourteenth*, seventeenth, *twentieth*, *twenty-seventh*, thirty-fourth, and fortieth, are critical days; the seventh, fourteenth, twentieth, and twenty-seventh being those which are especially critical. Galen, and some other writers, mention the fortieth, sixtieth, eightieth, hundredth, and hundred and twentieth; but these are more doubtful, and can apply only to chronic diseases. The third, fifth, ninth, and, by some writers, the eleventh, and seventeenth, are often called *intercalary* days: on these, crises less frequently occur. The intervening days are *non-critical* or vacant, on which salutary changes very seldom take place. Forestus, De Haen, Bordeu, and various other authors, have entered upon calculations respecting the terminations of acute diseases on particular days; and it results therefrom, that about three fourths have observed regular periods. These periods are, however, not always the same in similar diseases. They vary with the age, the constitutional powers, the temperament, and the regimen of the patients. They are earlier, and much more uniformly observed, in robust persons, than in those who are weak and advanced in age.

22. That critical changes should so frequently occur on the days specified, cannot be explained otherwise than in the way attempted by Cullen. He remarks that, from the universality of the tertian and quartan periods in agues, we cannot doubt of there being in the animal economy a tendency to observe such periods; and the critical days above mentioned are consistent with this tendency, as all of them mark either tertian or quartan periods. These periods are, however, not promiscuously mixed, but occupy constantly their several portions in the progress of the disease; so that, from the beginning to the eleventh day, a tertian period obtains; and from the eleventh to the twentieth, and, perhaps, longer, a quartan period is as steadily observed.

23. In entering thus fully into the exposition of the doctrine of crises, according to my belief, as deduced from observation, and the recorded experience of the best authors, I would recommend a judicious, but not a too partial, attention to them, excepting in fevers where morbid action has so far advanced that a determinate course must be reckoned upon; but, when any vital organ is threatened by disease, either originating in it, or attacking it consecutively, as in the progress of fevers and of the exanthemata, or when the vital powers are greatly reduced, although favourable crises may occur, they cannot be reckoned upon, and the expectation of them ought not then to prevent the adoption of decisive measures. When, however, they do supervene under such circumstances, the knowledge of the facts connected with them becomes of real importance, inasmuch as it acquaints us that the means of cure ought to be directed in such a way as not to impede or interrupt, but to develope and promote them. Their occurrence on certain days, in preference to others, should also induce us to watch the phenomena of disease at these periods with the utmost attention. It is true

that critical days have been denied by many of the moderns, upon the ground of their not having observed them. But, as Dr. Cullen has well remarked, the fault is in the physician. He who will not observe closely and comprehensively, should not throw discredit on the results obtained by the more accurate and attentive enquirer. Authorities in matters of opinion are of little value; but in matters of fact, as in this case, they are testimonies — are positive evidences; and whoever will take the trouble to refer to several hundred authorities collected by Ploucquet, or even to those below (nearly all of which he has omitted), will find them sufficiently conclusive.

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CROUP. — Syn. *Affectio Orthopnoica*, Baillou. *Angina Strepitosa*, Ghisi. *Angina Infantum*, Wilcke. *Cynanche Stridula*, Wahlbom. *Angina Suffocatoria*, Bard. *Angina Infantum Strangulatoria*, Russel. *Cynanche, vel Angina Trachealis*, Cullen, Johnston, Rush, &c. *Asthma Infantum Spasmodicum*, Simpson. *Suffocatio Stridula*, Home. *Asthma Acutum Infantum*, Millar and Cookson. *Morbus Strangulatorius*, Starr and Rosen. *Morbus Truculentus Infantum*, Van Bergen. *Angina Polyposa*, Michaelis. *Angina Membranacea*, Auct. Var. *Cynanche Laryngea*, Dick. *Orthopnœa Membranacea*, Laudun. *Tracheitis Infantum*, Albers et Frank. *Angina Laryngea Exudatoria*, Hufeland. *Laryngo-Trachéite*, Blaud. *Empresma Bronchlemmitis*, Good. *Cauma Bronchitis*, Young. *Die Häutige Bräune*, *Huhnerhüsten*, Germ. *Trachéite*, *Croup*, Fr. *Strypsiucka*, Swed. *Croup*, or *Roup*, Scott. *Hives*, Amer.

Classif. — 1. *Class*, Febrile Diseases; 2. Diseases of Sanguineous Function; 2. *Order*, Inflammations (*Cullen*). 3. *Class*, *Order*, Inflammations (*Good*). III. Class, I. Order (*Author*, in *Preface*).

1. Nosolog. Defin. — *Accelerated, difficult, wheezing, or shrill respiration; short, dry, constant, clangous or barking cough; hoarse or altered voice; pain and constriction above the sternum, with symptomatic inflammatory fever; frequently, towards the close of the disease, expectoration of membranous, albuminous, or glutinous substances, occurring in children.*

2. Patholog. Defin. — *Inflammation of the trachea, sometimes of the larynx and trachea, and frequently also extending to the large bronchi, occasioning albuminous and membranous exudation, more or less spasm of those parts; and terminating either in suffocation or exhaustion of vital power, generally in a few days, or within the period constituting an acute malady.*

3. Lit. Hist. — Although we had no precise account of croup until the work of Home appeared, yet there cannot be any doubt of its occasional occurrence among children from the earliest ages; and that it was confounded with other diseases affecting the throat and air-passages. Hippocrates states, "Angina Gravissima quidem est, et celerrimè interimit, quæ neque in faucibus neque in cervice quicquam conspicuum facit, plurimum verò dolorem exhibet, et difficultatem spirandi, quæ erectâ cervice obitur, inducit. Hæc enim eodem etiam die, et secundo, et tertio, et quarto strangulat." And Baillou, after describing an affection of the respiratory passages, observed in Paris, in 1576, with the nature of which he was unacquainted, remarks, "Chirurgus affirmavit se secuisse cadaver pueri ista difficili respiratione et morbo (ut dixi) incognito sublati: inventa est pituita lenta, contumax, quæ instar membranæ cujusdam arteria aspera erat obtenta, ut non esset liber exitus et introitus spiritui externo: sic suffocatio repentina." That the above observations strictly apply to croup, there can be no doubt. Dr. Blair, of Cupar Angus, first mentioned, and shortly described, the disease by its present name, in his medical papers published in 1718. Ghisi noticed it, as it prevailed in the north of Italy in 1747, by the appellation of *Angina Strepitosa*; Starr, in the *Philosophical Transactions* for 1749 and 1750, by the name of *Morbus Strangulatorius*; and Wilcke, as it occurred in Sweden during some years preceding 1764. After the descriptions furnished by Home, and his Swedish contemporaries, Halen and Wahlbom, it received a place among specific diseases, and became the subject of a number of works, and even of controversial discussion. The treatises of Simpson, in 1761, and of Millar, in 1769, on the acute asthma of infants, gave rise to this latter occurrence, especially on the Continent. These authors, having observed the more spasmodic states of this disease, described them under the above designation; subsequent writers differing widely as to their being distinct maladies, or merely varieties of inflammatory croup, with predominance of the spasmodic symptoms. This point was warmly contested in the numerous productions which the prize offered by Napoleon, in 1807, called forth. My opinions respecting it will appear in the sequel.

4. I. History of the Forms and Progress of the Disease. — Croup has been viewed, since its description by Home, as an inflammation of the interior surface of the trachea and larynx. Some authors have divided it into *three* distinct varieties, namely, 1st, *Catarrhal* croup, or a slighter

form of the disease; 2d, *Nervous* or *Spasmodic* croup, or a slighter state of the inflammation, occurring in nervous and irritable temperaments, which influence the form and issue of the disease, giving rise to a spasmodic form of it; and 3d, *Inflammatory* croup, or that in which the inflammation of the air passages is carried to a greater height, and is always attended by the production of a membranous exudation. The opinion that croup consists of an acute inflammation, occasioning the production, in a number of cases, of a false membrane; in others, of an albuminous concretion of various degrees of density; in some, of a viscid mucous secretion, and of the inflammatory lesions of the mucous membrane itself, already described (see Bronchi, &c. §3, 55.); has been attacked by MM. Guersent and Bretonneau, who consider that the formation of a false membrane is the distinctive character of croup; and that those cases in which it is not formed, are merely what they term *false* croup. I agree with M. Bricheteau in considering that the distinction here contended for is calculated more to puzzle the inexperienced, than to advance our knowledge. The experiments of Schwilgue, Jurine, Albers, Schmidt, and Chaussier, as well as pathological observation, prove that the form of disease called false croup by the above authors proceeds from a similar state of morbid action as that denominated the pure disease, and is merely a modification resulting from less intensity of the inflammation, peculiarity of the temperament and habit of body, the causes occasioning it, and the greater predominance of the spasmodic or nervous states. The experiments of the authors now referred to demonstrate, that the injection of irritating matters into the air-passages sometimes produces simple inflammatory irritation; in others, a thick, viscid, mucous exudation; and in many, particularly in young animals, a complete false membrane. These differences of opinion, which are not confined to the writers now mentioned, but extend to many of those quoted in the course of the article, will appear, from what is about to be advanced, as more apparent than real. That the disease should present numerous modifications, approaching acute bronchitis on the one hand, and identical with laryngitis on the other, and varying characters according to the portion of the air-passages chiefly affected, the temperament, habit of body, severity of inflammatory action, and association with other diseases, is an inference to which *à priori* reasoning may lead every practitioner. Without adopting the confined views of some writers, or the hypothetical doctrines of others, I shall be guided chiefly by an extensive experience in the disease, and consider it under the following heads:—1st, The symptoms and progress of true croup; 2d, The varieties or modifications of the disease most frequently observed; and, 3d, The complicated and consecutive forms.

5. i. The usual Form and Progress of true Croup.—The *simple* and usual form of croup generally commences with more or less of precursory symptoms, and runs its course in a few days. It has been divided by authors into different stages or periods, more,—I believe, with the view of giving precision to their description, and to the treatment recommended, than from any marked change in the character of the symptoms. M. Goelis has divided it into four stages, viz. 1st, the invading or catarrhal stage; 2d, the inflammatory period; 3d, the stage of the albuminous exudation; and 4th, the period of imminent suffocation. A nearly similar division has also been adopted by Dr. Cheyne. The difficulty of determining these various stages must be evident; and yet the advantages arising from a division of the disease into distinct periods must be evident,—not so much, however, for the purpose of description, as for the more strict appropriation of the means of cure. Premising, therefore, that croup, particularly this form of it, is strictly progressive, with no great change in its features, until towards its close; and that, therefore, all divisions of its course are merely arbitrary, and without any positive grounds in nature; I shall notice, 1st, its *precursory* signs; 2d, its *developed* and confirmed state; and 3d, the state of *collapse* and imminent suffocation.

6. *A.* The *precursory period*, *period of invasion* (Guersent), *of irritation* (Royer-Collard), *catarrhal* stage (Goelis), *febrile* period (Duges). These precursory signs are sometimes well marked, and of a distinctly catarrhal nature, as observed by Goelis: occasionally they are slight, chiefly of a febrile description; and either from this circumstance, or from the shortness of their duration, attract but little notice. The febrile symptoms, when present, consist chiefly of alternating chilliness and heat, or, in the more acute cases, of slight chills, followed by heat of skin, frequency and hardness of pulse, slightly flushed countenance, want of appetite, headach, excited or variable spirits, alternating with sadness, lassitude, &c. Often, in place of these, or in addition to them, there are a short cough, hoarseness, sneezing, coryza, sometimes moroseness, and all the signs of common catarrh. Upon examining the pharynx and mouth, no trace of inflammation can be detected in this form of the disease; but the tongue is generally white, and loaded at its base. The eyes are watery, red; and the eyelids darker than usual. These symptoms are sometimes only of a few hours' duration, or they may be present for two or even three days. In very young children, they may be so slight as to escape detection, whilst a somewhat different train of phenomena, such as heat of skin, chilliness alternating with heat, frequent short fits of coughing during the night, want of sleep, restlessness, indications of uneasiness about the throat, furnished by the frequent application of the child's hand to this part, &c. manifest themselves. The importance of ascertaining the invasion of the disease have led several writers to pay much attention to its precursory symptoms. Vieusseux has attached much importance to the catarrhal signs, and change in the voice. But these are not by any means constant; and, even when present, may be merely the commencement of a slight catarrh; indeed, there is no symptom which can be relied upon, as indicating its approach, until the disease is nearly fully formed.

7. *B.* The *developed state of the disease* (the *Inflammatory*, of Cheyne and Hosack).—After the above symptoms have existed for a longer or shorter time, or in a more or less marked manner, hoarseness, if it have not previously existed;

sometimes a peculiar shrillness or puling of the voice; difficult, sibilous, sonorous respiration; and an unusual, dry, loud, clangous or ringing cough, as if passing through a brass tube, or sometimes resembling the barking of a puppy; are observed. This croupal cough scarcely admits of description, although it is readily recognised after having been once heard. The succussions constituting it are followed by a dry, hissing, slow, sonorous inspiration, resembling the sound produced by a piston forced through a dry pump, or by a crowing noise similar to that emitted by a chicken in the pip. Expiration between the cough is more easy than inspiration, but with precipitation; the pulse is frequent and hard; the skin hot or burning; the face flushed, sometimes covered with perspiration; the eyes are watery and prominent; the carotid arteries beat strongly, and the jugular veins are tumid. The head is now generally thrown backwards; and the child, either by its speech or attitudes, expresses a feeling of anxiety, with pain and constriction about the trachea and larynx, which are often slightly tumified externally. The above symptoms, which usually first appear during the evening or night, generally somewhat subside early in the morning, excepting the frequency of the pulse, the hoarseness of the voice, peculiarity of the cough, and the sibilous inspiration. This remission sometimes continues the greater part of the day; but after falling asleep, or towards evening, all the symptoms become more severe than ever; and the difficulty of respiration, the sense of suffocation, the anxiety and distress, are increased. The patient constantly applies the hand to the throat, which is sometimes painful to the touch; the countenance is bloated; the pulse still remains frequent, hard or small; the cough is short, precipitous, convulsive, ringing, and followed by a crowing, or shrill or hissing inspiration; and at the commencement of this stage is generally dry, or attended by a scanty mucous or sanguineous expectoration; subsequently it becomes husky and suffocative, sometimes with fruitless attempts to excrete what is felt in the trachea. The patient constantly changes his position; breathes with great difficulty, all the respiratory muscles acting with great force; and at each inspiration, the tumid larynx descends rapidly towards the sternum, whilst the epigastrium is drawn upwards and inwards; and, during expiration, the former is carried towards the maxilla, and the latter comes on a plane with the surrounding surface. If any remission at all occur now, it is much less evident. All the symptoms become more severe. The cough is now more difficult, suppressed, or strangulating; the suffocation accompanying it more imminent, and the stridor or hissing noise of inspiration following it much louder: sometimes it is followed by vomiting, and the excretion of a glairy mucus, occasionally containing flocculent or membranous shreds. The pulse is now very frequent, contracted, sharp, and small. The cheeks and lips are, particularly during the cough, somewhat livid, or extremely pale and tumid. There are also great irritability and somnolency, but no delirium. The hissing, sonorous, and croupy character of the inspiration increases; and the voice, which was shrill or hoarse, often becomes broken, whispering, suppressed, or puling. When vomiting follows the cough, and particularly when the excretion of glairy, albuminous, and membranous matters accompany it, a momentary relief is obtained, sometimes followed by progressive diminution of all the urgent symptoms. Deglutition, particularly of fluids, is sometimes difficult, especially when the larynx is affected, and induces the fits of cough and strangulation. These symptoms seldom continue equally intense during the whole of this stage, but present several slight remissions, particularly at its commencement, and in the less severe cases. Throughout this period, and, indeed, during the whole disease, the bowels are constipated, and the urine in small quantity, of a high colour, and generally albuminous. The *stethoscope* generally furnishes no further information in this stage than a louder sound than that already heard; unless when the disease extends to the large bronchi; when a dry, tubular, or bronchial respiration, unaccompanied with crepitous dilatation of the pulmonary cells, but attended with perfect resonance of the thorax, may be detected.

8. *C.* The *third stage*, or that of *collapse* and *threatened suffocation* (the *Suppurative*, of Hosack and Cheyne), may commence from the first to the seventh day from the invasion, according to the intensity of the disease, and constitution of the patient. This period is characterised chiefly by the absence of any remission, and the increased severity of all the symptoms, particularly the acceleration and diminished power of the pulse and respiration. The pulse is now small, weak, irregular, unequal, or even intermittent; the cough is less frequent, less audible, suppressed, but suffocative. The voice is whispering, low, or entirely abolished; and the speech quick, imperfect, or lost; the motions of the *alæ nasi* and the parietes of the chest are forcible and remarkable, and accompanied with a similar descent and ascent of the larynx and epigastrium to that already described (§ 7.). The head is constantly thrown back; perspiration flows from the forehead; the eyes become sunk, and lose their animation; the countenance often assumes a leaden hue; the tongue is dark and loaded, and its edges and the lips are purplish; the surface of the body is covered with a cold viscid perspiration; the feet and hands swell; the skin is extremely pallid, and shows the veins through it, particularly those of the neck, which are large and distended; and the stools are dark and offensive. The patient very seldom recovers from this state; but he sometimes obtains momentary, much more rarely permanent, relief, owing to the expectoration of a portion of the albuminous, membranous, and muco-puriform matters obstructing the larynx and trachea. When the excretion is free, recovery sometimes takes place slowly; but where it is scanty, or when the disease has extended downwards through the bronchi, as it usually does when thus severe, the issue is commonly fatal. In this case, the patient tosses about in great distress; he seizes on objects around him, and grasps them convulsively for a moment; he throws his head back; seizes his throat as if to remove an obstacle to respiration; makes forcible efforts to expand the lungs; and after a longer or shorter period of such distress, seldom above twenty hours, expires, sometimes with signs of convulsive suffocation, but as frequently with

continued increase of the foregoing symptoms, and evidence of exhaustion of the vital energies, and in a state of lethargy. The *stethoscope* generally furnishes information in this period of the extension of disease to the larger bronchi. This extreme state of disease seldom lasts longer than twenty-four hours. In young children, convulsions sometimes occur, and occasionally terminate life.

9. *D.* Such is the usual course of the *more severe* cases of common and uncomplicated croup, when left to nature, or unmitigated by treatment. In its *slighter grades*, hoarseness, with a hard ringing cough, followed by a crowing or stridulous inspiration, present chiefly in the night and remitting in the day, are almost the only symptoms; the respiration and pulse being but little disordered in the intervals, and the febrile symptoms not very acute. But even these very favourable cases may experience sudden and dangerous aggravations; whilst, on the other hand, the severe and acute disease now described may be soon ameliorated by early and decided treatment at its commencement, or by the discharge of tubular, membranous, or puriform matters, at its more advanced periods.

10. *E.* The *duration* of the disease depends upon the vital energies of the frame, and varies from two to eight or nine days; but I have seen it terminate somewhat earlier, and prolonged much later when partial or scanty expectoration takes place from time to time. A fatal issue is most common on the fourth day. I believe that it very rarely assumes a *chronic* state, preserving at the same time its essential characters; although a somewhat different opinion has been advanced by Goelis. The cases, however, which he has adduced as instances of the chronic disease, are evidently either the partial removal of the more inflammatory, with recurrence of the more spasmodic, symptoms; or slighter relapses; or the extension of the inflammatory action to the larger bronchi, and its continuance in this seat for a longer period. Albers admits that it may become chronic, and supposes that the false membrane may sometimes adhere to the inflamed surface, and be gradually absorbed.; recovery at last taking place, without the excretion of the albuminous substances in such cases. These occurrences, although not impossible, are at least very rare. Hildenbrand supposes, on the other hand, that it may become chronic after the excretion of the albuminous exudation; inflammatory irritation still persisting in a lower grade, and terminating at last in ulceration. This is a much more probable occurrence; and I believe that I have met with it on two or three occasions, but I have never been able to verify it by dissection. In such cases, the disease continues in a slighter grade for several weeks, and is characterised by frequent remissions and exacerbations, emaciation, muco-purulent expectoration, slight soreness in the trachea, and the usual symptoms of tracheal consumption; the patient sometimes sinking at last, or occasionally recovering by judicious means.

11. ii. The Modifications of Croup. — The forms which the simple or uncomplicated disease assumes are attributable, as already hinted, to the particular part of the air-passages chiefly affected, to the temperament and habit of body of the patient, and the intensity of the causes.

12. 1st. *Croup with predominance of the acutely inflammatory symptoms* (the *Acutely Inflammatory Croup* of several modern authors). — This is merely the more acute or severe form of the disease, occurring in robust plethoric children of the sanguine temperament, who have been for some time weaned, and have had their first teeth, and during cold and dry states of the air. It is commonly preceded by chills, and horripilations, and in older children by distinct rigors; and is characterised by the more continued and unremitting severity of the symptoms, by the strength of the pulse, heat of skin, great difficulty and force of respiration, the vascular injection of the cheeks and lips, the highly inflammatory appearances of blood taken from a vein, &c. (*a.*) When the inflammation chiefly, or even partly, *implicates the larynx* (the *Laryngeal Croup* of Guersent and others), the strangulation, cough, and all the symptoms connected with respiration, voice, and speech, are extremely severe; pain is felt in the larynx and upper part of the trachea, and there is sometimes slight swelling in this situation. In young children convulsions, and in older children delirium, occasionally occur towards the close. The disease terminates in from twelve hours to five or six days, but most commonly in two or three days. (*b.*) When the inflammation is *confined to the trachea* (the *Tracheal Croup* of several Continental writers), the cough is at first dry, shrill, or sonorous, as if passing through a brass tube, and accompanied with sharp and lacerating pain in the course of the trachea, sometimes with slight tumefaction. The patient speaks in an under tone, but there is little hoarseness, and the voice and speech are not lost, or at least not so much affected as when the disease is seated partly or chiefly in the larynx. Heat of skin, and the usual symptoms of severe inflammatory fever, are also present. As the disease advances, the cough becomes more frequent and severe, but without the distressing sense of suffocation attending the foregoing modification; nevertheless there is still much difficulty of respiration in the intervals between the cough, sometimes with a species of rattle similar to that of bronchitis. The fits of cough are often followed by vomiting, or the rejection of membranous shreds, with a thick, glairy, and sometimes sanguinolent or purulent mucus. The excretion of this substance generally is productive of much relief, which is increased after each discharge, unless the inflammation has extended down the ramifications of the bronchi; and then the respiration continues extremely difficult, and the disease assumes all the characters of an acute bronchitis, and frequently terminates unfavourably. The progress of cases of this description is usually not so rapid, nor the termination so fatal, as of those affecting the larynx chiefly. All the symptoms evince less severity, especially when treated early; and it sometimes continues twelve or fifteen days, but usually from five to nine. When its severity merely is subdued, the inflammatory action not being altogether removed; or when, from accidental causes, or the fault of the constitution, it passes down the bronchi; it may be much more prolonged, and approach the chronic character; but it will then present many of the features of the most severe

bronchitis, into which, indeed, it will thus pass; and, as was stated in respect of that disease, whilst bronchitis may be followed by croup, the latter malady may thus occasion the former.

13. 2d. *Croup with predominance of bronchial symptoms* (the *Cynanche Trachealis Humida* of Rush; the *Mucous Croup* of some modern authors). — This form is not infrequent in young children of the lymphatic temperament, who are fat and flabby, with a white soft skin. It is often met with soon after the period of weaning, and in those who are brought up without the breast. It commences with coryza, and the other symptoms of catarrh, and often with little fever. After these signs have been present for some time, or sometimes without these being so marked as to attract attention, it generally attacks the child in the evening or during the night, and manifests itself in a decided manner by the sudden occurrence of a hoarse, suffocating, dry, sonorous, or shrill cough, with a sibilous inspiration. The seizure is usually severe, and is attended with manifest alarm to the patient. The countenance is pale, and covered by perspiration, and the lips are violet. Several slighter fits succeed to this first attack; the voice remains hoarse and low, the respiration sibilous and slightly difficult; but a remission usually takes place in the morning, and there is generally but little return of the croupal cough until evening and night, when it recurs, but often in a slighter degree. In some cases, the invasion is more gradual; the remissions but slight, or hardly evident, and the accession of expectoration much earlier; the disease approaching nearer, as respects its seat and character, to acute bronchitis. There is but little fever, the skin is not much warmer than natural, and the powers of life are not remarkably depressed. The throat and pharynx are unaffected. After the first, second, or third day, the cough is no longer dry, its fits become shorter, is sometimes accompanied with a mucous rattle, and begins to terminate in the expectoration of a thick glairy mucus. The disease now assumes many of the features of, or passes into, bronchitis. M. Guersent considers that this is merely a false or bastard croup. I believe that it is a milder form of the disease; and that it consists of a slighter degree of the inflammatory irritation of the same parts which are affected in the true croup; but that, in consequence of the much less severity, or some other modification, of the diseased action, and constitution of the patient, glairy mucus merely, instead of an albuminous exudation of a firm consistence, is thrown out; and that, when the features of bronchitis are assumed, the inflammatory action has extended down as far as the small bronchi.

14. 3d. *Of croup with predominance of spasmodic and nervous symptoms* (the *Laryngismus Stridulus* of Good; *Spasmodic Croup* of Wichmann, Michaëlis, Double, &c.; and the *Acute Asthma of Infants* of Simpson and Millar). This variety of croup has been described by German and French authors, under the name of Millar's *Asthma* and has given occasion to much discussion relative to its being a variety of croup, or a distinct disease. Of its being the former, however, there cannot be the least doubt. It occurs chiefly in children who are weak, irritable, subjects of worms, and of the nervous temperament; and comes on most commonly in the night, often during the patient's first sleep, frequently without well-marked premonitory symptoms, excepting languor, listlessness, headach, fretfulness, and sometimes a short tickling cough; and these may be slight, or of short duration. The child is suddenly wakened by great difficulty of breathing, cough, and general agitation, and continues thus affected for some time; the symptoms gradually subsiding towards morning, or being more quickly relieved by the cough terminating in vomiting. This form of the disease always presents complete remissions during the day, with exacerbations in the evening and night, and thus assumes a regular type; but the remissions often become less complete and of shorter duration, the exacerbations more frequent and prolonged, and the cough, difficulty of respiration, general agitation, and convulsive movements attending them, more severe. There is little or no increase of animal heat or fever, nor actual pain in the larynx and trachea, but a sensation of constriction and uneasiness. The countenance is generally pale in the remissions, and sometimes tumid and livid in the exacerbations, during which the respiration becomes sonorous, laborious, convulsive, and croaking: the extremities are usually cool. The cough continues dry, and accompanied with marked irritability, until the favourable termination of the disease; when slight or moderate glairy expectoration takes place, but without any membranous substances mixed with it. The pulse is very variable; sometimes small, frequent, and constricted; occasionally slow; but generally at last unequal, weak, or intermitting. The urine is paler than in the common and more inflammatory states of the disease, in larger quantity, and sometimes deposits a nebulous sediment. In this variety, the nervous and spasmodic symptoms are present from the commencement; in the former, they appear chiefly in the two last stages; the more common and inflammatory croup sometimes thus passing into the spasmodic.

15. Such are the usual characters of the well-marked spasmodic variety of croup; but cases of so pure and unmixed a form are comparatively rarely met with in practice; as the intermediate shades between the state of disease now described, and either of those preceding, are more commonly observed, at least in this metropolis and vicinity. I have scarcely ever seen a well-defined case unconnected with dentition; or one terminate fatally without the occurrence of convulsions in its advanced stages, or towards its termination; and it has very commonly presented evidence of cerebral congestion. On *dissection* of fatal cases, M. Guersent states, that albuminous concretions—sometimes extensive, but more frequently consisting of small isolated patches—are found in the larynx; whilst Millar and Rush detected little or no lesion of the air-passages. In the very few opportunities I have had of examining the state of parts in the more purely spasmodic cases of croup, an adhesive glairy fluid, with patches of vascularity, were observed in the epiglottis and larynx, and a similar fluid was found in the large bronchi. Congestions of the brain, particularly about its base and medulla oblongata, and of the lungs, cavities of the heart and large vessels, were also found; but these were most probably consecutive changes merely.

16. iii. Complications of Croup.—*A. With*

Cynanche maligna. This complication is distinctly alluded to by Johnstone, Withering, Cullen, and several contemporary authors; and is common in the epidemic visitations of this disease, or of anginous scarlatina; the greater number of fatal cases exhibiting soft fragments of false membranes, of a greyish or ash colour, covering the larynx and trachea, and a livid appearance of parts of the subjacent mucous membrane. This is one of the most dangerous complications of the disease. The affection of the air-passages is here consecutive, and the difficulty of swallowing usually precedes the characteristic symptoms of croup, which are generally accompanied with great fœtor of the breath. — *a.* In many instances of the malignant sore throat, the exudation thrown out from the inflamed surface forms a pellicle coextensive with the spread of the inflammatory process from the *fauces* to the pharynx and air-passages. In some cases, ulceration, and slight apparent sloughing, occur in the central parts, and those first affected; whilst the surrounding surface, and parts subsequently diseased, become covered by a soft and easily lacerated exudation. In rare cases the inflammation commences in the *pharynx* (*Cynanche Pharyngea*), and spreads to the fauces on the one side, and down the larynx, trachea, and œsophagus on the other. In these, the pellicular exudation formed on the inflamed surface very nearly approaches that of croup; oftener, however, it is of a darker and dirtier colour, softer, and not so continuous: whilst in some cases it is formed in patches, is similar to thin sloughs, and is interrupted in parts by a dark, foul, but not concrete secretion; the subjacent mucous surface being of a dark, livid, or brick-red colour, or ulcerated, or even partially sloughed. Sloughing, however, or even ulceration, although mentioned by several writers, is comparatively rare; the more frequent commencement of the faucial or pharyngeal complication of croup being attended by the pellicular or concreted exudation now mentioned, without sloughing. The above changes are most remarkable in the pharynx, and are slighter in the larynx and trachea; the exudation being there somewhat paler, and from its colour and appearance very generally mistaken, both while adherent to, and whilst being detached from, the inflamed surface, for sphacelated sloughs, particularly as observed in the throat, and described as such. The complication, with croup, of various states of angina or sore throat — malignant, or epidemic — whether commencing in the pharynx, or in the fauces and extending to the pharynx, is not uncommon. Epidemic visitations of it have occurred in very modern times, and have been described by Hamilton, Deslandes, Bourgeois, Bretonneau, Trousseau, Moronval, Emangard, Schmidtmann, and others. — *β.* In some cases the affection originates in the *tonsils* (*Cynanche Tonsillaris*, &c.) and extends to the adjoining parts. In the croup epidemic in Buckinghamshire in 1793, and described by Mr. Rumsey, the croupal symptoms were stated to have been coeval with "inflammation and swelling of the tonsils, uvula, and velatum-pendulum palati; and large films of a white substance were formed on the tonsils." Similar appearances have likewise been noticed by Ferriar, Hosack, Mackenzie, Robertson, and Bourgeois, and by myself; the pellicular exudation extending over the fauces, down into the pharynx and larynx. The croup which has been described by Louis, Hufeland, and others, as occurring in *adults*, was thus complicated. The complication with the malignant sore throat has been observed by me both in its *simple form* and in its *association with scarlet fever*. Some years since I attended, early in the winter, some of the children of a numerous family residing a few miles from town, in a low and damp situation. They had had scarlatina, with very severe sore throat, two or three years previously. On this occasion, one of the oldest was seized with malignant angina, extending to the pharynx, and along the Eustachian tube to the ear, with fœtid respiration, and irritation of the larynx, producing a constant tickling cough. A similar affection spread to four of the younger children, and in two of them it was complicated with croup; the symptoms of which were severe, continued, and well marked in one, and more spasmodic and intermittent in the other. In these, ash-coloured exudations covered the greater part of the fauces and tonsils, and extended down into the pharynx. They recovered with difficulty, by the means hereafter to be noticed.

17. *B.* Croup may be also complicated with *Thrush*.—Cases of this description are rare. I have seen only two of which I have taken any account. This association has also been observed by Jurine, Double, Pinel, and Royer-Collard, who notice the adynamic or ataxic character of the fever accompanying it; the adynamic state being the consequence chiefly of this associated disorder supervening upon pre-existing disease, generally of the digestive mucous surface, and often, moreover, in a weak and cachectic system. The patches of pellicular exudation in the mouth and throat, characteristic of thrush, had extended down the pharynx, larynx, and part of the œsophagus, in these cases: death having been occasioned by the consequent irritation, and frequent recurrence of spasm of the larynx. In the only one I had an opportunity of examining after death, there was little or no inflammation in the trachea; but there was considerable vascular injection of the pharynx, epiglottis, and larynx, which were covered by a cream-like exudation, their mucous membrane being softened. The trachea and bronchi contained some flocculent viscid mucus; and the digestive villous surface, particularly in the upper part of the œsophagus, stomach, and portions of the small intestines, was softened and inflamed. In all the foregoing complications, the affection of the larynx and epiglottis is generally more remarkable than that of the trachea.

18. *C. With the exanthematous fevers.— a.* Croup sometimes comes on during the eruptive fever, or efflorescence of *measles*; when it occasionally assumes more of the remitting and spasmodic character, and is seldom very severe or dangerous. In this case it generally subsides as the eruption becomes abundant. But it also supervenes upon the extinction of the eruption; or it does not appear until during or after desquamation; and, in some instances, not until advanced convalescence. When this occurs, the inflammatory fever soon passes into an adynamic state, and the disease assumes a severe form, with spasms of the larynx, often terminating with convulsions and suffocation. In one instance of this kind that occurred in my practice, much swelling and œdema of the throat appeared ex-

ternally, and aggravated the symptoms; recovery, however, unexpectedly took place, with a free discharge of glairy mucus, and concrete fragments of membrane. In another instance, emphysema of the throat occurred, and gradually extended over the neck, chest, and face. Permission was not obtained to examine the body, so that the channel through which the air had passed from the respiratory passages into the cellular tissue could not be exactly ascertained. — *b*. The complication with *small-pox* has been very particularly noticed by PINEL, ALBERS, VIEUSSEUX, and ROYER-COLLARD, and is not uncommon. It usually occurs in the more severe cases, particularly when the disease is confluent, and generally comes on slowly in the suppurative stage. In the more malignant cases, the difficulty of respiration is excessive; the voice very hoarse or suppressed; the paroxysms of suffocation extreme; the cough dry, or giving issue merely to a small quantity of dirty serum, or muco-sanguineous matter; and the attendant fever adynamic. On dissection, a membranous substance is seldom found in the larynx or trachea, but merely portions of a semi-concrete matter, with spots of intense inflammation in these parts, the epiglottis, and large bronchi. — *c*. The complication with *scarlet fever* is never met with excepting this disease be associated with sore throat, especially when malignant or epidemic (§ 16.). — *d*. The association, or rather the supervention of croup on *erysipelas*, particularly of the head and face, occurring in adults, has been observed by FORESTUS (*Opera*, l. xv. obs. 20.), LATOUR, STEVENSON, and GIBSON (*Trans. of Med.-Chirurg. Soc. of Edin.* vol. ii. p. 95.). In those cases, the inflammation and characteristic exudation spread from the fauces to the air-passage.

19. *D. With other diseases.*—*a*. Croup is sometimes associated with *acute bronchitis*; and when it terminates fatally, it is often in consequence of extension of the inflammation to the *bronchi*, and thence to the substance of the lungs, *pneumonia* thus also supervening. But the croup may also, although much more rarely, be consequent upon bronchitis. *b*. It may occur in the course of *pertussis*, and it then usually assumes the remittent and spasmodic, or the bronchial forms. *c*. Lastly, it may be associated with *œsophagitis*; but when this is the case the inflammation with albuminous exudation usually commences in the pharynx, and extends down the œsophagus, and to the larynx. This is not an infrequent occurrence in children under two or three years of age; as, indeed, M. GUERSENT has remarked; the larynx and epiglottis being the only parts of the air-passages affected; and these chiefly with spasm, from the irritation of the portions of false membrane covering or coming in contact with them.

20. II. TERMINATIONS and PROGNOSIS. — Croup may terminate—1st, in recovery; 2d, it may pass into or excite some other disease, — a return to health, or a fatal issue, taking place mediately through it; 3d, in death, either from exhaustion of the vital energies, or from suffocation. *A*. A return to *health* is indicated by the mild form of the disease; by the quiet respiration whilst the cough is absent; by the moderate excitement and frequency of the pulse; by a looser cough and a more natural state of voice, followed by expectoration of viscid mucus and membranous fragments; by a copious and general perspiration on the third day, the symptoms being moderate; by epistaxis on the second, third, fourth, or fifth days; by the absence or subsidence of violent attacks of spasm of the glottis, and suffocation; by the simple and uncomplicated state of the disease; and the absence of exhaustion, or of great frequency or irregularity of pulse, and of other signs of adynamia.

21. *B*. It may excite additional disease, or pass into some other malady, — a circumstance which, although not necessarily fatal, may greatly increase the danger. The morbid state of the system, and general depression of vital power accompanying most of the complications now noticed; the more constant affection, and disposition to spasmodic action of the larynx, in all of them; the interruption caused to the respiratory processes, and the attendant or consequent congestion of the lungs, as well as the marked disposition they create to consecutive disturbance; greatly augment their danger generally. The disorders consequent upon the simple and complicated states of croup are both direct and indirect. The direct are — *a*. Extension of inflammatory action to the bronchi and substance of the lungs, — generally an unfavourable event, and indicated chiefly by the unremitting persistence of the symptoms, by deep suffocating paroxysms of cough, great frequency of pulse, lividity or leaden hue of the countenance, by the dark tinge of the lips and tongue, cold clammy perspirations, somnolency, and all the characters of asthenic BRONCHITIS (§ 37.). When the bronchial affection does not appear until during convalescence, it is more slight, unless the causes have been energetic, and it presents more of the usual characters and states of that disease. The consecutive occurrence of either pneumonia or any of the forms of bronchitis should be carefully enquired after, by observing the symptoms, and examining the chest by auscultation. — *b*. Extension of disease to the sub-mucous and follicular structures, occasioning inflammation and ulceration of these tissues, with symptoms of laryngeal or tracheal consumption upon the subsidence of croup, is a much more rare occurrence than the preceding; but. when it takes place, a muco-puriform expectoration accompanies and follows the characteristic discharge and signs of croup, with pain and irritation in the larynx and trachea, recurring exacerbations of suffocating cough, and difficulty of breathing, chiefly of a spasmodic description, particularly when the inflammatory irritation is seated in the larynx or epiglottis, and the usual symptoms of hectic. The very marked tendency, also, of the disease to *relapse*, is in a great measure owing to the persistence of a slight degree of inflammatory action in the large bronchi, or in the trachea and larynx, for some time after the membranous exudation on the diseased surface has been thrown off; the disorder being readily aggravated upon exposure to the exciting causes. This disposition of the disease to return diminishes with the length of time that has elapsed from the subsidence of the original attack, but does not altogether disappear for many weeks, or even for months, especially in some constitutions, and in the last and first months of the year; and even more than one relapse may take place in weak, irritable, and nervous frames, but generally in a more spasmodic

form. — *c.* Besides producing these, it may occasion, although very rarely, abscess in the vicinity of the larynx or trachea. I believe that dilatation of the bronchi is a much more frequent result. — *d.* Of the more indirect terminations and consequences of this disease, congestions of the encephalon, giving rise to *convulsions* and effusion of serum in the ventricles, or between the membranes, are the most important. In many cases, particularly in delicate and nervous children, the convulsive movements seem to commence with the spasmodic actions of the laryngeal muscles, and the strangulation thereby occasioned; the head and neck being thrown back, and all the limbs convulsed. Life is in some cases thus terminated by asphyxy. Jurinf, Virusseux, and myself, have met with cases of *hydrocephalus* following the disease; but they are not common.

22. C. *Danger* is to be dreaded, when fever is very high early in the disease, and when respiration is permanently audible, cooing, and laborious, or as described above (§ 7.). When the disease goes on to the third stage, notwithstanding the treatment; when it presents any of the complications (§ 16.) and consecutive affections (§ 21.) already noticed; when the discharge of the characteristic exudation does not take place, or when the expectoration of fragments of it is not followed by any relief; when the countenance becomes livid or leaden, the eyes sunk, the lips and tongue dark, and the pulse very frequent, small, weak, and irregular; and the other symptoms of vital exhaustion appear; *great danger* exists. A *fatal issue* is to be expected when the patient presents the appearances described as characterising the third stage, particularly those noticed as marking its close (§ 8.).

23. III. Diagnosis.—The hoarseness, and the loud, sonorous, and ringing cough; the forcible and difficult inspirations; flushed face; injected and watery eyes; the frequent and hard pulse, with thirst and inflammatory fever, the heaving of the thorax and motion of the trachea, in the developed stage; and the husky choking cough, the whispering voice, and wheezing respiration, &c. of the third stage; sufficiently distinguish this disease from any other. When it is uncomplicated, nothing beyond a slight redness is ever observed in the throat; and there is little or no pain upon deglutition, unless the larynx be much affected. — *a.* Croup can scarcely ever be mistaken for *Cynanche maligna*, or *C. Pharyngea*, or any other form of sore throat, as long as these affections do not extend to the larynx; as the great difficulty of deglutition, and the but little disturbed state of respiration, independently of the obvious affection of the throat, &c., are sufficient to distinguish between them. When, however, portions of the concreted exudations in these affections irritate the glottis, they occasion a short, tickling, dry cough; and even excite, in some cases, strangulating spasms of the larynx, nearly resembling croup, particularly when it is complicated with these maladies. If, however, it be thus associated, the croupal characters, in addition to the appearances in the throat and pharynx, will be too evident to be misunderstood; the descriptions already given of these complications being sufficient to point them out.— *b.* During the eruptive fever of *measles*, the tracheal affection is often so great as to simulate croup; and in many cases it even amounts, as already stated, to a slighter form of the complaint, which usually disappears as the eruption becomes matured: but attention to the symptoms will readily show the nature of the disorder, and how far the affection of the larynx and trachea should be viewed as a symptom, or as an important complication of the exanthematous disease. — *c.* Croup may readily be distinguished from *bronchitis*, by its sudden and severe attack; its occurrence in the evening and at night; its remissions; the hoarseness, and the ringing, dry, and frequent cough; the difficult inspirations, and impeded respiration; the altered voice and speech; the sensations and symptoms referrible to the trachea in the former, and to the sternum and chest in the latter; and by the absence of expectoration until late in the disease, when it is membranous or tubular, and not mucous and muco-puriform as in bronchitis, until after the discharge of the membranous exudations. These characters will also serve to indicate the supervention of croup on bronchitis, — an occurrence which is sometimes observed, although much more rarely than that of bronchitis on croup. — *d. Laryngitis* is with greater difficulty distinguished from croup than the foregoing, and in many respects there is little or no difference. The practical importance of this diagnosis may not appear great, but it is sufficiently so to warrant an accurate distinction. 1st. True laryngitis occurs in adults; seldom, in children, in any other form than associated with either the simple or complicated states of croup. 2d. It is a purely inflammatory disease, attended by a fixed burning pain in the larynx, increased on pressure and examination; and, when attacking adults, never gives rise to a false membrane, unless it be superinduced in the specific and epidemic forms of cynanche, and then it assumes modified characters. 3d. It more frequently terminates in the manner characterising acute inflammations, viz. ulceration and suppuration, than when the larynx is affected in croup. 4th. It is more acutely and constantly inflammatory, the symptoms are more continued, and it is more benefited by a purely antiphlogistic treatment, than croup. 5th. It much oftener passes into the chronic form, than the latter disease. (See Larynx — *Inflammations of.*) — *e. Chronic laryngeal* and *tracheal inflammation* — the laryngeal and tracheal consumption of some writers — resemble croup, in the hoarse voice, harsh dry cough, and the difficulty of respiration; but their progress is much slower, and less acute, than croup; they do not present the violent paroxysms towards night; they seldom or never are observed in children; and ulceration of these parts of the air-passages is always found in fatal cases. —*f.* Croup may also be confounded with the diffusive inflammation which sometimes attacks, either primarily or consecutively, the cellular tissue about the throat, or with abscesses in the same situation; either of which may involve the larynx and membranous part of the trachea, or so affect them as to give rise to croupal symptoms; but the external appearances, the difficult deglutition, the state of the throat, and the history of the case, will at once show the differences existing between them. — *g. Pertussis* and croup can hardly be mistaken for each other; the invasion, characters, and progress of both diseases being so very

different. The prolonged whoop, the unchanged voice, and the occurrence of the cough in convulsive paroxysms after a meal, terminating in vomiting and a copious discharge of a clear and glairy fluid; the complete intermissions, respiration, voice and speech remaining unaffected; the almost entire absence of fever, and the much more slight and chronic form, of the latter disease in its uncomplicated state; are sufficient distinctions. Croup may, however, occur in the course of hooping cough; but then its characteristic symptoms will make it apparent to the attentive observer, and point out the nature of the resulting association. — *h.* The effects following *substances that have escaped into the trachea* often resemble croup; but may be distinguished from it by the sudden occurrence of pain and suffocation; by the frequent change of the exact seat of uneasiness with the change of the situation of the foreign body; the dryness of the cough, and the violence of the strangulation; and by the irregularity, the completeness, and sometimes the long continuance, of the intermissions. When a foreign substance passes into the glottis, and is retained there, suffocation is generally occasioned either from the size of the substance, or from the spasmodic constriction of the muscles of the larynx occasioned by it. — *i. Hysteria* may also simulate croup; but the age of the patient, the history of the case, and the local and general symptoms, if attentively observed, will indicate the nature of the affection. — *k.* The spasmodic states of croup closely approach to *convulsive spasm of the larynx*; but the absence of cough and fever, the brief fits of strangulation, the complete intermissions, the spasm of the thumbs and toes, the purplish countenance, and the general convulsions, will distinguish that affection from any form of croup. (See Larynx — *Convulsive Spasm of.*)

24. IV. Causes. — *A. a.* Croup is more frequent in cold and moist climates than in those which are warm. Rapid and frequent vicissitudes of season, weather, and temperature, have considerable influence in producing it. Hence its prevalence in the valleys of Switzerland and Savoy; in this country, particularly on its eastern side; in the other north-west countries of Europe; and in North America. But the middle, and even the south of Europe, are not exempt from it. M. Valentin has shown its freqnency in the middle and southern provinces of France, Goelis in Vienna, and Ghisi in the north of Italy. Sir James M'Grigor notices its prevalence — probably in a complicated form, from its occurrence also in adults (§ 25.) — at Bombay, in 1800. According to the information given by Jurine, Lentin, Cheyne, and others, we might be led to infer that it has been more common in very modern times than formerly: the difference may, however, be owing to its having been mistaken for some other affection. I believe that it has not been so frequently met with during the preceding five years, as it was about twenty or thirty years ago. M. Jurine remarks, that, although the table he has given of the number of cases from 1760 to 1807, shows a nearly progressive increase, yet he has observed, at Geneva, no increase during the last eighteen years preceding the date of his work. The following evidence, nevertheless, would render it evident that, in some countries at least, croup is more prevalent now than formerly. According to the information given by Dr. Cookson, a practitioner of forty years' experience in Lancaster had never seen it until 1760. Dr. Friedlander (*Journ. de Montpellier*, No. IX. p. 276.), states, that it has become yearly more prevalent in Vienna; and that the physician to the Hospital for Children, who had treated, from 1774 to 1817, nearly 60,000 children, did not meet with a single case in the three first years of his practice, saw it but rarely during the next six years, and yet treated 1665 cases of it in the last five years of this period. Similar facts are also furnished by Dr. Goelis. Although croup occurs at all seasons of the year, it is most prevalent in those which are cold and moist, or when the alternations of temperature are sudden and remarkable. I have observed it more frequently in the months of January, February, March, April, November, and December, especially if east or north-east winds prevail after heavy or continued falls of rain. I believe that the above results are nearly in accordance with those furnished by Jurine, Crawford, Michaëlis, Double, and Bricheteau.

25. *b.* The great susceptibility of *early age*, and the narrowness of the larynx previously to puberty, have generally been supposed to favour the occurrence of croup. M. Blaud, however, denies that this latter circumstance has any influence in causing it. This is doubtless the case in respect of the *production* of the disease, but not as regards its *severity* and *danger*, both of which it evidently increases. It is rare to meet with croup until after the child has been weaned: I have, however, seen it in children at the breast, as early as three, four, five, and six months of age; but much more frequently at this age in those who have been brought up by hand; and in a still greater number of instances, at from seven months to upwards of a twelvemonth, in those which have been recently weaned. M. Duges states, that he met with an instance of it in an infant of a few days old. The age at which the disease is most common is, according to my experience, from one year to nine. But it not infrequently occurs at both an earlier and a later period. Van Bergen states, that it is often observed from the age of two to five years inclusive: Home assigns from fifteen months to twelve years: Crawford mentions some cases from fifteen months to two years, but gives the age of from two to eight as the most common: Cheyne, from sixteen months to twelve years; Salomon, from two to five years inclusive; Michaëlis, from fifteen months to ten years: Zobel, from the latter months of suckling to nine years; Vieusseux, from seven months to ten years: Bernard, from one to six years; Barthez, from two to ten; Rumsey, till fourteen; and Caillau, from eighteen months to eleven years. The foregoing applies only to the simple and uncomplicated disease. When it occurs in a complicated form, or consecutively upon anginous affections, particularly upon inflammation of the pharynx, tonsils, or fauces, or on the exanthematous diseases, it may, and, indeed, occasionally does, occur in adult subjects, and in infants of a more tender age. The cases published by M. Louis, and denominated by him croup in the *adult*, were instances of the anginous complication. Although the occurrence of uncomplicated croup in adults is very

rare, cases have been observed by Hosack, Mitchell, Mills, and Latour.

26. *c.* M. Blaud and Dr. Albers observe, that *boys* more frequently contract the disease than *girls*, owing to the greater exposure of the former to its exciting causes. This opinion has been opposed by MM. Double and Royer-Collard; whilst Dr. Jurine states, that of ninety-one cases he treated up to 1808, fifty-four were boys, and thirty-seven girls; and of twenty-eight cases which occurred in 1808, eighteen were boys, and ten girls. According to his observation, also, the greater number of cases occurred at the age of two, three, and four years; and next at one, five, and seven. This accords with my own experience, which is further supported by that of Goelis, who, from 1797 to 1808, treated 252 cases of the disease, of which number 144 were boys, and 108 girls.

27. *d.* The nervous and sanguine *temperaments*, or a mixture of the two — the spasmodic characters predominating in the former, the inflammatory in the latter — with a tendency to a fulness of habit, seem to predispose to croup. That it will, however, often come on independently of plethora, cannot be disputed. I have seen it in infants of about four months old, brought up by hand; and even in these, soon after having lost much blood in the treatment of other diseases, especially when cold easterly winds occur in the spring or autumn, after heavy falls of rain. Cheyne, and some others, conceive that an hereditary tendency exists in croup. But this is not made out: for, as M. Desruelles has judiciously remarked, the only proof that can be brought in support of it, is the circumstance of two or more children being seized with it in the same family; an occurrence which may be explained by the susceptibility of age and temperament, being often necessarily the same in several of them; and by their being exposed to the same agents, and placed under similar circumstances.

28. *e.* The *localities* in which this disease seems *most* prevalent are those which are low and moist, near the sea, on the banks of large rivers or lakes, or near marshes, in the depths of low valleys, or at the bases of precipitous mountains. Hence the endemic character, which some writers have imposed on it, but which is not strictly applicable; for, although it is more frequently observed in the above situations, yet it is also often met with in places very oppositely circumstanced; and it cannot, therefore, strictly be said to be an *endemic* disease.

29. *f.* The *epidemic* prevalence of croup has been contended for, and denied, by writers. Some consider it as entirely sporadic and accidental; others suppose that it may become epidemic consecutively upon catarrhal epidemics, and that it has no other claims to such a character; whilst many believe that it occasionally appears in an epidemic form. That it has so occurred in former times appears evident. Baillou manifestly observed it in an epidemic form, in Paris, in 1576; Ghisi, at Cremona, in 1747; Starr, in Cornwall, in 1748; Rosenstein, in Upsal, &c., in 1762; Van Bergen, in Frankfort, in 1764; Walhbom and Baeck, in some parts of Sweden, in 1768 and 1772; Barker and Most, in some places in the United States; Autenrieth, at Stutgardt, in 1807; Albers and others, in parts of Saxony, in 1807 and 1808; Schmidtmann, in 1811; and various other writers during the last fifty years. My own observation would lead me to infer, that, although croup is generally a sporadic disease, occurring occasionally at all seasons, yet it sometimes assumes epidemic features, both in respect of its simple state, and its complications with other species of angina, particularly at periods when they or catarrhal affections prevail — the seasons favourable to the production of these diseases most frequently occasioning this malady also. This opinion derives support from the numerous facts furnished by Rumsey, Pinel, Jurine, Goelis, Albers, Royer-Collard, Bricheteau, Bretonneau, and other writers referred to at the end of this article.

30. *g.* Several authors, particularly Wichmann, Boehmer, Field, Rosen, Goelis, Lobstein, Guersent, Louis, Shultz, and G. Gregory, have adduced facts to show that the disease may occasionally prove *infectious*. The two early Swedish writers contemporary with Home, namely, Halen and Wahlbom, assert its infectious nature. On the other hand, this property is denied by Chalmers, Michaëlis, Thilenius, Double, and Albers. It has most indubitably manifested this property when it has prevailed epidemically, and when associated with cynanche maligna, and some other exanthematous or anginous affections. On several occasions, however, of its occurrence within a short time, in two or more members of the same family, it has evidently proceeded from the same causes acting upon similar states of susceptibility and disposition. But even the simple form of the disease has appeared in children who have slept in the same bed with another affected by it. Two or three such cases have occurred under my own observation; and others are recorded by Goelis, and some other authors now mentioned. Whether or not it was produced in these cases by inhaling the air respired by the affected child, or by the causes above stated, may be disputed. Yet it is probable that the air which has been respired by the affected may sometimes be a concurrent or determining cause of it in others.

31. *B.* Although the foregoing may be considered as *predisposing* causes merely, yet they are very commonly the only *exciting causes* which can be detected. There is no doubt, however, that the causes which occasion common catarrh and bronchitis sometimes also give rise to croup. It is also not infrequently excited by, or at least consecutive of, bronchitis, hooping cough, the various forms of cynanche, measles, erysipelas, and scarlet fever; and it occasionally also appears during advanced convalescence from these, especially the latter; and, indeed, from other acute diseases. Also running against the wind, crying, and exertions of the voice; cold acting in any manner, or upon any part of the body, particularly upon the neck and throat; having the hair cut short during cold or windy weather; habitual exposure, and the laying aside the accustomed covering of the neck and chest; and even accidental attempts at swallowing substances of an acrid nature, or of a very high temperature; have sometimes produced croup. The retrocession of the above eruptive diseases, and the suppression of other eruptions, or of discharges, secretions, and excretions, are amongst its most frequent causes.

32. V. Pathology of Croup. — i. *Lesions observed in fatal cases.* A precise idea of the

organic changes which take place in the course of the disease is necessary to enable us to devise, at the commencement, appropriate means, both for their prevention, and for their removal when prevention is unattainable. The lesions observed in fatal cases, and present in all, to a greater or less extent, may be referred to two heads.— 1st. Inflammation with tumefaction, redness, injection of the blood-vessels, and slight softening of the mucous membrane of the air-passages. 2d. An albuminous exudation in the form of a false membrane, or a thick, glutinous, and stringy mucus, or both. (See BRONCHI AND AIR-PASSAGES — *Lesions of*, § 12.) *A*. The former of these is usually observed, varying, however, in respect both of intensity, and extent of surface affected. In some cases, they are limited to the upper part of the trachea; in others, they extend to the larynx, or to both the larynx and first divisions of the bronchi, or to the latter merely; and, in complicated cases particularly, or when the disease assumes a seemingly epidemic, or even infectious character, the inflammatory states now enumerated, with the characteristic secretion, exist also in the pharynx and fauces, and advance downwards to the ramifications of the bronchi. In the most acute forms of the disease, the mucous surface of the trachea and larynx assumes the above inflammatory appearances in the course of a few hours. In the second stage of the disease, it becomes streaked or partially covered by an albuminous, and sometimes a sanguinolent exudation; and in the last stage, this exudation has concreted to a more or less complete membrane; the inflammatory states of the surface underneath still remaining, but in a less distinct manner, and occasionaly in patches or streaks only. In some cases, the injection of the vessels, and tumefaction of the surface, are but slight, yet the exudation of a thick concrete membrane exists to a considerable extent; in others, it is thin and scanty, or almost entirely consists of a thick tenacious mucus.

33. *B*. The morbid exudation varies much in consistence, in quantity, and the extent of surface covered by it. In some complicated or consecutive cases, already alluded to, a false membrane has formed from the fauces to the last ramifications of the bronchi. MM. BRETONNEAU and BRICHETEAU have observed it without any breach of continuity throughout the whole of this extent. I have never met with an instance where it was so extensive, without interruptions, particularly in the bronchi and about the larynx. In the greater number of the pure uncomplicated cases of the disease, the concretion exists principally in the upper part of the trachea. In the more acutely inflammatory, it extends to the larynx and epiglottis; in others, to the first ramifications of the bronchi; and in a few, in both directions. In the complicated cases, and in those of an apparently epidemic and infectious nature, the throat is equally affected, constituting the *Diphtherite*, or the *Inflammation pelliculaire* of M. BRETONNEAU. This false membrane is whitish, greyish white, or passing to a greyish yellow. Its thickness varies considerably. MICHAËLIS and BARD consider a line and half, or two lines, to be its utmost thickness. I have certainly seen portions quite as thick, but not thicker, and sometimes evidently consisting of two or more distinct layers. It is thickest in the posterior and superior part of the trachea, and thinnest about the larynx and epiglottis, when it extends thither, and in the lowest and anterior part of the trachea. Its consistence and tenacity also vary extremely, not only in different, but also in the same case. It is almost universally softest where it approaches the bronchi, where it generally passes into a thick glutinous mucus. The more consistent and firm it is, the more perfectly is it moulded upon the surface from which it was secreted. But when the consistence is slight, it forms merely membranous shreds, or soft polypous concretions, intermingled with a thick glutinous mucus. The interior of those exudations is generally covered with a whitish tenacious mucus; and their exterior, or the surface which has been in contact with the inflamed mucous membrane, is sometimes dotted with minute specks of blood. In some cases, these concretions are found still adhering to the surface on which they are formed; in others, they are either partially or altogether detached from it by a puriform mucus.

34. The state of the exudation varies with the stage of the disease, the intensity of the inflammation, and the treatment which has been adopted. Thus, when a child dies very early in the malady, instead of the albuminous coating above described, a tenacious, or reddish, frothy mucus is only found. In this comparatively rare case, the spasm of the air-passages attending the inflammation, together with the obstruction occasioned by this mucus, has produced asphyxia. It seems that this glutinous exudation becomes more condensed, and moulded into a false membrane, or partially assumes this state, as the disease advances. (See BRONCHI AND AIR-PASSAGES.)

35. *C*. In many cases, instead of a membranous exudation, a viscous, muco-puriform matter lines the trachea only, or both the trachea and larynx, as remarked by FRANK, VIEUSSEUX, VALENTIN, DOUBLE, DESRUELLES, BRICHETEAU, BLAUD, and ODIER. This substance is whitish, greyish, or yellowish grey, and occasionally flocculent. It is not infrequently formed in considerable quantity in the more acutely inflammatory cases (§ 12.), and particularly in those which terminate fatally in some hours. It seems as if the quantity of thick viscous matter thrown out on the inflamed surface, together with the spasm of the trachea and larynx, occasioned suffocation before it could be condensed into a membranous substance. Cases of this description have been particularly noticed by M. ROYER-COLLARD, and have occasionally come before me in practice. I have sometimes also observed a thick, stringy, and adhesive matter, of a greyish white colour, in the superior and posterior part of the trachea and larynx, obstructing the passage, the mucous membrane underneath being nearly altogether exempt from redness and tumefaction. In some instances, this matter has presented a muco-puriform character, varying in its shade of colour, but extremely thick and adhesive. A similar appearance has been remarked by DESRUELLES, DOUBLE, BLAUD, and BRICHETEAU. Owing to the absence of the usual marks of inflammation in the situation where this accumulation has been met with, it may be presumed that the inflammatory marks had partly dis-

appeared after the discharge of this matter; its secretion promoting the resolution of the inflammatory action, the remaining signs of which had vanished after death; the accumulated secretion which had been instrumental in occasioning dissolution alone presenting itself, the powers of life having been insufficient for its excretion. I have suspected, from observing the progress of other cases, that the inflammatory action sometimes had commenced in the bronchi, extended upwards along the trachea, and that the secretion now noticed had been chiefly furnished from the larger bronchial ramifications, and had become so thick and adhesive when it arrived at the upper part of the trachea and larynx, as not to have been expelled by the cough, but to have excited spasm of the glottis, and thereby produced suffocation. In some instances of this description, more decidedly inflammatory appearances were observed in the larger bronchi than in the trachea. It is probable in these, that the secretion found in the latter situation proceeded chiefly from the former, and that the injection of the vessels in the mucous lining of the trachea had disappeared after death.

36. *D.* Any very remarkable lesion of the tissues subjacent to the mucous surface has not been found, unless the disease has terminated in tracheal consumption. It has been a question whether or not the false membrane formed in croup is capable of becoming organised, and united to the surface that has produced it. We have no conclusive evidence of such an occurrence, although SOEMMERRING, ALBERS, and BRICHETEAU are inclined to believe it possible. The other morbid appearances are chiefly the consequences of the interrupted functions of respiration and circulation through the lungs; such as congestion of this organ and of the brain; hepatisation of parts of the lung; emphysema of this viscus; and, in very young children, enlargement of the thymus gland. The lesions observed in the complications of the disease, as far as they have not been already noticed, more strictly belong to the particular maladies with which it is occasionally thus associated; where they are described, and in the article MEMBRANE.

37. ii. *Nature of the Disease.* — Different opinions have been entertained as to its inflammatory nature in all cases, the exact character of the inflammation, and the extent to which spasm of the upper parts of the air-passages may contribute to its production. The very slight inflammatory signs sometimes found in the part covered by the false membrane; the absence of these, as well as of any fluid or concrete exudation, in other cases; the circumstances under which the disease has sometimes made its appearance, and the absence of phlogistic symptoms in its course, an albuminous exudation either forming notwithstanding, or not at all; have induced several writers to consider it as not merely an inflammation of the upper part of the air-passage, but a disease of a peculiar nature, more or less connected with the state of the system, although principally affecting the trachea, and frequently the larynx and large bronchi also. The opinions of ROGERY, HARLES, HECKER, and many others, amount to this merely; and they seem not far from the truth. I have remarked, that, although croup assumes the more unequivocally inflammatory form in strong and plethoric children, it does not most frequently affect them, unless they be of the sanguine or irritable temperament; that it presents every shade or modification from this, to the least phlogistic, and most manifestly spasmodic, form; that even its most inflammatory state may assume a spasmodic or nervous character after large depletions, which, while they diminish, as under every other circumstance of disease, the phlogistic diathesis and symptoms, increase the nervous and spasmodic; and that, even when the first seizure has been of the inflammatory form, yet the relapses, or subsequent attacks, which are sometimes repeated several times at irregular intervals, have generally possessed more of the spasmodic character.

38. Another fact, which I have uniformly observed, appears important, namely, that the quantity of fibrine and crassamentum in the blood taken from the patient, and of albumen in the urine, have been great in proportion to the inflammatory type of the disease, and the disposition to form a false membrane; whilst in the more spasmodic varieties, in which an albuminous exudation is seldom found, or at least but sparingly, and the urine is more copious and limpid, and less, or not at all, albuminous, the blood has presented a smaller or less firm crassamentum. These facts evidently show, not only that the state of the blood is different in these forms of the disease, but that the condition of the organic nervous or vital power, upon which the appearances and constitution of the circulating fluid so closely depend, is also different; and, moreover, that the manifestations of both the one and the other will vary in the different modifications of croup, conformably with these results. The combined and reciprocative operation of the nervous influence, and the condition of the circulating fluid, will give rise, according to the state of the frame, and the nature and combination of the exciting causes, to constitutional as well as local phenomena; to a state of febrile action, which will be inflammatory in, generally, the majority of cases, nervous in others, and present more or less of gastric or even of adynamic symptoms in some, particularly when the disease occurs in a complicated or epidemic form. The importance of attending, during the treatment of particular cases, and of their different stages, to the characters of the constitutional disturbance — to the attendant fever, will be evident, as indicating not only the means to be adopted, but also the nature of the local mischief. Thus, in the cases attended by inflammatory fever, the exudation is abundant and rapidly formed; in that manifesting the nervous form, it is either scanty, imperfect, or consists of a little glairy fluid, — the spasmodic character predominating, and cerebral symptoms sometimes supervening; and in that presenting the adynamic and gastric form, it is spreading, — being seldom limited to the trachea and larynx, but often extending to the pharynx, fauces, the mouth, and even to the nostrils on the one hand, and down the œsophagus and bronchi on the other. It is in this last form that the disease presents itself when it is epidemic or infectious; and although the adynamic (or the malignant character, according to J. P. FRANK) often manifests itself early, yet the antecedent febrile symptoms very evidently evince high action.

39. There is one important point not sufficiently adverted to by authors, viz. the very early period at which the tracheal exudation is often poured out, in the inflammatory states of the disease; the symptoms marking the first or premonitory period being those indicating the local developement of the malady. Thus, a healthy child has evinced no disorder for several days, or the disorder has been so slight as to escape observation — it may even be more than usually lively and alert on the day preceding the night on which it is most severely attacked; and yet, if an emetic be that instant exhibited, a large quantity of thick, glairy, sanguineous, and gelatinous matter will be brought away from the air-passages; showing that, in many instances, the early advances of the inflammatory action is slow and insidious; that the characteristic seizure often does not occur until the exudation has accumulated to a considerable extent in the trachea, or the inflammation has extended to the larynx; and that it is partly owing to the retention of this matter, —which is evidently thrown out in a fluid form,—that it concretes into a false membrane, each successive discharge sometimes forming a distinct layer. MM. Gendrin, Andral, and other pathologists, have remarked, that the inflammatory action which gives rise to the albuminous exudation on the surface of mucous membranes is of a sub-acute, rather than of an acute kind. I believe that this is the case in respect of the inflammation of the trachea and larynx, in croup; and that the formation of a false membrane is the result not so much of the sthenic or acute character of the local action, as of the abundance of albumen and fibrine in the blood,—a circumstance which partly accounts for the frequency of relapses in some children (§41. *o.*), and justifies Harles, Hecker, and others, in considering the disease to consist of a peculiar form of inflammation. Some writers, however, suppose that the very acute symptoms, and rapid termination of many cases, militate against these opinions; but it should be recollected that, even in the most severe cases, the inflammatory action, when it commences in the trachea, often exists for several days, in the manner already noticed, until it has either extended to the larynx, or produced such a quantity of albuminous exudation as will obstruct respiration, or induce, by its irritation, spasm of the air-passages,—these effects being the chief causes of the severity and rapid termination of the disease. This will become more evident, when we consider the consequences of interrupted respiration upon the frame—whether the interruption proceed from the mechanical obstruction occasioned by the exudation and false membrane, or the frequent recurrence or continuance of spasm of the larynx and trachea; or from inflammatory action, and its consecutive exudation extending down the bronchi; or from two or all of these combined. These consequences are, in fact, the third stage of the disease; the symptoms of which are the usual phenomena resulting from obstructed respiration, interrupted circulation, and congestion of the lungs; imperfect action of the air upon the blood, and the circulation of this fluid in a nearly venous state, with congestion of the cavities of the heart, and impeded return of blood from the head. The circulation, moreover, of imperfectly arterialised blood to the nervous systems occasions lethargy, with sinking of the vital powers, and increases the disposition to spasmodic action of involuntary parts, and to convulsive movements of voluntary organs; all which (the former especially) become so prominent a character of the malady in its advanced stages, and often terminate existence. Thus it will appear manifest, — and the fact is of great practical importance, — that the severity, rapidity, and danger of croup, are not the immediate consequences of the activity or acuteness of the inflammatory action; but of the exudation to which it gives rise, and of the conformation and functions of the parts which it affects.

40. Duval, Jurine, Albers, and Schmidt, have considered it worth ascertaining, in how far the disease could be *artificially produced* in the lower animals; and whether or not, when thus produced, inflammation exists to the extent of accounting for the phenomena, or gives rise to a false membrane. They injected into the trachea of fowls, dogs, cats, sheep, wolves, &c. various irritating substances, as the bichloride or peroxide of mercury (Schmidt) dissolved in spirits of turpentine, and solutions of iodine, and nitrate of silver; they moreover made these animals inhale the fumes of sulphuric and muriatic acids; and the results were just what might have been anticipated, viz. that in some cases, inflammation without any exudation was produced; in others, a fluid, or more or less concrete exudation was found in various quantity; and in all, the matter in the air-passages was not sufficient entirely to obstruct the access of air to the lungs; thus confirming the opinion justly contended for by Cullen and others, that a great part of the phenomena and consequences of the disease is to be attributed to spasm of the larynx and trachea. Schmidt succeeded in producing a false membrane only in young animals, — a fact in accordance with the spontaneous occurrence of the disease previously to puberty, and to be referred to the more albuminous state of the blood often observed at this period. It may be of importance to know that croup — identical in its phenomena and organic changes with the disease in the human subject — occurs also in several of the lower animals, especially before they are fully grown. Its occurrence in chickens is well known by the name of "*Pip.*" Dupuy, Rush, Valentin, Youatt, and others, have observed it in horses and dogs; Double, in lambs and cats; and Ghisi and Gohier, in cows. In some of these animals it has even occurred as an epidemic.

41. *Pathological Conclusions.* — Another point, of greater importance than it may at first seem, is whether or not the matter concreted and moulded on the inflamed mucous surface be exuded by this tissue itself, or secreted by the follicular glands with which it is so abundantly supplied. M. Grimaud has adopted the latter alternative. From particular attention I have paid to this subject, some of the results of which have been stated in the article Bronchi (§11, 12.), I would draw the following inferences relative to it, and to the pathology of croup generally: — (*a*) That the mucous membrane itself is the seat of the inflammation of croup; and that its vessels exude the albuminous or characteristic discharge, which, from its plasticity, and the effects of temperature and the continued passage of air over it, becomes concreted into a false membrane; — (*b*) That the occasional appearance of blood-vessels in it arises

from the presence of red globules in the fluid when first exuded from the inflamed vessels, as may be ascertained by the exhibition, upon the approach of the symptoms, of a powerful emetic, which will bring away this fluid before it has concreted into a membrane; these globules generally attracting each other, and appearing like blood-vessels, as the albuminous matter coagulates on the inflamed surface;—(*c*) That the membranous substance is detached in the advanced stages of the disease, by the secretion, from the excited mucous follicles, of a more fluid and a less coagulable matter, which is poured out between it and the mucous coat; and, as this secretion of the mucous cryptæ becomes more and more copious, the albuminous membrane is the more fully separated, and ultimately excreted if the vital powers of the respiratory organ and of the system be sufficient to accomplish it; — (*d*) That sub-acute or slight inflammatory action may be inferred as having existed, in connection with an increased proportion of fibro-albuminous matter in the blood, whenever we find the croupal productions in the air-passages; but that these are not the only morbid conditions constituting the disease; —(*e*) That, in conjunction with the foregoing, — sometimes only with the former of these in a slight degree,—there is always present, chiefly in the developed and advanced stages, much spasmodic action of the muscles of the larynx, and of the transverse fibres of the membranous part of the trachea, which, whilst it tends to loosen the attachment of the false membrane, diminishes, or momentarily shuts, the canal (of the larynx) through which the air presses into the lungs; — (*f*) That inflammatory action may exist in the trachea, and the exudation of albuminous matter may be going on, for a considerable time before they are suspected,—the accession of the spasmodic symptoms being often the first intimation of the disease; and these, with the effects of the pre-existing inflammation, give rise to the phenomena characterising the sudden seizure; — (*g*) That the modifications of croup may be referred to the varying degree and activity of the inflammatory action; the quantity, the fluidity, or plasticity of the exuded matter; the severity of spasmodic action; and to the predominance of either of these over the others in particular cases, owing to the habit of body, temperament, and treatment of the patient, &c.; — (*h*) That the muco-purulent secretion, which often accompanies or follows the detachment and discharge of the concrete or membranous matters, is the product of the consecutively excited, and slightly inflamed, state of the mucous follicles, the secretion of which acts so beneficially in detaching the false membrane; — (*i*) That a fatal issue is not caused merely by the quantity of the croupal productions accumulated in the larynx and trachea; but by the spasm, and the necessary results of interrupted respiration, and circulation through the lungs; — (*k*) That the partial detachment of fragments of membrane, particularly when they become entangled in the larynx, may excite severe, dangerous, or even fatal spasm of this part, according to its intensity relatively to the vital powers of the patient; and that this occurrence is most to be apprehended in the complicated states of the malady, where the inflammatory action, with its characteristic exudation, spreads from the fauces and pharynx to the larynx and trachea; the larynx being often chiefly affected in such cases, and, from its irritability and conformation, giving rise to a more spasmodic and dangerous form of the disease; —(*l*) That the danger attending the complications of croup is to be ascribed not only to this circumstance, but also to the depression of vital power, and the characteristic state of fever accompanying most of them, particularly in their advanced stages; — (*m*) That irritation from partially detached membranous exudations in the pharynx, or in the vicinity of the larynx or epiglottis, may produce croupal symptoms in weak, exhausted, or nervous children, without the larynx or trachea being themselves materially diseased; and that even the sympathetic irritation of teething may occasion the spasmodic form of croup, without much inflammatory irritation of the air-passages, particularly when the prima via is disordered, and the membranes about the base of the brain are in an excited state; — (*n*) That the predominance in particular cases of some one of the pathological states noticed above (*g*), as constituting the disease, and giving rise to the various modifications it presents, from the most inflammatory to the most spasmodic, may be manifested in the same case, at different stages of the malady, particularly in its simple forms, and in the relapses which may subsequently take place; the inflammatory character predominating in the early stages, and either the mucous or the spasmodic, or an association of both, in the subsequent periods; — (*o*) That the relapses, which so frequently occur after intervals of various duration, and which sometimes amount to seven or eight, or are even still more numerous, may each present different states or forms of the disease from the others; the first attack being generally the most inflammatory and severe, and the relapses of a slighter and more spasmodic kind; but in some cases this order is not observed, the second or third, or some subsequent seizure, being more severe than the rest, or even fatal, either from the inflammation and extent of exudation, or from the intensity and persistence of the spasmodic symptoms, — most frequently from this latter circumstance. The above inferences, however minute or trite they may seem, should not be overlooked, as they furnish the safest and most successful indications of cure, and are the beacons by which we are to be guided in the treatment of the disease.

42. VI. TREATMENT.—i. THE CURATIVE TREATMENT OF CROUP. I shall first state the method of cure on which I would chiefly rely in the different modifications of the disease; and afterwards notice some of the remedies which have been recommended by various writers. Several of these are of great benefit in certain circumstances of the disease; but we can seldom depend upon any one of them: it is on a judicious combination and sequence of means that we should chiefly rely; and upon the adaptation and co-ordination of these in particular cases. The *intentions of cure* are—1st, to diminish inflammatory and febrile action, when present; and to prevent, in these cases, the formation of a false membrane, or the accumulation of albuminous matters in the air-passages; —2d, when the time for attempting this has passed, or when it cannot be attained, to procure the discharge of these matters; — 3d, to subdue spasmodic symptoms as soon as they appear; and, 4th,

to support the powers of life in the latter stages, so as to prevent the recurrence of spasms, and to enable the system to throw off the matters exuded in the trachea.

43. *A. Treatment of the common and inflammatory Croup.* — *a.* If the practitioner see the patient in the *first stage* (§ 6.), particularly if hoarseness, or a rough cough, with other catarrhal symptoms, be present, it will be proper to give an active antimonial emetic, with the view of fulfilling the *first* of the above intentions. This will often bring away a considerable quantity of a thick, glairy, and sometimes slightly sanguineous matter from the trachea, and will give immediate, although generally only temporary, relief. If the matter discharged from the air-passages present the above appearances; if the child be plethoric, the pulse at all excited, and the countenance flushed; we should not be deceived by the calm following the full operation of the emetic, but should have recourse to blood-letting. In the majority of instances, cupping between the shoulders or on the nape of the neck, or the application of leeches on the sternum, to an extent which the age, habit of body, and strength of the patient may warrant, will be preferable to venæsection. Under these circumstances, particularly when the nausea occasioned by the emetic has hardly subsided, the abstraction of little more than an ounce, or an ounce and a half, of blood, for every year that the child may have completed, will be borne. In town practice, the local is preferable to general blood-letting; but the latter will be adopted, with advantage, in the country, amongst plethoric and robust children. The advantages of depletion and antimonials are attributable to their influence in arresting the inflammatory action, and, from the consecutively accelerated absorption of fluids into the circulation, to the relative diminution of the albuminous constituents of the blood.

44. Immediately after depletion, and an emetic, the best internal medicine undoubtedly is *calomel* and *James's powder* — from three to five grains of the former, and two or three of the latter. This powder may be repeated every second, third, or fourth hour, until two or three doses have been taken. After the firse dose, the child should be put in a tepid bath; and be allowed as much tepid diluents as the stomach will bear, in which sub-carbonate of soda may be dissolved, and which may be rendered agreeable with syrup. If the powders, given to the extent now mentioned, have not acted upon the bowels, castor oil, or some other purgative, assisted by an emetic, should be administered. These means will seldom fail of cutting short the disease. If, however, it still proceed, the means to be employed in the next stage should be adopted according to the circumstance of the case.

45. *b.* The *second or developed stage* is that in which medical aid is most frequently resorted to; and at this period, conformably with what has been stated (§ 39.), the disease is actually further advanced than the symptoms indicate. At its commencement, however, the *first intention of cure* should be attempted; but the most decided means will be now requisite to attain its fulfilment. These should be put in practice, even although the treatment already recommended may have been employed in the preceding stage. An active *antimonial emetic* should be instantly exhibited, so as to produce full vomiting; and immediately upon the conclusion of its operation, *blood-letting*, general or local, must be resorted to. The abstraction of a greater quantity than that indicated above (§ 43.) will seldom be more beneficial; nor, indeed, will it be borne without producing syncope, which, in children, especially, should be avoided, as favouring the supervention of convulsions or reaction. But it may be requisite, particularly when the patient has not lost any blood during the preceding stage, to repeat the depletion. On this, or on any future occasion of repeating it, local blood-letting, in the situations and mode already mentioned (§ 43.), is now to be preferred. If it have not been prescribed previously, the calomel and James's powder should be given every two or three hours, until three or four doses are taken; and the adjuvants directed to accompany and to follow this medicine in the first stage, should also be employed in this.

46. Having thus carried depletion as far as seems prudent, and fully evacuated the *primæ viæ*, and a very obvious improvement have not taken place, or if the suffocating seizures recur notwithstanding, a blister should be applied between the shoulders, on the nape of the neck, or on the epigastrium, *but never on the throat;* and if symptoms of febrile excitement still attend the seizures, a full dose of tartar emetic should be given, so as to excite vomiting again, and be repeated until it has this effect fully. If the urgent symptoms and fever still continue, *vomiting* may be excited a third or fourth time, at intervals of two or three hours. The tartar emetic is, upon the whole, the best medicine for the purpose in the early or inflammatory states of the disease, and may be given in doses of half a grain, in simple solution, to a child two or three years old, as advised by Dr. Cheyne, and repeated at about half an hour, or sooner, if vomiting be not induced. M. Guersent prefers ipecacuanha, and advises blood-letting to precede the exhibition of emetics. Where the inflammatory action is considerable, this method may be adopted; but where we may expect to bring away the exuded matter by means of an emetic, before it has concreted into a membrane, it will be as well to exhibit one without delay, and to keep up a constant nausea by the same medicines given in frequent and small doses.

47. If the symptoms continue notwithstanding the judicious use of the above means, we should infer the formation of a false membrane, unless the exacerbation be altogether spasmodic — the breathing and voice becoming natural, or nearly so, in the intervals. The measures to be employed now should have reference to the separation and discharge of the concrete exudation, and the removal of spasmodic symptoms — to the fulfilment of the *second* and *third intentions* proposed. Bleeding, even if the state of the patient would admit of it, would not promote these intentions; and the exhibition of calomel or mercurials, excepting with the view of promoting all the abdominal secretions and excretions, and thereby to derive from the diseased organ, would not materially assist our views, inasmuch as it is impossible thereby to affect the system of children so as to prevent the formation of coagulable

lymph. In this case, we should assist the operations of nature in detaching the false membrane. It has been stated, that this is accomplished by the effusion, by the excited follicles, of a fluid matter between the concrete substance and the mucous coat; therefore those medicines which have usually the effect of increasing and rendering more fluid the mucous secretion of the air-passages, should now be prescribed. But care should be taken not to exhibit these, or any other *expectorants*, too early, or until depletion has been carried sufficiently far. They are most serviceable about the termination of the second, and the commencement of the third stage. The medicines best calculated to act as expectorants in this disease are, the preparations of *squills*, of *ammoniacum*, of *senega*, the *sub-carbonates* and the *sulphurets* of the *alkalies*, and *camphor*. The oxymel or syrup of *squills* may be given, either alone, or with some one of the sulphurets, or with senega, and generally to the extent of keeping up a slight nausea, unless the exacerbations of cough and suffocation be severe, when full vomiting should be produced by their means. I prefer the emetic effect at this period to be obtained by squills; as antimony lowers too quickly the vital power, which ought now to be supported, so as to enable the diseased organ to throw off the morbid matter formed upon its surface. A mixture, consisting of decoction of senega, with vinum ipecacuanhæ and oxymel of squills, may also be adopted with equal advantage. When the medicines fail of exciting vomiting, the pharynx should be irritated by a feather. I have seen very much benefit derived from this simple means; and have considered it more beneficial than any other, in the third stage, in promoting the discharge of matters from the trachea. Jurine also places great reliance on it. When severe exacerbations, with spasm and threatened suffocation, occur, it is always most advantageous to produce instant vomiting. The sulphate of zinc has been advised by M. Guersent, and the sulphate of copper by Dr. Hoffmann, for this purpose.

48. During this and the preceding stages, the *inhalation* of watery and medicated vapours may be resorted to. At the commencement of the disease, vapours of an emollient kind are most beneficial; but when we wish to promote expectoration, camphor may be added to the substance used in this way. Home, Crawford, Pearson, Rosen, Pinel, and Goelis, have approved of this practice. When spasmodic symptoms manifest themselves, inhalation, assisted by the *tepid* or warm bath, is often of use; but antispasmodics should also be prescribed with the other medicines, or in enemata. I have never seen any permanent advantage derived from narcotics given by the mouth, except from *opium* or syrup of poppies, combined with antispasmodics; probably owing to their lowering the vital energies, which are always much depressed when nervous symptoms appear. Great care should be always taken in exhibiting *opiates* in clysters to children: in very young children the practice is attended by much risk. Opiates are given to greatest advantage with ipecacuanha, as in Dover's powder, or with camphor or calomel, or with both. I have likewise found camphor, with James's powder and hyoscyamus, of much benefit in some cases in which I have prescribed it. The *hydro-sulphuret* of *ammonia* may likewise be tried, in both this and the next stage of the disease.

49. In many cases, the judicious use of blood-letting, calomel, antimony, &c. will cut short the disease, even although the patient may not have been treated until this period has been far advanced; and in others, the active use of these means may give rise to very alarming depression of the vital energies, even when they may have succeeded in removing the cause of obstruction and irritation in the air-passages. In these, stimulants, antispasmodics, and restoratives must be immediately resorted to, but with great caution, lest the inflammatory action be reproduced by their means.*

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* The following case will illustrate the above observation, and may prove instructive to the less experienced reader. I have extracted it *verbatim* from my note-book, with the remarks suggested at the time appended to it: —

William Hodson, aged five years and a half, was seized, on the 17th of Nov. 1821, with hoarseness, fever, and a ringing, dry cough. The mother opened its bowels with salts, and gave it some antimonial wine. The following day, in the evening (18th), I saw it. There was much fever, with flushed countenance, and a constant, hard, and ringing cough, with a sibilous noise on respiration. Pulse frequent and hard; skin harsh and dry; great restlessness, tossing, dyspnœa, with hoarseness, and the characteristic breathing of croup. I directed blood-letting from a vein in the arm; and the blood was allowed to flow in a full stream till approaching syncope was indicated, seven ounces being abstracted; and the following powders were directed to be taken every ten minutes, till full vomiting; and subsequently every three hours: —

No. 162. ℞ Hydrarg. Submur. gr. xxx.; Antimon. Tart. gr. iij.; Ipecacuanhæ gr. vj. Misce benè, et divide in Pulv. viij.

Early in the morning of the 19th I again saw the child. The powders had been given, as above, until full vomiting had been produced; and one powder had been taken subsequently. The sense of suffocation had disappeared after the vomiting. The matters ejected contained much thick, ropy mucus, with membranous shreds of firm coagulated lymph floating in it. The cough and croupy symptoms had disappeared; the voice was clear, and the respiration easy: but now the child complained of distressing sickness, with frequent vomiting and purging: the stools were first bilious, offensive, copious, and fæculent; but they had now become watery. The pulse was extremely frequent, so as scarcely to be counted; and so small and thready as hardly to be felt at the wrist. The countenance was pale and sunk; the skin cool and moist; and all the symptoms of sinking of the powers of life very manifest. The powders were discontinued, and the following mixture directed: —

No. 163. ℞ Aq. Cinnam. ℥ iijss.; Spirit. Ammon. Arom. ʒ jss.; Tinct. Opii ♏ xv.; Syrup. Scillæ ʒ iij. M.

Two teaspoonsful of this were to be taken every ten or fifteen minutes, until a decided effect from it was evident. After four or five doses, the stools and sickness were restrained, and the child fell into an easy and sound sleep.

A blister was now applied to the sternum, which was to be removed at the end of four hours, and poulticed with a bread-and-water poultice. The semicupium to be employed afterwards, and at bed-time. Three grains of calomel, with one of James's powder, to be taken at night; and the mist. camphoræ, with liq. ammon. acet., vini ipecacuanhæ, and syrup. papaveris, every three hours. Linseed tea, or barley water, with sugar-candy or liquorice, for common drink.

20th.— All the symptoms of croup had disappeared; but there was still some cough and fever, with occasional paroxysms of difficult breathing. The bowels had been open this morning; pulse 120, and small. Antimonial wine was added to the mixture; and an injection directed, with assafœtida, spiritus terebinthinæ, oleum ricini, and camphor.

In the evening.— He had had no return of the paroxysms since the injection, which was retained above an hour, and had procured two evacuations. Pulse 116; cough less frequent; skin more natural. The blistered surface had risen in some parts, and was inflamed in all.

From this time he continued to recover: diaphoretics, demulcents, aperients, and the semicupium, being employed until convalescence was complete.

Remarks.—It is by no means unusual to find a recurrence of the inflammatory and local symptoms, after they have been apparently most completely subdued by means similar to those employed in the foregoing case; and even after the powers of life, and all local inflammation and febrile ac-

50. *c. The treatment of the third stage*, either when the patient has not been earlier seen, or when previous measures have failed, should be directed with the view of fulfilling the *second* and *third* indications of cure, and at the same time with due reference to the *fourth* — the preservation of the exhausted nervous and vital powers. The chances of recovery are now very few; but these few should not be neglected. Many of the remedies already mentioned, especially *expectorants*, should also be exhibited in this stage; and these ought occasionally — particularly when the symptoms become very urgent — to be given so as to exert a speedy emetic action; and be combined with *antispasmodics* — with either camphor, ammonia, æther, musk, valerian, assafœtida, the oxide of zinc or bismuth, the sulphurets of the alkalies, &c.; and the same medicines, or the infusion of valerian, may also be prescribed in enemata, especially when spasmodic or nervous symptoms are predominant. When *emetics* are required in this stage, those substances which are exhibited in smaller doses in the remissions, in order to act as nauseants or expectorants, are amongst the most eligible — particularly squills, senega, the sulphate of zinc. The *inhalation* of the vapour of ammonia, camphor, or æther, in that of warm water; or of the fumes of warm vinegar, either alone, or with camphor; is sometimes productive of benefit in this period. Some advantage may also be derived from *sternutatories* blown into the nostrils, as advised by Lentin and Thilenius. I have seen, in two or three instances, the sneezing occasioned by them favour remarkably the discharge of the false membranes from the trachea; common Scotch snuff having been used for this purpose.

51. The *tepid bath* may be resorted to both in this and the preceding stage, once or twice daily, or according to circumstances; and either the sulphuret of potash, or the sub-carbonates of potash or soda, may be put in the water; and, if a tendency to collapse becomes apparent, the bath should be *warm*, and some mustard may also be added. *Blisters* between the shoulders, or on the sternum, may likewise be tried; but they always require great discrimination and care, in order to avoid unpleasant consequences from them. They should not, in this stage, remain on longer than from four to eight hours. Home and Thilenius advise them to be applied to the neck; Lentin and Goelis, to the neck and sternum; and Royer-Collard, between the shoulders or on the arms; Maercker states, that he has derived but little benefit from them. Olbers and Royer-Collard speak favourably of sinapisms placed on the lower extremities. I have, however, seen more advantage accrue from rubefacient liniments (F. 299. 304.) or epithems, applied on the epigastrium and chest, or between the shoulders. During this, as well as the preceding stage, a *cathartic* action should be exerted upon the bowels, unless the medicines previously exhibited occasion diarrhœa, or dysenteric symptoms. Medicines of this description are beneficial, as active derivatives from the seat of disease, and as evacuants of morbid secretions. Calomel, with jalap, may be given, either alone, with musk, or some other antispasmodic medicine; but, in every instance, the occasional exhibition of an enema should not be neglected. Olbers, Albers, and Jurine, strenuously advise large doses of *musk* to be exhibited; and Kendrick and Royer-Collard, *assafœtida* to be administered in clysters. The *affusion of cold water* on the head has been sometimes resorted to by Harders, Schmidt, and myself, when the preceding means have failed, particularly if congestion or other cerebral symptoms have supervened, and the exacerbations have assumed chiefly a spasmodic form.

52. *B. Treatment of the humid and spasmodic Forms of Croup.* — *a.* In the *humid or bronchial form* of the disease, the intentions of cure are, — 1st, to subdue inflammatory action; 2d, to remove the matters exuded from the air-passages; 3d, to calm spasmodic action; and, 4th, to support vital power. These can be attained only by *bleeding*, general or local, as already advised, but never from the throat itself; in the early stages by antimonial *emetics*, and subsequently by those consisting of ipecacuanha or sulphate of zinc; by *calomel*, with James's powder, as prescribed above, and afterwards with other *purgatives*, as scammony or jalap; by *cathartic* enemata; by *external derivatives*; and, lastly, by *antispasmodics* and *diffusible stimulants*. Of these, individually, little need be added to what has been already advanced. More advantage seems to be derived from *purgatives*, in this, than in any other form of the disease. I have sometimes seen them bring away a thick, gelatinous, glairy secretion, similar to that discharged from the air-passages in the advanced stages. Their operation should be promoted by the administration of purgatives in antispasmodic clysters, as extract of colocynth with assæfœtida, valerian, or camphor; and if spasmodic symptoms become urgent, the sulphurets or sub-carbonates of the alkalies, and either of the various antispasmodics already mentioned, may also be taken by the mouth, particularly camphor, with James's powder, or Kermes mineral, or ipecacuanha, with spirits of nitre, æther, or other diaphoretics. The medicated *tepid* or moderately *warm bath*, *blisters*, rubefacient *liniments*, the *inhalation* of simple or medicated vapours, may also be resorted to in the manner detailed above. In the last stage, when the powers of life indicate exhaustion, ammoniacum, senega, oxymel of squills; and camphor, assafœtida, musk, ammonia, the æthers, &c. in full doses; and rubefacient and stimulating frictions, liniments, and baths, with the rest of the treatment already recommended at this period; are the chief means in which we can confide.

53. *b.* In the *spasmodic form* of the malady, the indications of cure are very nearly the same as now stated; but the treatment will necessarily vary with the extent to which inflammatory

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tion, had been equally depressed. This recurrence of the acute symptoms seems owing to either an over-active use of stimulants, or an injudicious choice of them in the collapse occasionally following the decided use of blood-letting and antimony. Sometimes it arises from exposure to cold, or a current of cold dry air; and then, generally, a distinct chilliness or rigor is previously felt. Occasionally I have traced it to a too early recourse to food, or articles of a too stimulating and indigestible description. Inattention to the state of the bowels will also dispose to it; and even a blister applied too near upon the seat of disease has evidently produced such an effect, especially in thin irritable children. In no case would I permit a blister to be placed upon the throat, so firmly am I persuaded that mischief is occasioned from it in this situation.

irritation may be supposed to exist either in or about the larynx, particularly soon after the appearance of the disease; or about the medulla oblongata, in its more advanced course. In that state of constitution in which this form is most frequent, bleeding is seldom required beyond that procured by a few leeches applied to the nape of the neck, when we infer the presence of inflammatory irritation in the above situations. In this modification, whether occurring primarily, or in relapses, *antispasmodics*, given both by the mouth and by clysters, are indispensable; but *emetics*, and afterwards *cathartics*, medicated *tepid* or *warm baths*, and *inhalations*, *blisters*, or *rubefacient* frictions and liniments along the spine and over the epigastrium, and the *cold affusion* on the head, also constitute important parts of the treatment. The antispasmodics most to be confided in, are, the sulphurets and sub-carbonates of the alkalies, valerian, assafœtida, ammonia, camphor, musk, the preparations of æther, the oxides of zinc and bismuth, and the liquor ammoniæ acetatis, with excess of ammonia. Mr. KIMBELL states, that he has derived most advantage from the internal use of arsenic, or sulphuret of potass, aided by regular attention to the bowels, the shower bath, and by blisters or anodyne frictions on the spine. Of arsenic I have had no experience in this affection; but I have given the preparations of bark, and used the other remedies he has mentioned, with advantage. If the above means do not soon remove the disease, irritation about the base of the brain or medulla oblongata should be suspected, and leeches ought to be applied on the neck; and calomel, with aperients, or with musk or camphor, exhibited once or twice daily, injections being also employed: cerebral symptoms should be always enquired after, and energetically treated when detected.

54. C. *Treatment of complicated and consecutive Croup.* — The treatment of the various complications of the disease must be directed according to the general principles now sketched; and with strict reference to the nature of the associated malady, to the period of the primary disease at which it appeared, to the characters of the attendant constitutional disturbance, and of the prevailing epidemic, and to the well-ascertained fact that local inflammations supervening in the course of continued or eruptive fevers, although they require depletions, do not admit of them to the same extent as those which occur primarily.

55. *a.* The association of croup with *inflammation of the throat*, and exudation of lymph in this situation, whether originating in the *pharynx*, which is rarely the case, or extending thither and to the air-passages from the fauces and tonsils, is one of the most frequent forms in which the disease presents itself, particularly when epidemic or infectious, and is, therefore, deserving of particular notice. But the treatment must, in a great measure, depend upon the degree in which either sthenic or asthenic inflammatory action and fever may be considered to exist. Although great increase of vascular action is present at the onset, in the majority of such cases; yet it is often attended by deficient vital power, and exhaustion soon takes place. Even in the most sthenic cases, the treatment which would have been of service at first, is soon no longer admissible; whilst in other cases, and in some epidemics, very marked adynamia is manifested from the commencement. Much depends on the precision with which the exact nature of the case and the state of vital power are ascertained, and on having early recourse to judicious measures. As to the predominance of either of the states of morbid action alluded to, the frequency and tone of the pulse, the colour of the exudation in the throat, and of the parts surrounding it, and the continuance of the disease, are the chief guides. If the inflammation and exudation commence in the tonsils and spread downwards, if the exudation be of a light colour, and the inflamed parts of a lively hue, the pulse being strong, full, and not very quick, depletions, general or local, the use of emetics and nauseants, and the rest of the antiphlogistic treatment, are required; but the further the disease departs from these characters, the darker and dirtier the exudations appear, the more livid and deeper the colour of the inflamed parts, the quicker, softer, and weaker the pulse, the more should antiphlogistic measures be relinquished, unless in some cases to a moderate extent, and at the very commencement of the complaint; and the more ought we to have recourse to camphor, ammonia, the decoction of senega, ammoniacum, &c.

56. *b.* The nearer the complicated disease, in its local and constitutional manifestations, approaches to the *malignant form*, the more extreme is the danger, and the greater necessity is there for the exhibition of tonics and stimulants. In such cases, the decoction of senega, the infusion of serpentaria, or mixture of ammoniacum, may be prescribed, with camphor, and any of the compound spirits of ammonia; or the decoction of bark, with liq. ammon. acetatis and tincture of capsicum; or the sulphate of quinine, with infusion of roses, and the æthers; or either the chlorate of potassa, or the muriate or carbonate of ammonia, with camphor, musk, myrrh, assafœtida, &c. in suitable vehicles. When the paroxysms of suffocation become urgent, senega, preparations of squills, or F. 402., may be given in doses sufficient to produce vomiting, and repeated according to circumstances; and active stimulant and antispasmodic clysters be thrown up. The vapour of camphor and warm vinegar may also be employed, and various stimulating and aromatic fumigations resorted to. The mouth and throat should be frequently gargled, or washed, by means of a sponge fixed to the end of a piece of whalebone, with a solution of the chlorurets, or of the sub-borate of soda in camphor mixture; or with a weak solution of nitrate of silver, — a scruple to an ounce of distilled water, — as first advised by Mr. MACKENZIE; or with Goulard water, as suggested by Dr. HAMILTON; or with the chloric acid or chlorine in decoction of bark, or other stimulating detergents; and sinapisms or embrocations with Cayenne pepper, or rubefacient liniments (F. 300. *et cet.*), may be applied on the nape of the neck, or on the lower part of the chest, and on the epigastrium. In the complications of the disease with angina maligna, observed by LOEFFLER and BRETONNEAU, powdered alum was directed by them to be blown into the throat; and various other astringent and antiseptic powders may be employed in the same manner. When the characteristic eruption of scarlatina accompanies the affection of the throat and air-passages, the treat-

ment must be directed according to the same principles. In all cases of angina, attended with membranous exudation, whether the attendant constitutional disturbance present sthenic or asthenic characters, the local treatment advised by Mr. **Mackenzie** should be adopted upon the appearance of the exudation on the tonsils or fauces, and a large blister should be applied early, as being the most efficacious means of preventing the extension of this form of inflammation to the pharynx, air-passages, or œsophagus.

57. *c.* The treatment of the *complications with aphthæ*, or *with any of the eruptive fevers*, will depend, as much as the foregoing, upon the state of vital power characterising the constitutional affection. The appearance of croupal symptoms in the course of small-pox — particularly confluent small-pox — will require nearly the same medicines as have now been recommended (§ 56.); and the washes advised to be applied to the mouth and throat will be equally serviceable in the *aphthous*, as in the *variolous* complication. When croup is consequent upon either *measles*, or *hooping cough*, vascular depletion is more frequently required than in almost any other complication, excepting that with inflammation of the throat of a sthenic kind, whether attended by albuminous exudation or not.

58. *D. The affections consequent upon croup* — or the states of disease which it excites, or into which it passes — require not only appropriate remedies, but also the application of them with strict reference to the primary malady, and the means by which it was combated. When it runs on to *bronchitis*, the latter affection commonly assumes the asthenic form, generally terminates fatally, and requires the treatment described in the art. **Bronchitis** (§ 70. *et seq.*). Its passage into *pneumonia* is attended with similar results; and depletions, unless they have been previously neglected, are not well borne. When *diarrhœa* or *dysenteric* symptoms are produced, in the latter stages, by the means used to remove the disease, we shall generally find the preparations of *opium*, and the warm bath, as hereafter to be noticed, of much benefit. A considerable number of cases, particularly those complicated with sore throat, terminate in *sinking*, or *exhaustion* of vital power, and not by suffocation. This circumstance should be kept in view in the treatment of the last stage; and its earliest indications be met with suitable stimulants and tonics (§ 56.). In cases presenting *imminent suffocation*, the question of *tracheotomy* should be entertained; but at the same time, with the recollection, that either exhausted vital power, the extension of disease to the bronchi, and the accumulation of viscid or concrete exudations in them, or inflammatory action, or emphysema of the lungs themselves, may tend individually, or in combination, to prevent the success of the operation, independently of the immediate contingencies to which it is liable. (See § 74.)[*]

59. **Remarks on various Remedies advised, and on the Opinions of Authors respecting them.** — *a. Nauseants* and *emetics.* In the first stage of the disease, and in the commencement of the second, I have sometimes found that *tartar emetic*, given so as to produce and prolong a state of *nausea*, has so completely relieved the croupal symptoms as to prevent altogether the necessity of having recourse to blood-letting; and that in other, and more severe cases, the same medicine, exhibited so as to produce vomiting, and to continue the nauseating effect for some time afterwards, and thereby to prevent reaction supervening upon the emetic operation, has been followed by a similar result. *Emetics* have been much recommended after blood-letting, and the inhalation of vapour, and when the exudation is presumed to begin to loosen, by **Home**, **Lentin**, **Darwin**, **Maercker**, **Portal**, **Smith**, **Hecker**, **Vieusseux**, **Rumsey**, &c. When the patient has not been visited sufficiently early, this plan is certainly judicious. But when he is seen in the first stage, it will be better to attempt to prevent the formation of the false membrane, by exhibiting *nauseants* or *emetics* instantly, as now advised, and, unless the inflammatory symptoms are very severe, before having recourse to blood-letting. This early exhibition of emetics is sanctioned by **Crawford**, **Cheyne**, **Pinel**, **Hosack**, **Thompson**, **Hufeland**, **Albers**, **Schwilgue**, &c. Dr. **Gaisler** prescribes, on the invasion of the disease, tartarised antimony and oxymel of colchicum. Whilst vascular excitement continues, either this combination, or the antimony only, in repeated doses, as suggested by **Cheyne** and **Michaëlis**, is the best emetic; but when we wish to detach the membranous exudation, the preparations of squills, alone, or with ipecacuanha, are preferable. In the more spasmodic form of the disease, ipecacuanha, as **Goelis** remarks, is as suitable an emetic as can be adopted: but when it is found necessary to exhibit such a medicine in the last stage of the disease, or when it is associated with angina maligna, or attended by symptoms of depressed vital power, senega, squills, or the sulphate of zinc, given with stimulants and antispasmodics, or F. 402., are to be preferred. **Goelis** recommends emetics in the first stage of the least inflammatory forms, and generally in the third

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[*] I may here adduce a summary of the practice adopted by the most experienced physician in France in this disease — the senior physician to the Hospital for Children in Paris. It will be seen how closely it agrees with my own, in a similar Institution in London: —

M. **Jadelot** considers croup as a kind of angina of the air-passage; presenting more violent symptoms, and having true paroxysms, separated by well-marked intermissions of a special character. He admits different degrees of the disease, without changing its nature. Bleeding by leeches, and emetics, are the agents he most frequently employs in its treatment. Emetics alone have often sufficed to stop the disease, especially in weak, pale, or bloated subjects; but, in opposite cases, he insists on the application of leeches, and allows the blood to flow until the child becomes pale, and the pulse loses its strength. After the bleeding, he causes vomiting, several times in succession, at intervals of two or three hours; and the practice is attended by the greatest success, relief being very apparent after each vomit.

When the croup has arrived at the second period, without having been opposed, and the presence of a false membrane is suspected, M. J. directs leeches to be applied; but, the moment they fall off, he hastens to produce vomiting: and it is in this case that he employs, by spoonsful, every ten minutes or quarter of an hour, the mixture called anticroupal[*], until full vomiting is produced. He insists, also, upon the use of errhines, and of derivatives applied to the skin and intestinal canal.

When the disease is very rapid, it has been a question whether or no we should commence by bleeding, or by an emetic. M. J.'s opinion is, that we should first bleed, if the child be robust, and if it present signs of congestion towards the superior parts: on the contrary, he would commence by vomiting, when the subject is pale and exhausted, and there is little heat or fever. (**Ratier's** *Medical Guide, &c.*)

[*] ℞ Infusi Polygalæ ℥iv.; Syrup. Ipecacuanhæ ʒj.; Oxymel. Scillæ ʒiij.; Antimon. Tart. gr. jss. Misce.

stage; but he prohibits them in the second or inflammatory stage, and when suffocation is threatened towards the close of the disease. When, however, tartarised antimony is employed, and nausea is kept up in the intervals between the emetic operation, as I have recommended above, bleeding being also employed, the reaction dreaded by this experienced writer will not come on. His objections to an emetic in the paroxysms of suffocation occurring towards the close of the malady, may be well founded, were antimony or even ipecacuanha to be then prescribed; but, when zinc, squills, and senega are conjoined with stimulants and antispasmodics, and their operation accelerated by irritating the pharynx, I have seen the air-passages thereby freed from the substances obstructing them, and the patient saved.

60. *β. Bleeding*, general or local, or both, although indispensably requisite in the great majority of cases, is not always of service. **Rumsey** and **Huggens** remarked its injurious effects in the complicated cases they treated; and the more nearly the disease approaches to the spasmodic, and the febrile symptoms to the adynamic character, particularly in the complications, the more likely is it to be of little benefit, or even injurious, unless the state of action and habit of body evidently requires it. In the more inflammatory states, it should be promptly and fully performed; the use of nauseating medicines generally preventing the necessity of having recourse to very large or injurious depletions. **Ghisi, Home, Crawford, Rosen**, and others, have preferred general blood-letting at the commencement; and **Bayley, Middleton, Balfour**, and numerous writers, have recommended the jugular vein to be chosen. **Treber, Hirschfield, Werner, Goelis**, and **Malfatti**, very experienced physicians in Vienna, employ local depletions, excepting in the most inflammatory cases; and I agree with them, differing only in preferring cupping to leeches. As to the *period* at which it should be resorted to, I believe, with **Goelis**, that little will be gained by resorting to it before inflammatory action is manifested, or after excitement has subsided. A suppressed and apparently weak pulse, early in the disease, is often rendered full and hard by venæsection, and a repetition of the operation required, — a circumstance evincing the importance of interpreting aright the state of the circulation. Of forty-seven cases treated by **Goelis**, in 1808, seven were blooded from a vein; thirty-four by leeches only; and six were not blooded at all. The average quantity of blood that I have found requisite to take, altogether, as nearly as I can calculate, is about five ounces in children of three years, seven or eight in those of five or six, and about ten ounces in those from ten to twelve. This result relates chiefly to those not seen until the second stage of the more inflammatory or common forms of croup. I have met with cases in which blood-letting had been chiefly confided in, and been carried to the utmost extent; but it certainly had seldom or ever cured the disease, when thus employed, and even sometimes had been evidently injurious. The celebrated **Washington** was said to have died of croup. He lost, at the age of sixty-eight, about ninety ounces of blood in twelve hours. An attentive perusal of the cases published by Dr. S. **Jackson** (*Amer. Journ. of Med. Sciences*, vol. iv. p. 361.) will show the inefficiency and injurious effects of excessive depletions.

61. *γ. Calomel and mercurial inunction* have been most strenuously recommended, the former especially, since it was first prescribed by **Rush**, and in larger doses by **Stearns, Marcus, Autenreith, Anderson, J. P. Frank, Neumann, Michaëlis**, and others, who gave it every three or four hours. **Hamilton** directs it, in full doses, every hour or two hours at first, and subsequently at longer intervals; **Hecker** advises it in small doses; and **Wigand** states that it is of no use. **Cheyne** prescribes it with James's powder; **Harles** and others, with the officinal preparations of antimony; **Schæffer**, with emetics and musk; **Schluter**, with oxyde of zinc and other antispasmodics; **Michaëlis** and **Neumann**, with expectorants; **Archer, Marcus**, and **Hufeland**, with decoction of senega, and mercurial inunction about the neck; and **Augustin**, with opium. In the stages attended by excitement, it is best conjoined with James's powder or tartarised antimony, as prescribed above; and sometimes with opium, or Dover's powder, and subsequently, if it be given at all, with purgatives; expectorants, antispasmodics, &c. being exhibited in the intervals. **Goelis** conceives that it is useful in diminishing the tenacity of the croupal exudation, and in retarding its formation. He moreover supposes, that the daily exhibition of a small dose of this medicine subdues the diathesis, or constitutional disposition to contract the disease; and when croup has been prevalent, and appeared in one of a family, he has given about a grain at bed-time daily to each of the other children.

62. *δ. Blisters and counter-irritants* have been already mentioned; but there are certain points, particularly as respects the period and manner in which they ought to be employed, that require to be noticed. There are very few writers who have not recommended blisters in croup, but quite as few have done so with the wished for precision. On this subject **Goelis** is more practically minute than any other writer; and in many respects his experience coincides with my own. I believe that most advantage will be derived from as early an application of a large blister as is consistent with the previous employment of blood-letting. Directly after the first depletion, therefore, one should be applied in either of the situations advised (§ 46.); a piece of fine tissue paper being placed between it and the skin. It ought to be removed upon the appearance of redness of the cuticle, and a warm bread and water poultice placed over the part, and frequently renewed. If blisters be used in the latter stages, they should be watched with great care, and be allowed to remain for a few hours only, and not a minute after slight redness is produced. I believe that the dangerous effects sometimes occasioned by them are owing to the want of these precautions, and to having recourse to them at a time when the vitality of superficial parts is soon exhausted, owing to vital depression and to deficiency of blood, consequent upon excessive depletion. The liberal use of calomel, particularly when it has not been carried off by purgatives, may also, by increasing the irritability of the tissues, dispose to unfavourable results from blisters. If prescribed at all, they should be of full size; they ought never to be applied over the

throat, as recommended by some writers; and, in very young and delicate children, it will be better not to place them over leech-bites. In the latter periods, I prefer to blisters, the use of warm poultices, on the surfaces of which Cayenne pepper and scraped camphor are sprinkled in quantity sufficient to produce redness of the cuticle; or the application of warm cloths, moistened with either of the liniments, F. 300. 307, 308. These are particularly useful upon the removal of the patient from a warm bath, especially in the complications of the disease. *Sinapisms* have been directed by many to be applied to the extremities; but I have seen more harm than benefit produced by them, from the distress and crying they occasioned.

63. ε. *Internal and external emollients* are sometimes useful auxiliaries, particularly in the first stage. The decoctum althææ, the mist. amygdal. dulcis, the inspissated juice of the sambucus niger, mucilages, with liquor ammoniæ acetatis, vinum ipecacuanhæ, and syrup (see F. 47. 389.), may be used internally; whilst warm fomentations, with decoction of camomile flowers and poppy-heads, are applied about the throat, and frequently renewed, upon the occurrence of hoarseness, cough, and difficult respiration. These have the effect of retarding the approach of the latter and more dangerous states of the malady, even when they fail of rendering more efficient aid. Lentin advises camphor to be applied to the chest; but it will be more beneficial to employ it along with the fomentations, which may extend over both the throat and the upper part of the chest; or it may be placed upon warm poultices, as advised above, particularly in the more spasmodic and complicated states of the disease.

64. ζ. *Cold epithems* on the throat have been employed by some writers, and particularly by Field. They appear to have been of little service in his cases. I am unable to give any opinion respecting them from my own experience. They seem not to be equal to warm fomentations. Goelis states, that they are dangerous means to resort to; and alludes to cases where they were injurious.

65. η. *Semicupium and pediluvium* are useful modes of derivation, in the first and second stages especially. But salt, mustard, and, in some cases, a little of either of the fixed alkalies, or of the sulphurets, should be added to the water, and its temperature gradually increased as immersion is prolonged. Great care is requisite in removing the patient from the bath, to prevent any chill. In many cases, it will be preferable to wring as dry as possible large pieces of flannel out of warm water prepared as above, and to wrap them round the lower limbs of the patient, changing them frequently, or prolonging the use of them, according to circumstances, and preserving the bed-clothes from moisture.

66. ϑ. *Tepid and warm bathing* are of service — the former in the early stages, the latter in the advanced periods, of the disease. Goelis advises the tepid bath of about 23° or 24° of Reaum.; and to be rendered antispasmodic by using a decoction of chamomile flowers and poppy-heads; or irritant, by adding some caustic alkali; or both antispasmodic and derivative, by a combination of these substances, according to the circumstances of the case. I have, in a few instances, used these baths, upon the recommendation of this writer, and certainly with marked advantage, but I have increased their temperature in the latter stages of the disease, rendering them, at the same time, more irritating by the addition of an alkali. In the early periods, however, the emollient and antispasmodic form of bath seems preferable, particularly when the patient breathes the vapour rising from it. The *duration* of immersion should seldom be shorter than twenty minutes, unless circumstances should prevent it; and I am convinced that it may be prolonged to two hours, with advantage, in some instances. In a case despaired of, I caused, upon the recommendation of Goelis, the child to be put in a bath consisting of a decoction of chamomile flowers and poppies, to which some caustic alkali was added. It was kept there for twenty-five, and on a second occasion forty, minutes. It ultimately recovered. Care must be taken that the temperature of the bath does not fall during its continuance. As soon as the patient is removed, and the skin dried, he should be placed in warm flannel, or in a blanket; and perspiration encouraged by diaphoretics suited to the nature of the case and stage of the disease: in the early stage by antimony or ipecacuanha, so as to excite slight nausea, or occasionally vomiting, if requisite; in the latter periods, with liquor ammoniæ acetatis, given in sufficient quantity to produce the same effects; or, if sinking be apprehended, with camphor, ammonia, &c.

67. ι. *Purgatives* have been given with different intentions; — either as mere evacuants of retained secretions and excretions; or as active derivatives from the seat of disease. Home, Desessartz, and Michaëlis, seem to have resorted to them with the former intention; Hamilton, Pinel, and Autenreith, with the latter view; Crawford, Thompson, and others, prescribing also enemata. My own experience is decidedly in favour of this class of medicines; and of employing calomel, jalap, scammony, &c., and extract of colocynth, with assafœtida, &c. in enemata (§ 51, 52.).

68. *Sudorifics* are of use only in the early periods of croup. James's powder, and the other preparations of antimony, subsequently ipecacuanha, and liquor ammoniæ acetatis, or the one combined with the other, and given to the extent of exciting nausea, in conjunction with emollients (§ 63.), are important auxiliaries. Goelis remarks, that Dover's powder is seldom productive of any benefit; and that sudorifics are never of service in the last stages. Gentle *diaphoresis*, early in the disease, is undoubtedly beneficial, when the patient drinks freely of emollients; but he with justice adds, that very copious sweats only increase the disposition to form false membranes of a firm and adherent kind, owing to the evacuation of too large a proportion of the watery parts of the blood. In these opinions, Treber, Hirschfield, and most of the Vienna physicians, agree.

69. κ. *Expectorants.* — Under this head may be ranked an important part of the remedies prescribed in croup. The *inhalation* of vapours has already been noticed. The experienced Goelis places much confidence in them during the first and third stages; in the latter of which they often increase the cough, but they favour the discharge of false membranes, by increasing the mucous secretion by aid of which they are thrown off,

have mentioned (§ 47.) the expectorants in which my experience has led me to confide. There are very few which have been more generally recommended than *senega*. Archer, Barker, Valentin, Royer-Collard, Lentin, Maercker, Carron, &c. recommend it after bleeding. Dr. Archer, who attributes the greatest virtues to this medicine, advises it to be given at the same time as calomel, in frequent doses, until it excites vomiting or purging. Goelis and Treber remark, that, although a good remedy in the third stage, it is by no means possessed of those specific virtues attributed to it by Dr. Archer; and in this I agree with them. It is a useful medicine in the complications of the disease with malignant sore-throat or scarlatina. *Squills* are chiefly trusted to by Hufeland, Rumsey, and Maercker, in the latter periods. They should not be exhibited in the more inflammatory states of the malady, until after depletions have been carried sufficiently far, and we wish to procure the expulsion of the concrete exudations formed in the air-passages. They ought to be exhibited in small doses in the remissions, and pushed to the extent of producing vomiting when paroxysms of suffocation occur. After the membranous substances are removed, squills should be altogether laid aside. The *sulphuret of potash* has been recommended by Professors Serf, Chaussier, Mercier, and Hecker, in doses of about four grains, given every three or four hours. It is sometimes of much service after depletions. It may be combined with camphor, or small doses of ipecacuanha.

70. λ. *Antispasmodics* have been very generally prescribed, and particularly by Michaëlis, Pinel, Schwilgue, Vieusseux, &c., after the decided use of antiphlogistic remedies. Home, Cheyne, and Goelis, consider that these medicines are of little use in common and inflammatory croup. I am, however, convinced, from extensive experience, that, when the inflammatory symptoms are altogether, or even nearly, removed by antiphlogistic medicines, when the disease passes into a spasmodic state, or presents from the commencement a predominance of such symptoms, and when increased irritability becomes manifest, a judicious exhibition of antispasmodic medicines is often attended with benefit. *Musk*, either alone or with other medicines, with calomel (Michaëlis and Wigand), with squills, sulphuret of potash, or other expectorants, and with camphor or ammonia, in the last stage of the malady[*]; *valerian* and its preparations, and *assafœtida*, or any of the other medicines of this class mentioned above, may be employed, either alone, or with expectorants and opiates, particularly when the energies of the system begin to be depressed, or the complaint assumes from the first a spasmodic character.

71. Of those medicines which are *antispasmodic* from their *sedative* operation, the most important are colchicum, opium, hyoscyamus, prussic acid, digitalis, and tobacco. *Colchicum* may be given combined with calomel, in the early and inflammatory states of the disease, or with ammonia or camphor, at a later period; but it ought, in young children especially, to be exhibited with extreme caution,— in very small doses, and carefully watched. It came into fashion in this and other diseases of the air-passages a few years since, and was, for a time, much employed; I then saw some cases of croup in which it had been very injuriously employed, from having been given in too large doses for the age of the child, or too long continued, or combined with other depriments, as antimony, &c., or exhibited after very large depletions. I can most truly assert, that I have seen at least two cases of croup, in which death was to be imputed to this substance, rather than to the effects of the disease; and yet it is sometimes of use when combined as I have now advised. Of *digitalis* I have had no experience in this complaint; if exhibited at all, it should be conjoined with calomel. *Prussic acid* has been employed in some cases which I have seen; but the same objections I have urged against colchicum apply to it, when prescribed for young children. In older patients it is sometimes of benefit, combined with camphor, or oxyde of zinc, or other stimulating antispasmodics, in combating the irritability and disposition to spasmodic paroxysms in the latter stages. *Opium* was much

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[*] The chief danger in croup often proceeds from the spasm with which the respiratory passage is affected in the progress of the disease. The obstruction of the tube by the false membrane and effused matter, seldom of itself causes suffocation; but rather this lesion, combined with spasm of the muscles of the larynx and membranous portion of the trachea; and, in many cases, exhaustion is superadded, or even constitutes the most important change. Depletions alone will not overcome this disposition to spasmodic action, which is generally observed to supervene at intervals; the periods elapsing between the paroxysms varying according to the strength and constitution of the child, and the severity of the disease. But, in many cases, the spasmodic action is more frequent and more dangerous, and the more likely to become associated with convulsions, the weaker the constitution and powers of life, and the more those powers have been reduced by copious depletions. After moderate depletion, therefore, and in many cases even previously to any, such medicines as possess an antispasmodic power, by first acting as nauseants, are of great benefit. M. Kimbell seems to have partly adopted this view of the disease and of its treatment; but I am confident he has carried it much too far. If his success has been equal to what he conceives it to have been, the cases which he has met with have been unusually slight. There is no doubt of bleeding, blistering, purging by calomel, &c. &c., having been pushed to hurtful lengths in many cases, or inappropriately applied; and the same may be said as to other means, which have tended more to exhaust the vital energies than to cure the disease: and there can be no doubt of the disposition to spasm becoming greater, and of its consequences being more to be dreaded, the lower the powers of life sink; for, with such sinking, the general sensibility and irritability of the frame increase. But I cannot conclude that those means could have been dispensed with in any considerable number of the cases which have fallen under my observation, and in which I have never omitted also to employ antispasmodics of the most active nature, from a conviction that the disease partly depends upon spasm. Mr. K.'s observations as to the treatment of the disease, are to the following effect: —"I never bleed or blister a child in croup: I have never thought it requisite to do so, since I have adopted the plan alluded to; although such auxiliary practice would be in no other respect incompatible, than as tending to invalidate the general strength. The treatment I allude to consists in confining the child to a uniform and rather warm temperature, giving an emetic of ipecacuanha, and, in an hour after, commencing the following mixture: —

No. 164. ℞ Pulv. Valerianæ ʒij.; Oxymel. Scillæ ℥j.; Tinct. Opii gtt. xx.; Aquæ Destillatæ ℥j. Misce.

I administer a teaspoonful every hour, if the child is from two to five years old; if from five to eight, every five and forty minutes, so as to maintain the anodyne effect of opium, and the sub-nauseant expectorant, antispasmodic effects of the squill and valerian, until the symptoms are removed; which commonly happens in ten or twelve hours, and which I have never seen protracted beyond eight and forty. On their subsidence, I have, in general, given a brisk dose of calomel and jalap."

Mr. K. likewise recommends the above treatment in hooping cough and in catarrh; and in those cases which are unconnected with inflammatory action, it is not inappropriate. In the slight and more spasmodic states of croup, it also will prove very beneficial.

employed, after depletions, by Kendrick and Huggans. It may be used both externally and internally (as may the preparations of *morphine*), with aromatics, camphor, or assafœtida, musk, &c., in the states of the disease now mentioned. *Henbane*, and *extract of poppy*, may also be employed under similar circumstances and forms of combination. *Tobacco* has been prescribed in croup, in various modes. Dr. Vanderburgh and Dr. Godman recommended a plaster covered with Scotch snuff to be applied across the top of the sternum; and myself and others have employed this substance, with the view of detaching the false membrane by exciting sneezing and an increased secretion of mucus. The *smoke* of tobacco has also been directed to be inhaled, in order to remove spasm, and promote expectoration, by its direct operation in the air-passages; and others have advised the patient to smoke a cigar, with the intention of producing nausea, as well as the other effects last enumerated. After depletion, and when the disease is about its acmé, the powers of life not being materially exhausted, a cautious use of this means may be serviceable. In the case of children who cannot use a cigar, the smoke of one may be blown around them, and in this way it will have a sufficient effect. Cloth moistened with an infusion of tobacco may, under some circumstances, be applied over the throat, and its effects carefully watched; but this measure is not without hazard, particularly after lowering remedies have been used, or in an advanced stage of the malady.

72. μ. The *preparations of ammonia* have been much employed in all the states of croup. *Caustic ammonia*, in doses of three or four drops, given every hour; ammoniacal liniments being at the same time applied about the throat; has been advised by some writers, in order to promote the excretion of the concrete exudations in the third stage of the disease. The *carbonate of ammonia* has been more generally employed. M. Rechou prescribed it both internally, and externally in ointments to the throat. In the latter stages, as a useful antispasmodic stimulant, it may be sometimes of service; it is very advantageously combined with camphor, or even with calomel, in the complications of croup with angina maligna, or with any of the eruptive fevers. M. Chamerlat has recommended the *muriate of ammonia* to be taken internally, and applied to the fauces, when the disease is associated with inflammation of the throat. The *cuprum ammoniatum*, and the *hydrosulphuret of ammonia*, have also been prescribed in doses suitable to the age of the patient. They may be sometimes of service in the more spasmodic states; but I have had no experience of their effects in this complaint.

73. ν. M. Valentin has recommended the application of the *actual cautery* upon each side of the throat, in the most severe forms of the disease, when it is at its acmé. *Moxas* seem to be preferable to the actual cautery; and, if this practice should be adopted, it might, perhaps, be advantageous to follow it by fomentations placed over the trachea. M. Dupuytren employed in one case, referred to by Guersent, a small rod of whalebone covered by pieces of sponge, which was introduced into the pharynx in order to remove the partially separated portions of false membrane lodged in that situation, or partly thrown out from the larynx. In the advanced stage of croup complicated with angina pharyngea, this contrivance is calculated to succeed.

74. ξ. *Tracheotomy.* — There does not seem to be a chance of success from this operation in any case wherein the treatment developed above has failed. The practitioner, however, may be called to a case so late in the disease, and where the suffocation is so imminent, that the propriety of having recourse to it may be admitted: but, even in these, the chances are infinitely greater against than in favour of its success; and if benefit can be obtained from any measure, it is as likely to accrue from the energetic exhibition of suitable emetics as from tracheotomy. Cases have doubtless been recorded of the success of the operation in croup; but these are so very few, compared to the number in which it has failed, that I perfectly agree with Goelis, Cheyne, Royer-Collard, Porter, Wood, and many others, in concluding that it should seldom or never be attempted in this disease. Of the propriety of having recourse to it in certain states of laryngitis, &c. there can be no doubt; and it may, with some slight grounds of hope, be resorted to when croup is chiefly confined to the larynx and upper portion of the trachea; also, perhaps, in some cases of its consecutive occurrence upon inflammation of the throat with membranous exudation; and when we infer, from the general symptoms and the signs furnished by the stethoscope, that the bronchi and lungs are unaffected; but in that period of the simple as well as of most of the complicated forms of the disease, in which only it should be attempted, and when internal treatment has failed, I believe that the superinduced lesions in the bronchi, lungs, circulating fluid, and nervous system, are such as to preclude hopes of its success. Moreover, the feelings of the parents regarding it, and the reputation of the physician and operator, are not to be kept out of view. "Ad tracheotomiam," says Goelis, "omnium remediorum incertissimum confugere res ardua est; parentes abhorrent, aversantur agnati et periclitatur medici fama, quem, infausta si fuerit operatio ac votis illudens, lacrymis multis velut homicidam prolis amatæ detestantur parentes."

75. ii. Prophylactic Treatment, &c. — *A.* Goelis states, that he never saw a child with porrigo and other chronic cutaneous affections attacked by croup whilst they remained fully developed, even when this disease was most prevalent. He therefore advises the having recourse to any form of issue, when an attack is dreaded. To resort, however, to emetics, to antimonial medicines, to counter-irritants, to depletions, to confinement in-doors one half of the year, and other measures which have been advised, is attended with greater mischief than to allow the child to run the slight risk there is of his having the disease. The case, however, is different in respect of a child who has once suffered an attack. The liability of croup to recur, even several times, after intervals of various duration, renders precautions, under such circumstances, very requisite. The chief of such measures are — removal from the predisposing and exciting causes (§ 24—31.); change of air and locality; the use of the shower or cold bath every morning, the skin being well rubbed with a hard or coarse cloth afterwards; the wear-

ing of flannel next the skin, and of a neckcloth in winter and spring; light nourishing diet, with strict attention to the secretions and excretions; immediate recourse to medicine upon the appearance of catarrhal or croupal symptoms; and a careful avoidance of exposure to cold and moisture. When croup occurs in one child of a family residing in situations where it prevails, more will probably be attacked. In such cases, removal to a healthier air is requisite. When it is prevalent either in a simple or complicated form, and particularly when the locality also increases the risk of seizure or relapse, the occasional exhibition of small doses of calomel and James's powder, or of hydrarg. cum creta with the sub-carbonate of soda, or the having recourse to either of them every second or third night, may be tried. In this country, care should be taken not to expose children to the north-east winds of spring, particularly when they follow heavy rains, &c.

76. *B.* The Diet and Regimen, in the more acute and inflammatory forms of croup, should be strictly antiphlogistic; and all food should be withheld until the stage of exhaustion supervene, when, if light nourishment can be taken, or be desired, it should be given. In the more spasmodic or prolonged forms, light food may be taken in small quantity. The best beverage of which the patient can drink, is a very weak decoction of marsh-mallows and liquorice root, to which a little candy and sub-borate of soda are added. The *temperature* of the room should be moderately and equably warm.

77. *C.* During Convalescence, change of air, as soon as it can be safely permitted, is especially beneficial; and strict attention ought to be paid to the prophylactic means stated above (§ 75.), in order to prevent a relapse or recurrence of the malady. These precautions are required during, and for some time after, recovery from the complications and consecutive affections of croup, as well as from its simple forms. In the winter and spring months especially, the convalescent should be kept in apartments moderately and as equably warm as possible.

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CYANOSIS. See Blue Disease.

CYNANTHE MALIGNA. See Fever, Scarlet; Fauces; and Pharynx, *Inflammations of*.

CYNANCHE PAROTIDÆA. See Parotid, *Inflammation of*.

CYNANCHE PHARYNGEA. See Pharynx, *Inflammations of*.

CYNANCHE TONSILLARIS. See Tonsils, *Inflammations of*.

CYNANCHE TRACHEALIS. See Croup.

CYSTITIS. See Urinary Bladder, *Inflammations of*.

DEAFNESS. See Ear, *Diseases of*; and Hearing, *Disorders of*.

DEBILITY. — Syn. *Adynamia, Asthenia, Atonia, Debilitas*, Lat. *Die Schwäsche, Schwaschheit*, Ger. *Débilité, Asthénie*, Fr. *Debolezza*, Ital. *Vital Depression, Diminished Vital Power or Energy.*

Classif. — General Pathology; *Pathogeny.* — Special Pathology. I. Class.

1. Defin. — *That departure from the healthy condition of the frame, which consists of a diminution of its vital energies — of an enfeebling of its powers, manifested in numerous conditions and grades throughout the whole frame, or more or less remarkably in particular systems or organs.*

2. *Debility* is a state of vital manifestation intimately connected with the nature of disease; and, in whatever acceptation it has been understood, it has been admitted by every physician who has looked beyond the grosser and more palpable changes superinduced in the economy, as not only a most important pathological condition, but as often constituting what is, in the common language of medicine, disease itself. It often performs a principal part in the commencement, and towards the close, of the most severe maladies; and its modifications are amongst the most difficult in pathology to detect and to interpret aright. Several of the appellations it has received have been more or less restricted to certain of its conditions; as *adynamia*, to want of muscular or animal power; *atonia*, to deficient vital tension and tone of circulating and exhaling vessels; *asthenia*, to depressed energy of organs essentially vital, &c.: but as the distinctions between them have never been made with sufficient precision, and have seldom been preserved, and as they have all been used synonymously by the best modern writers, they will be thus received at this place.

3. It might appear interesting to ascertain the varieties and grades of debility; but this is a matter of no easy accomplishment, if not entirely beyond the reach of our powers. Debility is, besides, a relative term; and of its extent or degree of departure from that condition of vital power requisite to the perfect performance and continuance of the functions, we can form no very precise idea, even were we agreed upon the standard of power by which the comparison should be made. Of its numerous grades and manifestations, from the slightest departure from health to the utmost consistent with existence, there can be no question; and therefore they cannot be otherwise than arbitrarily appreciated. This will appear obvious to any one who will refer to the numerous varieties into which Vogel and Sauvages have divided asthenia.

4. Divisions of. — It will be preferable, therefore, to consider debility in respect merely of its principal conditions relatively to the operation of the chief causes which induce it; and, in order to elucidate its morbid relations, and its influence in producing and perpetuating further disease, to enquire into its manifestations and effects on the various general systems and organs of the body. The majority of pathological writers have found great difficulty in considering this subject, and scarcely any two have agreed as to the manner of discussing it, or as to its nature. Some have viewed it as the negative of excitation, or a minor degree of that state of excitement induced in the system by the agents surrounding and acting upon it, — by privation, or change of the factors of life (Hartmann). This opinion, which may be traced to the *Strictum* and *Laxum* of Themison; but which was first insisted on, in a manner at all accordant with the doctrine of solidism, by Brown, and variously modified and illustrated by his contemporaries and followers; led to the division of this grand pathological state into two forms, — *direct* and *indirect* debility. This division was adopted by Darwin; and Rush followed the same track, denominating the former *debility from abstraction*, the latter *debility from action*. Rasori and Tommasini hardly even modified the doctrine of Brown, when they divided it into *primary* and *secondary*; the former arising from contra-stimulating, the latter from stimulating, impressions. Broussais followed a similar arrangement; but considered that it is primary in very few instances, and only from the abstraction of stimuli. The simplicity of these divisions is their chief recommendation; but it is carried so far as to be inconsistent with the complexity of those derangements to which the human frame is subject. This feeling seems to have induced Boisseau to impute it to three sources: 1. To a complete or prolonged abstraction of the accustomed stimulus; 2. A diminution of the reciprocal stimulating influence of the organs; and 3. To the inordinate excitation of a part, rendering the others incapable of acting with energy. M. Brachet, adopting similar views to my own, but several years after mine were published, both in the *London Medical Repository* and in my Physiological Notes, refers debility either to diminution of the action of the cerebro-spinal system, enfeebling the functions over which it presides, or to depression of the functions dependent upon the influence of the organic or ganglial nerves; the weakness of the nervous system arising, as he thinks, either from deleterious states of the blood, or diminution of its quantity. Hufeland divides it into *true*, and apparent or *false*; the one from change of the nervous sensibility, the other from oppression of the vital powers. Dr. Geddings, the most recent writer on the subject, considers debility, 1st, as *direct*, when arising from the abstraction of stimuli, or the operation of contra-stimuli, or such substances as "directly enfeeble the organisation;" 2dly, as *indirect*, or that resulting from exhaustion, and "from deterioration of the nutritive molecules of the blood;" and, 3dly, as *metastatic*, or that form proceeding from inordinate irritation of one organ leaving the others in a minor state of excitation. It is impossible to examine the conditions of debility with any degree of precision abstractedly from their principal causes. I shall, therefore, with due regard to

this connection, consider, 1st, The primary or direct states of debility; 2dly, Its consecutive or secondary conditions; and, 3dly, Those forms, consisting not only of depressed, but of otherwise morbid or vitiated, vital manifestation — or complicated debility. After having discussed these topics, with reference to *general debility*, the *more special* or *partial states of debility*, and *its consequences*, will be brought into view; and the subject pursued in its relation to general and special pathology.

5. I. Conditions of Debility. — i. Primary Debility (*Direct*, Brown; *True*, Hufeland; *from Abstraction of Stimuli*, Rush and Boisseau). This state of debility is not so frequent as is commonly supposed, although by no means so rare as Broussais and his followers contend. Many of the cases commonly imputed to it strictly belong to the other conditions specified above (§ 4.). Primary debility may be, (*a*) *Original*, or congenital; and (*b*) *Acquired*. — *A*. The former of these is observed in the children of exhausted, dissipated, or aged parents, — especially the male parent, — and is familiar to every common observer. It also presents itself in the infants of those who are of a strumous diathesis, although generally in a slighter grade, and more frequently obscured by concurrent disease of particular organs. This form of debility seldom continues long without being followed by some specific malady, which it either remarkably favours, or even more directly produces, — causes, which are innocuous as respects infants of originally sound stamina variously affecting, and ultimately blighting the debilitated offspring.

6. *B*. *Acquired* debility presents itself to our notice in every stage of life. If it supervene in infancy and childhood, it may be, to a certain extent, perpetuated in the constitution through life. But, in whatever period it may occur, it is most frequently the consequence of the *abstraction of stimuli* necessary to the excitation and perpetuation of the vital manifestations to a requisite extent. — (*a*) The infant that is not *sufficiently*, or is injudiciously, or *unnaturally, nourished*, if it escape any of the maladies to which it is thereby disposed, becomes pale, languid, soft, and enfeebled, or altogether diseased: it wastes; its flesh is flabby; its growth is impeded; and it at last is the subject of anæmia, or of tubercles, or of worms, or of disease of the digestive canal, of the mesenteric and other glands, or of the joints and bones. But insufficient or inappropriate nourishment affects all periods of life in nearly a similar manner. A fish diet through life gives rise to a weaker conformation of body than food of a mixed kind. This was proved by Peron in respect of the natives of Van Diemen's Land. Similar effects follow an exclusively vegetable diet, although not to so manifest a degree. It should, however, be admitted that those who are obliged to live on one kind of food alone, are more liable to experience insufficient supplies of it. — (*b*) The abstraction of the *animal warmth* is another cause, occasioning a modified, and, as it were, an acute form of debility, followed by peculiar effects, which are fully described in the article Cold. — (*c*) The *privation of solar light* has a marked influence on the vegetable creation; plants being pale, sickly, and imperfectly developed, and their proper juices scantily and insufficiently elaborated. An analogous effect is produced by the same cause on the animal creation, and particularly on man — the body becoming pale, sickly, and etiolated; the senses remarkably acute; the general sensibility and muscular irritability much heightened; the organic actions readily influenced by the slightest external agents[*]; and the circulating fluids thin, watery, and deficient in albuminous constituents and red globules, and in quantity. Facts illustrative of this occurrence are adduced in the article on anæmia, which is thereby produced. (See Blood, *Deficiency of*, § 41.) The physical and mental debility resulting from confinement in dungeons and dark cells is to be attributed to the exclusion of light, restricted diet, want of exercise and of free air, and to moral causes combining with these in depressing the vital powers, and ultimately producing disease of a low and dangerous form. — (*d*) Intimately con-

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[*] The remarkable and authentic history of Casper Hauser, by the President Von Feuerbuch, furnishes striking illustrations of the above. The accounts which have been recently published of this person should be attentively perused by every pathologist and philosopher, as being most singular and instructive. Casper Hauser was kept, from infancy until he was eighteen years of age, in a perfectly dark cage, without leaving it; and where he neither saw a living creature, nor heard the voice of man. He was restricted from using his limbs, his voice, his hands, or senses; and his food consisted of bread and water only, which he found placed by him when wakening from sleep. When exposed in Nuremberg, in 1828, he was consequently, at eighteen years, as if just come into the world; and as incapable of walking, discerning objects, or conveying his impressions, as a newly born infant. These faculties he, however, soon acquired; and he was placed under an able instructor, who has recorded his history. Darkness had been to him twilight. The light of day at first was insupportable, inflamed his eyes, and brought on spasms. Substances, the odour of which could not be perceived by others, produced severe effects in him. The smell of a glass of wine, even at a distance, occasioned headach; of fresh meat, sickness, &c.; and of flowers, painful sensations. Passing by a churchyard with Dr. Daumer, the smell of the dead bodies, although altogether imperceptible to Dr. D., affected him so powerfully as to occasion shudderings, followed by feverish heat, terminating in a violent perspiration. He retained a great aversion, owing to their disagreeable taste and smell, to all kinds of food excepting bread and water. When the north pole of a small magnet was held towards him, he described a drawing sensation proceeding outwards from the epigastrium, and as if a current of air went from him. The south pole affected him less; and he said it blew upon him. Professors Daumer and Herrmann made several experiments of this kind, and calculated to deceive him; and, even although the magnet was held at a considerable distance from him, his feelings always told him very correctly. These experiments always occasioned perspiration, and a feeling of indisposition. He could detect metals placed under oil-cloths, paper, &c., by the sensations they occasioned. He described these sensations as a drawing, accompanied with a chill, which ascended, according to the metal, more or less up the arm; and were attended with other distinctive feelings, the veins of the hand exposed to the metal becoming visibly swollen. The variety and multitude of objects which at once came rushing upon his attention when he thus suddenly came into existence — the unaccustomed impressions of light, free air, and of sense — and his anxiety to comprehend them — were too much for his weak frame and acute senses: he became dejected and enfeebled, and his nervous system morbidly elevated. He was subject to spasms and tremors; so that a partial exclusion from external excitements became for a time requisite. After he had learned regularly to eat meat, his mental activity was diminished: his eyes lost their brilliancy and expression; the intense application and activity of his mind gave way to absence and indifference; and the quickness of apprehension became diminished. Whether this change proceeded from the change of diet, or from the painful excess of excitement which preceded it, may be questioned. My limits admit not of my adding more. The whole account is most important — the more so, as the physiological facts stated in it may be relied on.

nected with this cause and its effects, is the *privation* of *fresh air and exercise*. When muscular action cannot be performed under favourable circumstances, particularly as respects the requisite renewal of air, the circulation languishes, and suffers deterioration; the developement of the locomotive organs is either impeded or prevented, and they are no longer in a fit state for the execution of the acts of volition. By a want, also, of a requisite *renewal of air*, the stimulating constituent of it becomes diminished, and replaced by directly sedative gases, and by vapours loaded with the effluvia of the system that respires it, or of those which may respire it in the same place; the extent of the stagnation or confinement of air, and of the causes of deterioration, proportionately heightening and accelerating the depressing effects thereby produced upon the frame. — (*e*) It is extremely probable, that whatever, in its passage through the digestive canal, or circulation through the body, *abstracts oxygen from the system*, will be also, to a certain extent, a cause of debility, as supposed by HUMBOLDT. The causes of scurvy may be partly of this description; as well as those of several other diseases. — (*f*) A not uncommon cause of depressed vital power is *the young sleeping with the aged*. This fact, however explained, has been long remarked, and is well known to every unprejudiced observer. But it has been most unaccountably overlooked in medicine. I have, on several occasions, met with the counterpart of the following case: — I was, a few years since, consulted about a pale, sickly, and thin boy of about five or six years of age. He appeared to have no specific ailment; but there was a slow and remarkable decline of flesh and strength, and of the energy of all the functions — what his mother very aptly termed a gradual blight. After enquiry into the history of the case, it came out that he had been a very robust and plethoric child up to his third year, when his grandmother, a very aged person, took him to sleep with her; that he soon afterwards lost his good looks; and that he had continued to decline progressively ever since, notwithstanding medical treatment. I directed him to sleep apart from his aged parent; and prescribed gentle tonics, change of air, &c. The recovery was rapid. But it is not in children only that debility is induced by this mode of abstracting vital power. Young females married to very old men suffer in a similar manner, although seldom to so great an extent; and instances have come to my knowledge, where they have suspected the cause of their debilitated state. These facts are often well known to the aged themselves, who consider the indulgence favourable to longevity, and thereby often illustrate the selfishness which, in some persons, increases with their years. — (*g*) It is extremely possible that whatever *conducts the electricity* of the body from it, will occasion direct debility. With this view I have long been in the habit of causing females who used steel supports to their stays, to lay them altogether aside. The experiments on CASPER HAUSER confirm this supposition. — (*h*) Intimately related to the causes consisting of abstraction of requisite stimuli, and to the effects resulting therefrom, seem to be the privation of those excitants to which the frame has been long habituated; although these, as well as their effects, may be considered as falling more strictly under a different section of this subject. The privation, by whatever cause, of those states of electrical tension which exist in healthy conditions of the body, and fright, or prolonged fear, may also occasion primary debility.

7. C. But the vital power is enfeebled by another class of causes — by agents which seem *directly* to depress it below its healthy standard. These agents have been called *contra-stimulants* by the Italian physicians of the school of RASORI. — (*a*) Several of those, however, when employed in sufficiently small quantities, actually excite the parts to which they are applied; and it is only when they are used in large doses that an opposite effect — violent depression and even annihilation of life — is produced. A minute quantity of prussic acid, or of tobacco, excites the organic functions; a large quantity instantly destroys life: and the remark applies, to a certain extent, to nearly all the more energetic narcotics; although many of them, as well as several other agents, whilst they depress the vital manifestations generally, also excite or irritate particular organs or tissues. Tartar emetic, acetate of lead, oxalic acid, colchicum, stramonium, belladonna, &c. furnish illustrations of this fact. — (*b*) The primary effects of *terrestrial effluvia* or malaria, and of the *infectious emanations* proceeding from the diseased, as from those affected by plague, yellow fever, typhus, and pestilential cholera, are evidently most acutely debilitating, even although these causes may also, and at the same time, act by irritating certain organs or tissues. — (*c*) Various mental emotions are also very powerful depriments of vital power, such as *fear*, *anxiety*, *grief*, longings after objects of affection, *nostalgia*, &c., particularly if they be of long continuance: they retard all the organic functions, and at last wither the whole organisation. — (*d*) Whatever impedes respiration, owing to the effects of this function upon the circulation, and on the blood itself, and consecutively upon the organic and cerebro-spinal nervous systems, also depresses the vital power in a very remarkable manner. Among the causes of primary debility, Dr. GEDDINGS has included *anæmia*. There can be no doubt of the existence of debility, when the blood is deficient or impure; but, instead of being the cause, anæmia is the effect of debility.

8. ii. CONSECUTIVE OR SECONDARY DEBILITY may arise in two ways: (*a*) from increased excitation of an organ, occasioning proportionate diminution of the energy of others — Sympathetic debility, or Debility from an irregular distribution of the vital endowment; and (*b*) from the exhaustion occasioned by previous excitement. — *A. Sympathetic Debility* (*Debilitas Spuria*, HUFELAND; *Metastatic Debility*, Dr. GEDDINGS). When it is considered that the organic or ganglial nerves alone supply the blood-vessels, and the secreting organs and surfaces; that they communicate very freely with each other, and with their chief centre, the semilunar ganglion; that they are formed into numerous plexuses, rendering thereby the connection between them still more close; and that they are intimately related to the cerebro-spinal system, through the medium of communicating nerves; the mutual dependence of action between

the various organs of the body may be easily explained. If, moreover, it be granted, as I have endeavoured to prove in another work, that the most important vital phenomena, — as digestion, assimilation, circulation, secretion, animal heat, generation, &c. — in short, that life itself, with all those manifestations of it now particularised, and which have usually been called organic — result from the influence exerted by the ganglial nervous system, through the instrumentality of the vessels and structures, upon the circulating fluid they contain, and reciprocally by this fluid upon the nerves ramified in the parietes of the vessels, and upon the ganglia themselves, through which it must necessarily circulate, — the agency of this system in the production of the numerous phenomena of debility must be evident. From this view of the subject, and taking into account the various functions of dissimilar textures, and, under certain circumstances, the combined influence and reaction of the cerebro-spinal system and sensorium, the numerous relations of disordered actions, as respects the manifestations not merely of debility, but of disease generally, may be more satisfactorily traced.

9. When one organ or general system is simply excited, without being otherwise diseased, the functions of other organs, with which it is more or less intimately related by means of the ganglial nerves, undergo a relative degree of change; for as we exalt the vital manifestations in one or more parts of the series, we diminish them in equal proportion throughout the remainder. These views were first stated in the *London Medical Repository*, for May, 1822, and fully illustrated in my Physiological Notes, published in 1824; and have since been adopted by BOISSEAU and GEDDINGS. A due application of them is of the utmost importance in pathology and therapeutics, as well as in ascertaining a large proportion of the forms of debility, particularly those presented to us in the course of many acute and chronic diseases: thus irritation of the mucous surface of the stomach or bowels enfeebles the rest of the frame; and inordinate excitation of any other secreting organ diminishes the nutritive and animal functions in an equal degree, and so on as respects various other viscera and structures, as more fully explained when describing the states of vital energy connected with the nature of disease. (See art. DISEASE.)

10. *B. The Debility of Exhaustion*, or from excitement of a part, or of the body generally (*Indirect Debility*, of BROWN).—This form of debility arises from all agents, mental or physical, which excite the actions of a part, or of the system, above its normal state. Many of these causes act with great rapidity and intensity, others very slowly and insidiously; and whilst some simply change the *grade* of vital action, others seem to alter it in *kind*. Their effects vary remarkably with the susceptibility of the organ and constitution on which they act, and the frequency of their repetition; each successive application being generally less efficient than the preceding, if it be delayed until the action of the previous one has terminated. The circumstance of stimuli being productive of exhaustion, or indirect depression of vital power, to as great extent below the standard of health, as the previous excitement rises above it, as fully shown by BROWN, DARWIN, and RUSH; and that stimuli must be repeated in larger quantity to produce the same effects, although presenting certain exceptions, are important facts as respects this pathological condition in particular, and disease in general: as long, also, as the repetition of the stimulus follows so quickly and regularly as to anticipate the appearance of the consecutive debility, the unavoidable consequences of its abstraction will not appear, at least for a very long time. But they ultimately will supervene in a most severe, and often dangerous, form, when such an event takes place; and if it does not occur soon, the prolonged excitement will ultimately terminate in organic change. Drunkards and opium-eaters often furnish proofs of the latter fact; and persons who indulge in an occasional debauch only, or who undergo great physical or mental exertions, feel the truth of the preceding positions. There is one cause, however, which requires to be particularised on account of its mode of operation and consequences: this is excessive sexual indulgence. It occasions a loss of vital power through the medium of the discharges, independently of the exhaustion consequent upon the previous nervous excitement. Its depressing effects are, moreover, experienced by all the organs, but especially in the ganglial and cerebro-spinal nervous systems; and are often followed by the most serious results in both male and female.

11. iii. COMPLICATED DEBILITY.—I have contended, in the article DISEASE, that the vital manifestations of an organ, or of the frame generally, may be modified, not only in *grade*, but also in *kind*. If this be admitted, it follows that debility, originating in either of the ways now shown, may be either *simple*, or *associated* with an otherwise morbid state of vital action. Upon a review of practical facts, we shall find that the more simple states of debility most frequently occur either primarily—especially from agents abstracting vital power—or indirectly, from causes which over-excite the nervous influence, or which abstract as well as exhaust vital power; such as the one last adduced. But the condition now under consideration is more generally the result of causes which either irritate in a slow and continued manner some particular tissue or viscus, or modify the sensibility of an organ, or change its secreting or nutritive actions, or even vitiate the condition of the circulating fluids. Whilst the preceding forms of debility are mostly met with in the commencement of diseases, or constitute the early stages of those ailments consisting almost entirely of simple asthenia, but, which are often mistaken for structural maladies, this condition is observed chiefly in the progress, or towards the close, of many acute and chronic complaints, some of which are of a specific or malignant character; and it may arise out of either of the foregoing varieties of debility, especially when much prolonged. That which becomes so remarkable in the course of typhus, or yellow fever, of plague, or of syphilis, cancer, scrofula, &c., consists not of a simple depression or exhaustion of vital power merely; for this power is also specifically modified even from the commencement of these diseases; — the sensibility and organic contractility are changed; the secretions and nutrition are interrupted, or much affected; and although the debility may be the same as to grade in several

or all of them at certain of their stages, yet is the vital endowment otherwise modified in each, and in such a manner as to present specific characters whereby they may be severally known and distinguished, without taking the grade of vital manifestations into the account. It is this form of debility which may be imputed to what has been called, in general terms, by Brera, the evolution of matters injurious to life: and it very often arises from causes, which, by the nature of their impression upon the living frame, not merely depress, but also otherwise vitiate, the conditions of life in all the systems and organs of the body, as shown by the effects produced by the morbid effluvia of typhus, yellow fever, and other malignant diseases.

12. II. The special Manifestations and Effects of Debility.—I have hitherto been considering asthenia in its *general conditions;* I have now to view it in its *specific* or *partial states.* In doing this, I shall only attempt an imperfect outline of its relations to the principal general systems and organs of the body, and endeavour to show that one or more of them may manifest this state in a greater degree than the rest, or in a modified form; and that in this manner much of the varied phenomena of disease may arise; but that neither of them can experience it to a great extent, or for a long time, without either a similar state of disease extending more generally, or some other morbid condition springing out of it,—consequences which must necessarily result from the intimate union of the different organs by the organic nervous and vascular systems, as well as from the mutual dependence of their functions, and the reciprocity of vital influence.

13. i. *Debility of the general Systems.—A.* The close connection of the *organic* or *ganglial nervous system* with the manifestations of life has been in several places insisted upon; and conformably with this opinion, and with intimate views of the origin and nature of morbid actions, debility cannot exist in a marked degree without this system being primarily affected. But of the extent of this affection we can form no estimate, excepting from the effects upon the functions of those organs which it influences. I have long considered, and on various occasions endeavoured to show, that the ganglial and the vascular systems, by their resulting and reciprocal actions, are the factors of life; and that the part which the former consequently and necessarily performs in the causation and removal of morbid phenomena is most immediate and important. If we examine closely the manner in which causes invade the frame, we shall find, a great proportion of those which produce any of the states of vital depression already noticed, make their impression in such a manner as to leave no doubt of their action being primarily exerted upon this system, thereby proving its very close connection with life. It is, however, evident that the impression made in this quarter will not remain for any time limited to it; but will extend in the first instance to those parts which are most intimately associated with it, and dependent upon it for the regular performance of their functions. This *à priori* inference is actually demonstrated by observation; for we find the circulating, the digestive, and the assimilative functions, immediately enfeebled by causes which can operate in no other way, and through no other channel than the nervous system of organic life. Such of those causes as are of an intense kind, and are most injurious to life,—which modify while they depress its manifestations,—have their impression rapidly propagated throughout this system, and to the structures and organs which it actuates; whilst those of a slighter kind, or slower operation, may exert their effects in parts of it only, or chiefly, and more or less partially in other viscera. Viewing this system, therefore, as that upon which the greater number of causes depressing the vital manifestations first exert their action, and consequently as the point whence the depressing effects proceed, I shall briefly consider these effects in each of the principal functions, organs, and structures.

14. *B. The circulating systems and fluids* are affected according to the intensity of the depressing causes relatively to the energy of the system at the time; and the ultimate results vary with the successive changes that supervene in it, and the associated nervous systems, and secreting and eliminating organs.—(*a*) In simple debility, the *heart's* action is languid, or slow; but readily excited by stimuli. If the debility be chronic, the parietes of its cavities may ultimately become wasted or thinned; or even softened, and the cavities themselves dilated. In the advanced stages of acute or complicated debility, the heart's action is generally very quick, soft, weak, small, and unequal or irregular; and in chronic cases, its substance softened, flaccid, or even dilated.—(*b*) The *arterial* vessels lose some portion of their tone; but, excepting in as far as they convey the impulse of the heart on the blood, they are not otherwise affected until debility arrives at an advanced stage, or is acute or complicated. When this occurs, arterial action may even become very much increased, particularly as respects the frequency of the pulsation communicated by the heart's contractions, whilst the vital power of the system generally is remarkably depressed. In such cases, the pulsations are broad, open, quick, and very easily compressed; or they are small, weak, soft, and thready. Acute and complicated debility, thus presenting the apparent incongruity of great depression of vital power, with morbidly excited vascular action, is not infrequently observed in the advanced stages of those diseases in which the circulating fluid becomes contaminated by injurious matters introduced into it from without, or generated in it, in the manner explained in the article Blood (§ 110—144.). In these, although the general manifestations of life are enfeebled to the utmost, yet the action of the heart and arterial system is excited by the irritation produced by the contaminated blood circulating through them, and the low grade of vitality still existing is thereby soon exhausted.—(*c*) The manifestations of debility on the *blood* itself,—in occasioning *plethora* when the vital depression is so slight as not to diminish digestion and assimilation,—in favouring irregular distributions, or *determination of blood*, in its more chronic states,—in producing *anæmia*, when its grade is still lower, or when it is more prolonged, and the assimilative functions, especially affected,—and in giving rise to *contamination* of this fluid, when it impedes the secreting, eliminating, or excreting functions,—will be found discussed in that article.—(*d*) Debility seldom exists long, or in a marked form,

without the *venous* circulation becoming thereby affected. The depressing agents, indeed, which act most severely upon the frame, give rise to impeded circulation or congestions of blood through the veins as one of their more immediate effects upon the economy, as shown in the article Congestion of Blood. — (*e*) The *lymphatic* and *absorbent vessels* even escape not the consequences of debility, particularly when it arises from original conformation, or deficient and unwholesome food. This is shown by scrofulous diseases of the glands, in the mesenteric consumption of children, and some states of dropsy. (See Lymphatic System.)

15. ii. *Debility of the Functions of associated Organs.* — The functions about to be particularised are depressed by, (*a*) Causes which lower the vital actions of the foregoing systems in a general and severe manner; and (*b*) by such as operate immediately upon these organs themselves. The former, being more general, and more intense in their operation, are immediately followed by arrest, or remarkable disturbance, of the functions in question; whilst the latter causes usually, but not always, over-excite and thereby exhaust these functions, and, by the frequency of their repetition rather than by their intensity, produce their effects more slowly and partially. *A. The digestive and secreting organs* are amongst the first to experience debility, however induced. This may arise from the evident dependence of their functions upon the ganglial system of nerves. But they may be especially affected, and may continue so for some time, without other parts of the frame evincing much disorder, particularly when the debility has been slowly and indirectly produced. The more special manifestations of debility in the *stomach*, the *liver*, the *duodenum*, and *bowels*, usually begin in this way; and they have severally obtained, according to the forms they assume, the names of indigestion, torpor of the liver, flatulence, constipation, colic, &c. — these being the more common effects, although several others may be adduced. When debility, either of an acute or chronic form, affects chiefly the digestive organs, the abdominal *secretions and excretions* are more or less disordered — are usually in smaller quantity and vitiated quality. But this is not the only result; they are generally retained on the surfaces and situations where they are secreted, until they undergo various changes, and acquire irritating properties. This is well illustrated by many of the functional diseases of the *liver*, and bowels. (See Cæcum, Colon, Concretions, Constipation, Liver, Worms, &c.)

16. *B.* The *respiratory and assimilating functions* manifest debility in various ways; the respiratory by frequency, shortness and quickness of action, and diminution of the changes usually produced upon the blood and air respired; the assimilating function by the thin and watery state of the blood, by the deficiency of its quantity, or of its red particles, as in *anæmia*, and, in slighter cases, by the milky or oleaginous condition of the serum. When debility is slight or recent, or when it has been gradually induced by stimulating agents, *nutrition* is not very materially affected; it may even be partially increased, owing to impeded or imperfect secretion and assimilation, the consequent abundance of fatty matter in the circulation, and its deposition in the adipose structure, thereby increasing the bulk of the body. But when the vital energies are more remarkably depressed, either in acute, chronic, or complicated cases, the nutrition of all the structures and organs, particularly of adipose, cellular, and muscular parts, is more or less arrested.

17. *C. The vital manifestations of the cerebro-spinal nervous system, and organs of sense,* may be remarkably enfeebled, without the rest of the frame being materially affected: but they may also be uncommonly active, although all the other functions of the body are debilitated. *Idiotcy* and certain states of *insanity* are often met with unconnected with any marked depression of the physical powers; and, on the other hand, particularly in chronic debility attended by emaciation and quickened circulation, the powers of mind are frequently very acute. The slightest change in the freedom, activity, or quickness of the circulation in the brain and spinal chord, and in the purity of the blood, will materially affect the character of the phenomena associated with debility of these organs, or of the body generally. As long as the circulation is unimpeded, and the blood sufficiently purified by the emunctories, debility will be attended by great activity of all the senses, and increased irritability of all the muscles. Hence arise various of its forms, familiar to every observer of disease, — that *with increased sensibility* (the *Debilitas ad Sensum* of some writers), and that *with augmented irritability* (the *Irritable Debility* of Hufeland and other German authors, — the "*Mobility*" of Dr. Cullen); both which forms constitute increased susceptibility, or excitability, of the cerebro-spinal system, and of the organs they influence. When, however, retarded circulation occurs in this system, or if the blood itself be rendered inappropriate to its state and functions, by the superabundance of unassimilated materials, or if it be insufficiently purified by the emunctories, debility, whether thus limited or universal, will be attended by a proportionate degree of *torpor* (the *Torpid Debility* of Hufeland), as well as by adynamia of all the organs dependent upon this system; instances of which are sufficiently common in many acute diseases. In this way the various manifestations of debility in the mental faculties, the general sensibility, and the mobility of the frame, in different cases and complications of disease, may be explained, — particularly if the various organic changes which so often supervene or become associated with this state of vital power, and with either of the conditions of the cerebral and general circulation now alluded to, be called into aid. The *causes* also, the nature of their impression, and their mode of operation, will remarkably modify the state and duration of cerebral asthenia. These are chiefly, (*a*) Such as act immediately on this system, — as inordinate mental exertions, the depressing passions and emotions, excessive fatigue, and narcotic poisons. (*b*) Those which act indirectly or mediately, — as the intense or prolonged impression of cold on the surfaces, terrestrial and infectious miasms, the actions of various sedative or contra-stimulant agents, and the abuse of the sexual organs; all which occasion modified or even different effects. The *organs of sense*, as

well as other parts immediately controlled by the cerebro-spinal system, have their functions enfeebled and impaired in proportion to the debility it experiences. But they may also be individually affected, and in various degrees, without this system being materially disordered. Such occurrences generally arise from the operation of local causes, — as over-excitement of the organ, and exhaustion of its sensibility by its peculiar stimuli; as weakness or loss of sight from over-exertion, or the intense or prolonged action of light; and loss of hearing from great noises, &c.

18. *D. The muscular structures*, from their connection with the ganglial and cerebro-spinal systems, necessarily experience the effects of depression of the energies of these systems, varying, according to its acute and chronic form, its degree, its simple or complicated state, and the progress it has made. But debility seldom originates in, or is limited to, these structures. Its earliest and simplest manifestations in them are diminished tone, flaccidity, wasting, particularly of voluntary muscles; lowered, or, in some cases, morbidly increased irritability, according as the nervous systems experience a diminution or increase of their susceptibility (§ 17.); occasioning, in some cases, irregular and tremulous motions, and a disposition to spasmodic or convulsive action, but more frequently defective energy of contraction, or power of continuing and repeating it, in both the involuntary and voluntary classes of muscles. In the more acute, or the more advanced and complicated states of adynamia, the insensible tonic contractility of muscular fibres are in a great measure lost; their vital cohesion is also so much diminished as to admit of their being more easily torn; they are incapable of performing even a portion of their functions; and their contractions are feeble, vibratory, or oscillating, productive of the utmost fatigue, sometimes of death; and the least exertion, even that requisite to preserve the body recumbent upon one side, cannot be sustained for a few minutes. These extreme states of debility occur in the most dangerous and severe cases of disease, as in adynamic fevers, scurvy, &c., and when the circulating and secreted fluids have become sensibly changed from their healthy condition.

19. *E.* The *sexual organs*, whilst they participate in the vital depression of the general systems, are often themselves chiefly affected. It is by no means uncommon to meet with instances, particularly in the male sex, of the most complete debility of these organs, amounting sometimes to entire loss of function, from precocious and inordinate excitement and indulgence; there being little or no other disorder, excepting enfeebled mental manifestation, in some cases. In others, however, all the organic and cerebro-spinal functions have become remarkably weakened, although not to the extent experienced by the organs in question. (See IMPOTENCY.)

20. iii. *The Manifestations of Debility in particular Tissues* are less evident than in the general systems and associated organs; and they are later in becoming evident. It is usually not until they are extreme, long-continued, or complicated, that they are remarkable. — (*a*) The *cellular tissue* at first evinces deficient firmness and elasticity, with softness, and, as debility increases, loss of its vital cohesion: it at last presents a tendency to œdematous or serous infiltration, and even to hæmorrhage, owing to weakness of the extreme vessels terminating and originating in it, and the insufficient support it yields them. When it is thus changed, the spread of other diseases through it is thereby remarkably promoted, and an unfavourable termination hastened, — as in cases of diffusive inflammation, erysipelas, punctured or poisoned wounds, &c.; its vessels having lost their power to limit the extension of inflammation by forming coagulable lymph. — (*b*) *Mucous membranes* are amongst the earliest of the particular tissues to experience the effects of debility, thereby increasing and perpetuating many of its phenomena. At first their functions merely are impeded; their secretions either diminished, or imperfectly excreted, or increased from relaxation of their vessels, or in other respects vitiated. As debility, whether of them especially, or of the frame in general, advances, vital cohesion becomes impaired, and they yield not the requisite support to their vessels; whence result softening, hæmorrhage from their surface, ecchymosis, asthenic ulceration, atrophy, &c. — (*c*) The *serous tissues* undergo a partial diminution of their cohesion, and permit an aqueous or serous fluid, in some extreme cases tinged with blood, to escape through their exhaling pores. — (*d*) The *erectile textures* at first evince greater susceptibility, particularly when debility has been induced by inordinate excitement of the sexual organs; but as it increases, they lose their peculiar functions. — (*e*) The *fibrous tissue* also experiences relaxation, becomes less elastic, and more readily yields than in health, giving rise to almost spontaneous dislocations, — results which have occurred in the chronic debility caused by masturbation, as remarked by Sir ASTLEY COOPER and Mr. COPLAND HUTCHISON, and by myself in one case. — (*f*) The *osseous texture* occasionally experiences, in children, an imperfect deposition of ossific matter, or even absorption of a great part of that already secreted; and, in aged persons, the removal of the animal matter which gives due cohesion to this structure: and, (*g*) The *corneous tissues* are often variously changed; the hair either falling out, or becoming thin, weak, or grey; the epidermis inclined to exfoliate, and rough or scaly; and the nails thin, long, crooked, or irregular.

21. III. DEBILITY OF THE WHOLE FRAME. — Debility seems, as already stated, most frequently to originate in the ganglial and vascular systems, which I have viewed as the chief factors of life; the digestive, assimilative, excretory, and cerebro-spinal organs being subsequently affected. But it may also commence in, and continue for a considerable time limited to, either of these, or even, although rarely, to one or more of the individual tissues. When existing thus locally, it usually springs from local and indirect causes, and is at first of a slight grade, the functions of the part merely being impeded; but, as it continues, the rest of the economy becomes implicated in various degrees, owing to the reciprocity of vital action and function existing throughout the frame. With this universal diffusion of asthenia, the part primarily disordered may still continue affected in a greater degree, exhibiting the changes of func-

tion, and even of structure, now briefly sketched in respect of the principal systems, organs, and tissues, according as they may be implicated; but, in many instances, the debility becomes co-ordinate throughout; and in rare cases, the part originally affected even partially recovers its powers upon some other organ having its vital energies more remarkably depressed.

22. IV. CHARACTERISTIC SIGNS, &c.—When asthenia is thus general and fully developed, the external aspect of the body, and all the vital functions, are affected; the extent and specific characters of ailment furnishing important pathological as well as therapeutical indications to the practitioner:—The countenance is pale, thin, or collapsed, sometimes bloated and discoloured: the eyes lose their animation, and sink in the sockets, and they are surrounded either by a dark or bluish, or by a tumid and œdematous, circle; the expression of the features is languid and depressed; the lips are pale; the tongue watery, moist, soft, broad, and sometimes tremulous, and the papillæ depressed and wasted; the voice and speech are weak, or nearly lost; the voluntary muscles lose their powers, and hence, in extreme cases, the continued supine posture, the inability to retain a position on either side, the sinking down in bed, and the falling of the head on the breast or on either shoulder. The surface of the body has its temperature diminished, is sometimes partially covered with a cold or clammy perspiration, becomes soft and flabby, occasionally of a more lurid or dirty hue, or pale and waxy, particularly in complicated debility; the firmness and elasticity of the soft solids are lost, and they either present a leucophlegmatic appearance, or they are remarkably emaciated,—the latter being particularly the case when the circulation is accelerated. The functions of the stomach and bowels are impaired, or altogether suppressed; and hence the want of appetite, the constipation, and emaciation,—which last affects first the adipose tissue, and next the cellular and least vitalised structures. When the depression is very great, the vital attraction requisite to the nutrition and healthy cohesion, especially of the more remote and superficial parts, being necessarily diminished, the function of absorption gains the ascendancy; and the less perfectly animalised constituents, particularly the adipose substance and the effete elements, are carried back into the circulation; and thus, in some states of disease, the body continues to live upon itself, until the functions are restored, or life extinguished; the external soft solids, attached to, or covering, the bones, meanwhile becoming remarkably extenuated. In general, the pulse is frequent, soft, small, and easily compressed; the action of the heart is weak, and leipothymia or syncope occur upon exertion, or on quickly assuming the erect posture. Respiration is frequent, imperfect, or anxious or difficult, and the motions of the thorax are slight and confined. The functions of the cerebro-spinal system are more or less enfeebled; and, with the changes described above (§ 17.) present the following phenomena:—Loss of memory; inability to prosecute a lengthened chain of discussion, or to fix the attention long on one subject; sometimes weakness, with hebetude of all the faculties; an unpleasant feeling of languor, and exhaustion, with a sense of anxiety referrible to the præcordia and pit of the stomach; vertigo or headach; noises in the ears, either with or without impaired hearing; weakness of the limbs, and relaxation of the ligaments of the joints, with tremors, occasionally convulsive movements, or local paralysis; and ultimately low or quiet delirium.

23. V. DIAGNOSIS.—A distinction has usually been made between *real* and *spurious debility*. The latter term, however, implies a contradiction. But as it is the morbid condition, and not the name imposed upon it, that requires notice, I may briefly allude to it. The state of system, to which this name has been applied, would be better expressed by denominating it *oppression of vital power*; this, or nearly similar appellations ("*oppressio virium*," "*debilitas ab oppressione*"), having been employed by several modern pathologists. The vital manifestations may be generally or partially *oppressed* by whatever impedes their free reaction in removing the impression produced by injurious agents, or by whatever arrests the function of an important secreting organ or vital emunctory, whereby the vascular system becomes overloaded, and consequently oppressed throughout, as well as in the organ whose functions have been interrupted. The distinction will be more easily understood by a reference to facts.—During pneumonia, the lungs perform their functions in respect of the blood imperfectly, and the various secretions and excretions are diminished. Hence the quantity of the circulating fluid is increased; the circulation through the inflamed lung rendered difficult; the functions of this organ impeded, and the vessels generally distended beyond their power of reaction upon their contents, so as to restore the suspended functions. In such cases, the pulse is suppressed, and not much accelerated; but it conveys the sensation of a confined limit of pulsation, thereby suggesting the idea of a sustained state either of tonicity which the systole of the ventricle cannot much affect, or of distension upon which the elasticity of the vessel reacts imperfectly in the intermissions between the systoles. That this state actually obtains, is shown by the effects of blood-letting in changing the character of the pulse, in removing the feeling of oppression, and in partly restoring the strength. Inflammations of other organs—as the liver, brain, &c.—also furnish instances of oppression of vital power. In all these, however, the state of the surface of the body, and other symptoms above noticed as characterising true debility (§ 22.), do not exist. In fevers, also, the reaction following the impression of the exciting causes is very generally attended by oppression of the powers of life, owing, in some cases, to an overloaded state of the circulation from interrupted secretion, &c.; and, in other cases, partly to this circumstance, and partly to the depressing influence produced by these causes still continuing, and, jointly with the increase in the quantity of the circulating fluid, favouring congestion of internal secreting and vital organs. Hence, in several forms of these diseases, a complicated pathological state is the result; viz. *depressed*, followed by *oppressed*, vital power, as soon as attempts at reaction begin to be made, in order to overcome the injurious impressions and changes occasioned by the exciting causes. This suppression of power may arise out of true

debility, may be associated with it, and terminate in it, in its worst and complicated states.

24. The Duration of debility is extremely various. It may, particularly when acquired and slight, be remarkably long, or continue through life, which it may not even abridge. When rapidly and *primarily* produced, or general and intense, or complicated, it is usually *acute* as respects its continuance; but when *consecutive*, or partial, or the result of irritation of particular textures, it is prolonged into the *chronic* state; its duration depending greatly upon its degree, and both being extremely various.

25. VI. Pathological Relations. — i. The Consequences and Terminations of debility are, (*a*) Impeded or interrupted secretion; (*b*) Changes of the circulating fluids; (*c*) Various states of irritation, or inflammatory action, in particular organs or tissues; (*d*) General reaction of the vascular system, associated with various grades of vital power, from the lowest, or most asthenic, to its highest, or most sthenic form, with their modifications; (*e*) Changes in the firmness, elasticity, nutrition, colour, form, and vital cohesion of the soft solids, and, in some instances, ultimately in the hard solids also; (*f*) Effusions of fluids (aqueous, serous, sanguineous, &c.) from mucous or serous surfaces, or in cellular or parenchymatous structures; (*g*) The production of numerous forms of organic change; (*h*) The formation of new or adventitious tissues or productions, as tubercles, tumours, melanosis, cancer, hydatids, worms, gangrene, &c.; and, (*i*) lastly, Death, which may occur directly from the intense action of the depressing cause, but more commonly through the medium of one or more of the changes now enumerated, the first and greater part of which often taking place consecutively.

26. ii. Associations of Debility. — Asthenia is very frequently connected with some other morbid condition, implicating either particular parts, or the system generally. Amongst these are the *consequences* now enumerated (§ 25.); but the most important are, (*a*) The association of depressed with otherwise modified or morbid states of the vitality of the system; (*b*) with a vitiated condition of the blood and secreted fluids, either or both of which constitute the complicated debility already mentioned (§ 11.); (*c*) with a disposition to solution of the textures generally, or of a part merely, as in malignant fevers; (*d*) with congestions, and chronic or acute inflammations of particular organs or structures, as in complicated forms of fever, erysipelas, diffusive inflammations, dysentery, &c.; (*e*) with intestinal worms, hydatids, and various malignant and adventitious formations.

27. A knowledge of the pathological relations of this most important and singularly overlooked condition of vital power is necessary to the practitioner, inasmuch as it enables him to entertain enlarged and connected views of disease, by the aid of which he may the better comprehend such states of disordered action as cannot be readily assigned to any particular type or specific form, owing to their imperfectly marked characters, the associated disturbance of different organs and structures, and the want of prominent symptoms whereby they may be ascertained. Debility not only constitutes, in its more intense forms, disease itself, and a most serious part of many of the most dangerous maladies, but it also *predisposes* the body to be affected by the numerous injurious agents to which it is constantly exposed.

28. iii. The Predisposition to be affected by the exciting causes of disease, arising out of debility, will necessarily vary with the form and grade it assumes, and the circumstances in which it has originated. This proposition is too evident to require illustration. But when the debility proceeds from irritation of one or more structures abstracting vital power from the rest (§ 9.), it may not increase, but may in some cases diminish, predisposition, particularly when it is attended by exalted sensibility and accelerated circulation. Thus the debility attending irritation in any part of the respiratory organs even diminishes the disposition to be affected by malaria, and infectious or epidemic agents. So much, however, of what constitutes liability to diseases is owing to the temperament, diathesis, the modes of life, and habit of body, as well as to general or local debility, that the exact share of each can rarely be ascertained. General debility either in its direct or primary form, or as consecutive of over-excitement, disposes the system to be affected by terrestrial emanations, vicissitudes of season and weather, and infectious effluvia. The more local or partial states of debility, particularly when existing in secreting organs and the associated structures, render them liable to congestions, inflammatory irritation, to disordered secretion and excretion, to spasmodic or convulsive movements, to effusions, to various states of inflammation, and organic change, with the other *consequences* and *associations* of debility above enumerated (§ 25, 26.), upon exposure to causes which disturb the *balance* of vital manifestation throughout the frame in a sudden or violent manner, or which impede the assimilating and depuratory functions, and thereby disorder the vascular actions and the circulating fluid. (See Disease — *Causes of*.)

29. VII. Treatment. — In attempting to remove debility, our means should be directed with a strict reference to its form, grade, and complication. These, however, are so numerous, that precise rules of treatment cannot be laid down; the only attempts of this kind that can be made, falling more appropriately under those diseases of which depressed vital power forms an essential part. (See especially the First Class of the author's classification.) In the treatment of debility, in either its simple or associated states, there is a particular class of remedies, viz. *tonics*, which are more beneficial than any other; although many articles belonging to other classes, as diffusive stimulants and antispasmodics, may often be prescribed, and with great advantage. Tonics, which have derived their name from their influence in augmenting the tone of contractile parts, owe the principal part of their good effects to their elevating, in a gradual manner, depressed vital power, hardly up to, and seldom or never above, the healthy standard; and to the permanency of their action. By their repetition before the effects of the previous dose have subsided, the beneficial influence ultimately is propagated throughout; and as soon as one or more important functions are restored, the rest participate in the change, and the whole assume

a regular discharge of their offices, owing to the reciprocity of vital influence and function existing throughout the economy. Much, indeed, if not more, is also due to the partial absorption into the circulation of their active constituents; and to their direct action on the vessels, the different tissues, and on the blood itself. Although various diffusive stimulants and antispasmodics produce beneficial effects in several states of debility, yet they are generally much less serviceable than tonics, and in many instances are even injurious, chiefly from the quickness and little permanency of their action, from their proneness to over-excite and over-heat the system, and consequently to indirectly depress its energies. Hence, in order to perpetuate their restorative effects, it becomes requisite to repeat them more frequently; and thus a habit and desire of excitation is generated, which, if not gratified, is followed by insupportable exhaustion. However, in many states of disease, they are beneficial from the rapidity of their action, and are useful adjuncts to more appropriate means. As all the agents which restore the vital energies vary not only in the grade, the rapidity, and the permanency of their action, but also in respect of the organ, or the system, or tissue, on which their influence is chiefly exerted, it becomes a most important object in practice to ascertain the part primarily and chiefly affected, and to prescribe them according to our knowledge of their mode of operation.

30. Before adopting measures to remove debility, we should ascertain, 1st, The *causes* in which it has originated; 2dly, Whether or no it may not be apparent merely,—the consequence of *oppressed*, and not of *depressed*, vital power; 3dly, If it proceed or not from *irritation* of a particular part, abstracting the due energy from others; 3dly, Whether it be *simple* or *complicated*; and, 4thly, If it be *associated* with any local mischief or *change of structure*. Having ascertained these important points, the next object is the choice of agents, and appropriation of them to the states of debility presumed to exist. It is chiefly to the neglect of a pathological analysis, similar to the above, of the cases which occur in practice, that the abuse of tonics in diseases of debility is chiefly to be attributed.

31. i. *Primary Debility* should be treated, conformably with the injunction now given, with strict reference to its cause, to the particular form it has assumed, and the organs or parts chiefly affected. If it have arisen from abstraction of the stimuli necessary to health, these should be restored; if from depressing agents, whether physical or moral, these should be counteracted as far as may be.—(*a*) When debility is manifested more especially in the viscera immediately influenced by the *ganglial* and *vascular systems*, it very generally proceeds from one or other of these classes of causes; and, besides their removal or counteraction, requires, according to the rapidity and the intensity of their operation, the most carefully selected remedies. If the vital depression be rapidly progressive or very great, diffusive stimuli, as camphor, ammonia, the æthers, serpentaria, arnica, &c., will be requisite in the first instance, until it is arrested, when tonics will be more serviceable; but, with the first indication of reaction, stimuli of every kind should be laid aside, lest the consequent excitement should be carried to an inordinate height by their means. The propriety of prescribing tonics appropriately to the states and grades of debility, as insisted on by **Hoffmann** and **Thomann**, cannot be doubted; but opinions will differ widely as to those which are more suitable to certain conditions. When the vital depression affects the action of the heart more particularly, after momentarily exciting the olfactory and respiratory nerves, as well as those of the stomach, by means of the volatile and diffusive stimulants, as the æthers, ammonia, and aromatic spirits, &c., the more permanent tonics should be employed. If there appear to be a deficiency of blood in cases of this description, the preparations of iron will be most serviceable, and will be advantageously combined with myrrh, cinchona, gentian, willow-bark, cascarilla, and the sub-carbonate of potassa. If the organic nervous influence be depressed, without any manifest deficiency of blood, either of these vegetable tonics may be taken, with the fixed alkalies or their sub-carbonates, or with the mineral acids, according as it may be desirable to promote the secretions, or to impart tone to the extreme vessels. When we wish to excite the functions of the viscera generally, and particularly when the blood does not undergo the requisite changes as it circulates through the different assimilating and depuratory organs, the chlorates of potass and soda (the oxymuriates) will be found of much use. I have employed them for several years with much benefit, at the Infirmary for Children, in diseases of debility affecting chiefly these organs, as well as the preparations of iodine, especially the hydriodate of potass. The bitter tonics, combined with aperients, will also prove of great service in similar cases. The marked advantages of associating individual medicines from each of these two classes,—first made known to me by the writings of **Hoffmann**, and confirmed by repeated observation,—are brought about both by their increasing the action of the secreting and excreting viscera when thus conjoined, and by their improving thereby the condition of the circulating fluids, as well as permanently exciting the vital influence. In some cases, the combination of small doses of the extract of nux vomica, or of strychnine, with aloes and myrrh, has proved equally beneficial. It was in pathological states similar to those now under consideration, that phosphorus was prescribed by **Conradi** and others, that the inhalation of oxygen gas was strenuously advised by **Beddoes**, and that electricity and galvanism were generally recommended by Continental writers. But I perfectly agree with **Grapengeisser**, in viewing these as calculated to be injurious where there exists any increase of irritability, either locally or generally, or where any vital organ is congested.

32. When debility is the consequence of the injurious impression of some powerful agent, as terrestrial or infectious effluvia, it will often be most advantageous to interrupt the succession of morbid phenomena by the exhibition of the most active tonics in large doses, and in conjunction with warm cordials. All the more intense states of primary debility proceed from impressions

made by sedative causes upon the ganglial system, and may be removed by counter-agents directed to the same system, before consecutive changes have advanced far, or the functions of the emunctories and the state of the circulating fluid have been disordered to the extent of giving rise to the early phenomena of febrile reaction. Thus, the more stimulating emetics, immediately followed by powerful tonics, or cathartics preceded by or combined with warm tonics, will often prevent the accession of fevers, when exhibited before the cold stage, or rigor, has commenced; and, in some cases, although it have commenced, if it have not terminated in excitement. But, in these cases, the tonics and other excitants prescribed should be of such kind, and in such quantity, as will make a powerful impression on the nervous system of organic life, and as are calculated to restore the suspended secretions. The preparations of cinchona, or the sulphate of quinine, combined with the hot spices, as capsicum, or with camphor, or with ammonia, and prescribed in large doses after an emetic, and followed by a purgative conjoined with the same stimulants, are the most eligible in such cases. The preparations of arsenic, the sulphates of zinc and iron, piperine, the muriate of ammonia, the chlorates, and various other tonics, are also appropriate in cases of primary debility, especially when assisted by the cardiacs now mentioned; but they are less efficient than the foregoing in removing the vital depression primarily induced by the exciting causes of fevers.

33. When asthenia affects especially the capillary vessels, and the crasis of the blood is deficient, or when hæmorrhages take place unattended by vascular excitement, the more astringent tonics should be given with sulphuric acid; and if the loss of tone be excessive, these should be associated with cardiacs and aromatics, and alternated with moderate or full doses of the more energetic terebinthinates, and balsams; morbid secretions being duly evacuated by the preparations of rhubarb.

34. (*b*) Debility manifested chiefly in the *associated organs of digestion*, can never be permanently removed, unless the secretions and excretions be duly promoted; and, for this purpose, the combination of tonics and aperients alluded to above is the most efficacious. But this practice should not be resorted to whilst irritation, or active congestion of, or determination of blood to, any of these viscera exists, lest we thereby convert such disorder into inflammatory action. In such circumstances, the more heating tonics, or those which contain most of resinous or oleaginous constituents, are the least appropriate. Where irritation of the digestive mucous surface is complicated with debility of these organs, mild tonic infusions may, notwithstanding, be exhibited with benefit, especially those of calumba, gentian, cinchona, quassia, &c.; and may be combined with acids, or with small or moderate doses of the nitrate of potass, or the sub-carbonates of potass or of soda, or with both the nitrate and sub-carbonate. It is chiefly in cases of this description that diffusive stimuli and heating tonics, so much and justly inveighed against by Broussais, Otto, and Philips, are injurious. When asthenia is associated with a somewhat lax state of the bowels, not proceeding from inflammatory irritation of their mucous surface, muriate of lime, or cusparia, calumba, quassia, or cascarilla, with the alkaline sub-carbonates, &c., are generally of service. When the debility of these organs is attended by torpor of the liver, or accumulations of bile in the gall-bladder and hepatic ducts deobstruent purgatives should precede the exhibition of tonics and stomachics. If it be associated with *worms*, purgatives, and afterwards chalybeate tonics, are required.

35. ii. *Treatment of Consecutive or Secondary Debility.—A.* It will generally be found, when the debility arises *from irritation of some organ or secreting surface*, that tonics or stimulants, unless such as are mild, and contain but little of an essential oil or other heating constituents, combined with deobstruents and anodynes, will prove either of no service, or injurious, from favouring the supervention of inflammatory action and organic change. Similar effects are also apt to follow the exhibition of tonics, when debility is attended with congestion of some internal viscus, or obstruction of secreting organs: and they will seldom be of any benefit until these affections are in some measure removed; unless the powers of life are incapable of themselves of restoring the tone of the circulation and the suspended secretions, by developing a healthy reaction. In such cases, local depletions, and remedies calculated to excite secretion and excretion, should precede, or even in some instances accompany, the exhibition of gentle tonics, which ought to be prescribed in conjunction with deobstruents, assisted by change of air and a light nutritious and farinaceous diet.

36. *B.* The debility which follows over-excitement, or *which consists of exhaustion of power*, requires means proportionate to its degree and form. The most intense grade of exhaustion occurs in the last stages of adynamic or malignant fevers, and of some other acute diseases; and often demands not merely permanent excitants, but the more active stimuli, as camphor, ammonia, serpentaria, arnica, wine, spirits, æthers, &c., to prevent the rapid extinction of life: whilst other states of exhaustion, especially such as are slower in their accession, or follow local inflammations, spasmodic or hæmorrhagic diseases, and the less severe forms of fever, admit only of the more gentle tonics; and even these, particularly if they be not cautiously prescribed, may reproduce the disease which occasioned the debility, especially if it was inflammatory or hæmorrhagic. It is not uncommon to find acute inflammations rekindled, or chronic inflammations follow the acute; and relapses of fevers, or visceral engorgements, or obstructions, supervene, when the exhaustion has been treated by heating tonics or stimulants, or by a premature use of a too full or stimulating diet. On the other hand, too strict exemption from all restorative means has been not infrequently followed by permanent general or local debility, or by very slow recovery; and it has often favoured the accession of other acute or chronic diseases; exhaustion predisposing the system to be impressed by their exciting causes. In the more difficult and doubtful circumstances of this form of debility, it will be, upon the whole, judicious to trust chiefly to wholesome air and suitable diet; and, if tonics or stimulants are

necessary, to select those which are the least heating, and to exhibit them along, or alternately, with such medicines as will promote the secretions and excretions most requiring aid, and with internal and external derivatives from the principal seat of disease. In cases of this description, particularly in the young, and in those who previously enjoyed a sound constitution, the returning energies of life generally stand but little in need of a spur; they require rather a judicious guidance, especially in respect of the digestive, the secreting, and excreting functions.

37. iii. *Complicated Debility*, or that condition of the frame which consists not merely of a depressed, but of an otherwise morbid state of vital power, has been ascribed above — 1st, to unwholesome food, and to imperfect assimilation; 2dly, to an impure or altered state of the circulating fluid, occasioned by impeded or disordered secretion and excretion; and, 3dly, to the absorption of morbid matters into the blood, either from some one of the mucous surfaces, or from parts of the body in which they have been generated. The operation and effects of these sources of contamination have been fully insisted on in the articles Absorption, and Blood (§ 110—151.). The indications of removing them may be resolved into the following: — 1st, To cut off the supply from the sources of contamination; 2d, To raise the powers of life, as expressed chiefly in the *ganglial* and *circulating systems*, by the means pointed out under that head (§ 31.); 3d, To promote the depuratory actions of the emunctories.

38. *A.* The propriety of endeavouring to accomplish the *first* of these intentions cannot be questioned; but, when the contaminating matters are formed in some part of the system, as in various malignant diseases, apparently local at their commencement, it frequently cannot be put in practice, or the period at which it might have been attempted with any prospect of success may have passed, and the other intentions are our only resort. — *B.* The *second* indication is to be fulfilled by the remedies already noticed (§ 31.), and the treatment recommended in the article Blood (§ 157.); particularly by the alkaline chlorates; the preparations of bark, of iodine, of iron, of arsenic, or of zinc; by astringents and antiseptics, as the acetic and citric acids, &c.; by the preparations of the bitter roots and woods, or of the aromatic and tonic barks, with liquor potassa, or the alkaline sub-carbonates, in the more chronic diseases, and with the sulphuric, the muriatic, or nitric acids, in the more acute maladies, and with warm spices, &c.; and by the gum-resins, the balsams, the terebinthinates and camphor, prescribed according to the circumstances of the case. — *C.* But whilst we are endeavouring to elevate vital energy by those and other means, we should also fulfil the *third* intention, by associating, or alternating, them with the more tonic and stomachic purgatives, or with warm and stimulating diaphoretics, as the abdominal or the cutaneous secretions may require to be promoted.

39. iv. *Debility affecting chiefly associated organs, or particular textures*, requires nearly similar means to those already advised, according to the grade and form it may assume. The treatment of its manifestations in the *ganglial* and *vascular systems*, and in the *digestive viscera*, has been already noticed; and is still more particularly discussed in the articles Blood, Colon, Indigestion, &c. — *A.* Debility of the *cerebro-spinal organs* must be treated according to the causes that have occasioned it, and the characters it presents. The causes, whether moral or physical, should be removed or counteracted as far as possible; and if it have arisen from mental excitement, repose and agreeable amusement should be inculcated. (*a*) When it is characterised by increased *sensibility*, the bitter infusions with liquor potassæ or the sub-carbonates of soda or potash, with conium or hyoscyamus; the preparations of iron; chalybeates; vegetable tonics and aromatics, with small doses of opium or the preparations of morphine; cold or shower baths; sea-bathing, change of air, &c., mental tranquillity, and agreeable employment; are amongst the most efficacious means. (*b*) If it be attended by increased *irritability* or *mobility*, the mineral acids, alone or with bitter infusions; the preparations of cinchona; the acetic acid; Hoffmann's anodyne, valerian, assafœtida, musk, or vegetable tonics, with opiates or anodynes, the prussic acid, the Iceland moss, ass-milk, alkaline or tepid baths, &c., are suitable remedies. (*c*) If the debility be great, and particularly if it be attended by *torpor* or depression of the sensibility depending neither upon cerebral congestion, nor upon a plethoric state of the vascular system, the warm or diffusible stimulants, combined with permanent tonics; aromatics and cardiacs; iodine, strychnine, or the extract of nux vomica in small doses; coffee; camphor or phosphorus in minute quantities; warm salt water bathing; the shower bath; chlorine fumigating baths; the use of astringent and camphorated washes to the head and surface of the body; the nitro-muriatic acid bath, or sponging the surface of the trunk, or even the head itself, with a tepid wash containing these acids, may be tried and associated with the foregoing, or other internal remedies, according to the peculiarities of the case.

40. *B.* The *sexual organs* are debilitated — (*a*) from imperfect developement, depending upon their interrupted evolution, or upon general asthenia; and (*b*) from over-excitement. The *first* of these causes seldom occurs in the male, but not infrequently in the female (see Chlorosis, and Menstruation), and in such cases requires the constitutional treatment there described. The *second* cause is common to both sexes, although perhaps more so in the male than female. When it has thus originated, and exists merely in a slight degree, without amounting to impotency, the organs will recover their energies soon after marriage, if regular and abstemious habits be adopted. In other circumstances, and in severer cases, attention should be paid to the general health: the mind ought to be occupied by interesting pursuits; the patient should rise early in the morning, and use the shower bath, or local aspersion or affusion, and live regularly. If the causes in which it originated be relinquished, the sexual function will soon be restored. The tonics which are the most efficacious in cases of this description are, the muriated tincture of iron, taken in the infusion of quassia, or of chamomile flowers; the tincture of iodine; coffee; and the extract of conium,

with the preparations of cinchona, cascarilla, or iron, &c. (See Impotency and Sterility.)

41. *C.* The manifestations of debility in the *cellular*, the *mucous*, and other tissues, must be treated according to the principles already stated. When asthenia in any of its various forms affects the digestive *mucous surface*, the treatment already noticed (§ 34.) is applicable. If it be attended by hæmatemesis, malæna, or intestinal hæmorrhage, the terebinthinates, and sulphuric acid, either alone or with tonic decoctions, or the superacetate of lead with acetic acid and opium, are the most energetic. If it manifest itself chiefly in the *respiratory mucous membrane*, the astringent tonics, the mineral or vegetable acids, the inhalation of the fumes of astringent and tonic substances (see Bronchi, § 100.), sponging the chest daily with tepid or cold astringent lotions, change of air, sea-voyaging, and horse exercise, are amongst the most salutary measures.

42. v. *Of the various constitutional and local diseases* with which debility is commonly associated (§ 25, 26.), little or no mention need be made at this place, as they are particularly noticed elsewhere. I may, however, remark that inflammations occurring in a debilitated and cachectic state of the frame, more especially if the debility be of that complicated kind described above (§ 11.), are characterised by deficient energy of all the functions actuated by the organic nervous system, and by imperfect tone of the vascular and capillary system itself (see Inflammations—*Asthenic Forms of*); and that they seldom admit of the large depletions which are indispensable in the healthy or sthenic states of those diseases. The inflammations which not infrequently supervene in the course of adynamic fevers, and certain forms of erysipelas, as well as various other associations of the pathological conditions now under consideration, fully illustrate this position. Such asthenic forms of complicated disease, however greatly increased the general vascular action attending them may be, require the powers of life to be supported, and, in many cases, powerful tonics and stimulants to be exhibited, even at the time that it may be necessary to resort to local or derivative bleedings in order to prevent the disorganisation of the viscus especially affected. In all such maladies, the pulse is remarkably quick, often full, but soft and compressible — a state which, although resulting from depressed vital energy, is too generally viewed as evincing a very different condition; and depletions, often the very cause of the great frequency of the pulse, are resorted to, in order to render it slower — to perform an impossibility: the important pathological facts, that great quickness of pulse is the consequence of debility, and that the most tumultuous and morbidly increased vascular action is very frequently associated with the utmost depression of vital power, being either unknown or overlooked.

43. vii. *The treatment of the debility attending convalescence from disease* has been partly anticipated, particularly at § 36.; but I may here offer a few additional remarks on this important subject. — *a.* The great susceptibility of the system to impressions from external agents or mental emotions, attending the debility of the early stage of convalescence, should make the practitioner cautious as to its management. Exposure to cold, the premature exhibition of stimulants or of too heating tonics, too great indulgence of the appetite, and inappropriate food, may occasion relapses, may favour the supervention of other diseases, and may thereby superinduce dangerous or irremediable organic change. This is no infrequent occurrence after fevers, particularly the exanthematous, and after inflammations of the viscera. Such unfavourable results proceed not merely from the above causes, but also from inattention to the secretions and excretions; the patient often relinquishing too soon the use of those means which are still requisite to enable the weak powers of life to perform their various functions. The laying aside the use of medicines too soon is even still more frequently productive of mischief in convalescence from chronic diseases, particularly those of the bowels and liver, and dropsies. In these, the use even of the same means that removed the complaint is often necessary for a considerable time afterwards, either in different doses or in modified forms. During the whole period of recovery, the causes which produced the malady ought to be carefully avoided; and the physician should prescribe the diet and regimen of the patient, and such other measures as may seem to him calculated to ensure the object proposed. The articles of *diet* should at first be bland, digestible, and in small quantity, which may afterwards be gradually increased; and, with the returning powers, the farinaceous food first adopted may be added to weak animal decoctions, — or to milk, particularly asses' milk. Subsequently white fish, boiled; or chicken, rabbit, game, or the lean of well-fed mutton, may be taken, at first in small quantity and without heating condiments. Although white fish or flesh may not be more readily digested than game, venison, or mutton, yet they are generally not so heating as the last-mentioned article, or as beef. Before wine, or any other exciting beverage, be allowed, the effects of the gentle and tonic bitters, in the form of infusion, should be first observed; and if these occasion no febrile excitement, nor accelerate the pulse, a little old wine, particularly Hermitage, sherry, or East India Madeira, may be taken in water with the principal meal.

44. *b.* The *temperature* of the room, and the bed and body clothing of the patient, ought to be duly regulated according to his habits, and the peculiarities of the case, and with strict regard to ventilation. Subsequently, *change of air* and suitable *exercise* should be prescribed; at first in a close or open carriage, according to the season, and afterwards on foot, or on horseback; the last of which, and sea-voyaging, being the best suited to convalescents from pulmonary diseases.

45. vii. *Moral Regimen, and other means.* — *A.* There are various other remedies that may be resorted to in the more urgent cases of debility; but these are pointed out in the articles on the specific diseases, of which debility forms an important part. — *a.* The internal use of tar water, once so inordinately lauded, and subsequently so very undeservedly neglected, and medicated baths, may, however, be here noticed. I have had several oppportunities of observing the good effects of a course of tar water, or of an infusion or decoction of pine tops and shoots, in simple debility, and in complaints chiefly to be referred to this state of vital endowment. — *b.* The idea that

the skin is entirely incapable of absorbing fluids in which it may be immersed, has led to the neglect of *medicated baths*. But it should be recollected that, independently of any power of absorption this structure may possess,—and which I believe it possesses under some circumstances, and in respect of various agents,—it is a living, an active, a finely sensible, and, as to the nature and extent of its functions, an important organ; and that it is very susceptible of impressions by which not only its own functions are modified or altogether changed, but the actions of other organs are variously affected in consequence of the nervous and vascular connections and functional relations, which bind the different parts of the economy into one indivisible whole. Entertaining such views, I believe that cold, tepid, warm, or medicated baths; that lotions or washes, or stimulating liniments and frictions applied to the surface,—the former in slighter cases, the latter in the more urgent; are not infrequently beneficial in diseases of debility, when judiciously employed, and with due reference to antecedent or existing visceral disorder. Sea or salt water bathing; shower baths; camphor and chalybeate baths; warm, tepid, or cold baths, either general or local, of iodine, or of iodine and sub-carbonate of potassa; baths of decoctions of willow or oak bark, sometimes with the addition of an alkaline sub-carbonate; washes with camphor water, rose water, and vinegar, applied to the trunk; or sponging the surface daily with a mixture of these, at a temperature of about 60°; or with a small proportion of the nitric and muriatic acids in water at a temperature of 70° to 80°; are respectively of much service, when suitably prescribed.

46. *B. Moral treatment*, or attention to such mental impressions and emotions as are calculated to promote the physical means resorted to, is particularly beneficial in restoring the vital powers, especially when the nervous systems manifest a more than ordinary share of depression and its attendant disorders. The manner and bearing of the physician, when calculated to inspire *confidence*, will of themselves do much in fulfilling the intentions of his prescriptions. The faith reposed in the remedies resorted to will often accomplish as much as they are physically capable of performing, and not infrequently much more. In order to inspire this feeling, the physician should himself evince a calm, and, in cases of great danger and depression of the vital energies, a cheerful confidence. Hope, in whatever form it may be excited, and in every degree to which it can be elevated, is a most powerful agent in combating diseases of debility; whilst its opposite, despondency,—the consequence and the cause of debility,—is one of the greatest evils we have to guard against in these maladies. Every practitioner whose range of observation has comprised the malignant diseases of warm climates, or of temperate countries, must have remarked, that when the patient dreads, and still more if he entertains a sentiment of, an unfavourable issue, or if he be apathetic and careless of the event, the very worst sign of depressed vital power has appeared, and the most active moral and physical stimulants are then required; whilst, on the other hand, a firm confidence in the physician, and ardent desire of recovery, are the best aids by which his endeavours can be seconded.

47. *C. Travelling*,—owing to the exercise, the change of air, the continued succession of novel and exciting objects presented to the senses, the agreeable occupation, without exhaustion of the mind which attends it, and the amusing and exhilarating matters incidental to it,—is one of the most efficacious means of restoring the depressed or exhausted powers of the frame, especially the enfeebled functions of the digestive organs and of the nervous system; and nearly allied to it, are *pleasant society*, rational *amusements*, and varied, interesting, but not fatiguing, bodily and mental *employments*.

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DEGLUTITION, DIFFICULT.—Syn. *Dysphagia* (from δὺς, *difficulty*, and φάγω, *I eat or swallow*). *Deglutitio difficilis vel impedita*, Auct. *Schweres Schlingen*, Ger. *Dysphagie*, Fr. *Dysphagy*. *Difficulty of Swallowing*.

Classif.—1. *Class*, Diseases of the Digestive Function; 1. *Order*, Affecting the Alimentary Canal (*Good*). SPECIAL AND GENERAL PATHOLOGY; *Symptomatology* (*Author*, *&c.*).

1. Difficult or obstructed deglutition is an occasional symptom of several diseases, and a constant concomitant of a great variety of organic changes, affecting the *fauces*, the *pharynx*, the *œsophagus*, or parts in their immediate vicinity; and which are discussed under these heads, particularly in the article on the ŒSOPHAGUS. After having noticed the only *idiopathic form* in which dysphagy can strictly be said to occur, I shall arrange those pathological states of which it is an important phenomenon, and with reference to the places in which they are more appropriately described, and to the principles and means of cure.

I. PRIMARY OR IDIOPATHIC DYSPHAGY. *Nervous Quinsey*, HEBERDEN.

CLASSIF.—II. CLASS, I. ORDER (*Author*).

2. DEFIN.—*Difficulty of swallowing, occurring suddenly, and accompanied by a choking sensation.*

3. i. This form of dysphagy is not infrequently observed. It generally takes place when the patient is apparently in good health; and chiefly in irritable, nervous, or weak constitutions. It is usually induced by violent gusts of temper, or mental emotions, or by dread of its accession; and is occasionally so severe as to threaten suffocation. When it affects the œsophagus, it gives rise to a sensation resembling that occasioned by the retention of an extraneous body; and matters attempted to be swallowed are either retained for some time, or rejected. When the pharynx is principally affected, deglutition is generally attended by a sense of choking. It may continue only for a minute or two, or it may be prolonged for several days, or even months, difficulty being present in various degrees upon each attempt at receiving substances into the stomach; or it may be remittent. It is often accompanied by the retention of flatus in the œsophagus, probably by spasm; the difficulty of deglutition being increased by the flatulent distension, but removed upon the discharge of flatus. It resembles in this the globus hystericus; but it differs from hysteria in the circumstance of its occurrence in males as well as in females, and independently of any of the other characteristic symptoms of that affection.

4. ii. The TREATMENT of primary or idiopathic dysphagy should be directed with the view, 1st, of relieving the existing difficulty; and, 2dly, of preventing its recurrence.—(*a*) The first object may be attained by swallowing slowly cold or iced fluids; by cold applications to the neck or throat; by cathartic, anodyne, and antispasmodic enemata; and by camphorated liniments, or antispasmodic and anodyne plasters placed on the sternum or throat. (*b*) The recurrence of the affection will be prevented by the internal use of vegetable bitters and tonics, with the alkaline sub-carbonates; by narcotics or antispasmodics combined with ipecacuanha; and by a free action kept up for some time on the lower bowels, by means of the resinous or other purgatives conjoined with vegetable bitters, and promoted by clysters. The other means, mentioned hereafter (§ 16.) will also prove useful adjuvants.

II. SYMPTOMATIC AND COMPLICATED DYSPHAGY.

CLASSIF.—GENERAL PATHOLOGY; *Therapeutics*, &c.

5. Difficult or obstructed deglutition is an occasional or constant attendant upon a variety of functional disorders, and of organic changes. 1st. It is often symptomatic of hysterical, hypochondriacal, flatulent, and asthmatic affections. 2d. It is constantly attendant upon tetanus and rabidity. 3d. It is sometimes produced by organic change seated in parts about the base of the brain or cranium, the medulla oblongata, or upper part of the spinal chord. In all these symptomatic states, the parts immediately concerned in the function of deglutition are seldom, and not necessarily, affected organically: but in the following there always exists either inflammatory action, or its consequences, or some structural change, in the parts by which food is conveyed into the stomach, or in their immediate vicinity. The preceding may be called *symptomatic forms* of dysphagy; those which are to follow, *complicated states* of this affection. Under this latter may be arranged, 1st, Dysphagy from congenital malformations; 2dly, From inflammation, or structural lesions of the mouth, tongue, fauces, pharynx, or tonsils; 3dly, From diseases of the epiglottis or larynx; 4thly, From inflammations or structural lesions of the œsophagus, or of the cardiac orifice of the stomach; 5thly, From tumours pressing upon the pharynx, or on the œsophagus. On each of these I shall add but few remarks.

6. i. SYMPTOMATIC OR SYMPATHETIC DYSPHAGY.—*A. Of spasmodic or flatulent diseases.* Difficulty of swallowing occasioned by *hysteria*, *hypochondriasis*, spasmodic *asthma*, *dyspepsia*, and even *rabidity*, is in a great measure to be ascribed to a flatulent distension of a portion of the œsophagus, with spasmodic constriction of other parts of this tube, and disposition to convulsive or spasmodic action of the muscles of the pharynx, either upon certain occasions of their being excited by the mind, as in hydrophobia, or upon attempts at performing their usual functions. In many instances, particularly those connected with asthma, indigestion, or flatulence of the digestive canal, the difficulty is attributable rather to the ascent of flatus in the œsophagus, preventing the transmission of food into the stomach than to spasmodic action of the muscular parts concerned in the process. In these cases, the patient feels much pain, with a sense of distension or pressure under the sternum, and in the course of the œsophagus after swallowing.

7. *B. Dysphagy may be occasioned by structural lesion about the base of the brain or cervical portion of the spinal chord*, or about the base of the cranium. In such cases, the paralysis may be more or less complete; and it may be limited to the muscles of the pharynx and upper part of the œsophagus (BONET, PORTAL, BALDINGER, and myself), or it may have extended to them from other parts. Numerous cases illustrating these positions have been recorded. The participation of the muscles of deglutition in either general or partial paralysis is very commonly observed in apoplexy, &c.; and the occurrence of this form of dysphagy, independently of organic change, or rather from *congestion* about the base of the brain, is shown by its occasional accession in the advanced stages of fevers. Paralysis of the muscles concerned in this function may also be produced by wounds of the nerves of the face (PALLETTI), by

lightning (Paterson), and by severe cold (Bleuland). It is, however, most frequently caused by the slow developement of tumours, or cysts, or other structural changes about the base of the cranium, whereby either the nerves supplying these muscles are compressed at their origin or in their course, or a portion of the brain or of the upper part of the spinal chord is injured.

8. ii. Complicated Dysphagy, or difficult deglutition from structural change affecting the parts immediately concerned in this function, comprises a great variety of lesions. I shall merely enumerate them with reference to their seat; their nature, morbid relations, and treatment, being fully discussed under more appropriate heads.

9. *A. Dysphagy from congenital malformation.*— Extreme smallness, or enlargement of the *tongue*; the termination of the pharynx, or of the œsophagus, in a cul de sac, or obliteration of the œsophagus; the division of this part into two canals, and its communication with the trachea; are the chief malformations which interrupt deglutition; and are of very rare occurrence in otherwise well-formed infants. Cases, however, have been recorded by Blaes, Van Cuych, Michel, Billard, Martin, A. Cooper, and Andral. In these, death, necessarily resulting from inanition, took place in from three to nine days. A slight interruption to deglutition very frequently arises from congenital fissures of the soft and hard palates.

10. *B. From diseases of the mouth and throat.*— (*a*) Inflammation or chronic enlargement of the *tongue*; ranula; sublingual calculus (Guenther); and aphthæ, ulceration, tumours, and excrescences about the base of the organ (Reidlin, Van Swieten, Tode, and Inglis); are not infrequent causes of dysphagy. Cases of chronic enlargement of the tongue, impeding deglutition, unconnected with malignant disease, and continuing for many years, are recorded by several writers. I have seen an instance of this kind, that had existed from infancy to nearly middle age. These and other affections, with the treatment appropriate to them, are particularly noticed in the article upon the *Diseases of*, and the *Indications furnished by, the* Tongue.—(*b*) The *fauces* and *tonsils* not uncommonly occasion dysphagy. Inflammation, suppuration, ulceration, or destruction of the soft *palate*, or of the *uvula*; great relaxation of the latter part; inflammation, abscess, chronic enlargement, and ulceration, of the *tonsils*; fungous and other tumours and polypi of the maxillary sinus, or posterior nares; various tumours or excrescences attached to the palate or tonsils (Schmidt, Thilenius, &c.); and the severe effects of mercury, or the sudden arrest of salivation; are generally attended by more or less of dysphagy.—(*c*) When the *pharynx* is the seat of inflammation or of its consequences, or of the lesions now enumerated, or of malignant disease (Kergaradec, and myself), deglutition is commonly much more impeded than when only the fauces are affected; and in some instances it is extremely difficult or nearly impossible. In such cases, the epiglottis and larynx are more or less irritated, and, by the consequent disorder of the respiratory actions, the dysphagy is still further increased. Foreign, and particularly pointed or sharp, bodies lodged in the pharynx, are also sometimes causes of dysphagy.

11. *C. Dysphagy from disease of the epiglottis and larynx.* — (*a*) Inflammation, ulceration, and entire destruction of the *epiglottis*, or induration, incurvation, and the removal of it by wounds, will occasion difficult deglutition, as in the cases recorded by Maynwaring, Schurig, Bonet, Desgranges, Tonanni, and Larrey. (*b*) Also inflammation and ulceration of the *larynx*, ossification of its ligaments, and displacement of the *os hyoides*, are generally attended by dysphagy. The possibility of the occurrence of this last cause, although observed by Valsalva, and Mollinelli, has been doubted; but the instance of it noticed by Sir C. Bell (*Surg. Observ.* p. 160.), and the case wherein it was caused by swallowing a large hard substance, recorded by Dr. Muona (*Annali Univers. di Med.* Nov. 1828.), put the matter at rest. Fracture of this bone by external violence has produced not only an impossibility of deglutition, but even more serious consequences, as shown in the cases published by Dr. Marcinkowski and M. Lalesque (*Journ. Hebdom. &c.*).—(See Larynx — *Diseases of.*)

12. *D. Diseases of the œsophagus, and cardiac orifice of the stomach,* will impede or altogether obstruct deglutition. Inflammations and their consequences, as softening and ulceration, induration, thickening, stricture, and purulent collections between the coats of these parts; also partial dilatations, sacs and diverticula, or even large pouches, either with or without thickening and stricture of the part of the œsophagus immediately below the dilatation (Blasius, Haller, Meckel, Monro, Ludlow, C. Bell, Odier); polypous or fungous excrescences or tumours of various kinds in some portion of this canal, or in the cardiac orifice of the stomach; or scrofulous, callous, cartilaginous, osseous, carcinomatous, or scirrhous degeneration of these parts; or merely enlargement or ulceration of their mucous glands; and spasm, rupture, or perforation of the œsophagus, or the lodgment of foreign bodies in it; are severally causes of dysphagy; and are fully described in the articles on the *Pathological Anatomy* of the Digestive Canal; and on the *Diseases of the* Œsophagus, as well as in those of the Stomach.

13. *E. Tumours pressing upon the pharynx, or upon the œsophagus,*— as bronchocele, or other tumours or abscesses near the throat and in the neck; tumefaction of the lymphatic and secreting glands below the jaw, and at the top of the sternum; aneurism of the subclavian or carotid arteries, or of the aorta before it passes into the abdomen; enlarged bronchial glands, tumours of various kinds, and abscesses in the posterior mediastinum; exostoses or other diseases of the cervical vertebræ, and purulent collections between them and the œsophagus (Carmichael, myself, and others); also abscesses formed between, or involving, the trachea and œsophagus (Hay and myself); dropsy of the pericardium (Bano); and enlargement of the liver; have severally been observed to occasion dysphagy.

14. iii. The Diagnosis of dysphagy requires a few observations merely. — (*a*) In *idiopathic*, as well as in the *sympathetic* dysphagy, the difficulty takes place suddenly, disappears as suddenly, re-

mits or intermits, and is generally attended either by convulsive efforts, by choking sensations, or by flatulence, dyspepsy, or various nervous symptoms, particularly when it is connected with hysteria, hypochondriasis, &c. — (*b*) In cases of atonic or *paralytic* dysphagy, solids are more easily swallowed than liquids; but the process is often very slow, and the difficulty great. — (*c*) When it proceeds from disease of the *fauces*, the cause is obvious to the sight; and frequently also when it is induced by the state of the *pharynx*. In this latter case, as well as in dysphagy from lesions of the *epiglottis* and *larynx*, or from tumours or fungous excrescences developed in, or pressing upon, the pharynx, or from inflammatory diseases of it, or of the upper part of the œsophagus, substances are often forcibly ejected into or through the nostrils, upon attempts at deglutition, owing to the spasmodic action of the muscles of the pharynx.— (*d*) When dysphagy is caused by a diminution of the canal of the *œsophagus*, either from thickening of its parietes, or from tumours pressing upon it, &c., difficulty of swallowing solids is first felt, and this at last is followed by a difficulty of swallowing fluids; the interruption to this function proceeding gradually and slowly. When the obstruction is seated low in this tube, or about the cardiac orifice of the stomach, pain is usually felt under the sternum after swallowing: and the matters are afterwards regurgitated into the mouth, owing either to a sudden reaction of the parietes of the canal, or more commonly to their inverted peristaltic action. (See art. Œsophagus—*Diseases of*.)

15. iv. Treatment. — It must be evident that the treatment of sympathetic and complicated dysphagy should be conducted strictly according to the pathological state on which it depends, as far as that may be ascertained. Hence a tolerable knowledge of the means applicable to it, in every circumstance in which it presents itself, is to be acquired only by a reference to the articles where the various lesions occasioning it are described, in respect of their nature and cure.

16. *A. Sympathetic dysphagy* — (*a*) of *spasmodic* or *flatulent* disorders, requires very nearly the same treatment as already recommended in the idiopathic form of the disease. If it accompany *hysteria*, swallowing, slowly, cold or iced fluids, and cold applications to the neck, will soon afford relief; but it will afterwards be necessary to have recourse to tonics and cooling aperients, with other means suited to the peculiarities of the case. The instances in which Tode and Wichmann found quassia so beneficial, were probably of this kind, or the idiophatic form already noticed. — (*b*) When dysphagy is connected with *flatulent dysphagy*, or with *asthma*, or *palpitations* of the heart, relief will generally be obtained from anodynes or antispasmodics combined with refrigerants, or from vegetable tonics with alkaline sub-carbonates and aperients. Blisters, or rubefacient plasters, or either of the ammoniacal, the compound galbanum, or the cummin plasters, with opium or the extract of belladonna, applied over the sternum or throat, will also materially assist the internal remedies. Heinecken advises the preparations of *zinc*, which, as well as the oxide of *bismuth*, may be tried in this form of dysphagy. He also recommends the distilled water of the *laurocerasus*, for which the *hydrocyanic acid* may be substituted with advantage. Besides these, the *cuprum ammoniatum*, the preparations of camphor with those of henbane or conium, may also be exhibited. In every form of dysphagia not depending upon organic change, purgatives, and cathartic and antispasmodic enemata, will be productive of more or less benefit.

17. (*c*) Dysphagy from *paralysis* or atony of the muscles of deglutition should be treated according to the principles stated in the article Palsy. If it be occasioned by congestion about the base of the brain or spinal chord, general or local bleedings, active cathartics, and external derivatives, must be employed. Congestion having been removed, large doses of camphor, as advised by Hoffmann; stimulating linctuses and gargles; sialagogues; electricity and galvanism; exciting liniments or blisters to the neck or throat, as suggested by Loeffler; as well as moxas and issues; may be severally employed. Dr. Barton recommends the *xanthoxylum* in cases of this description. Thunberg and Baldinger advise the cajeput oil to be rubbed on the neck; Gardanne, *sinapisms* to be applied on the same part; and Franck, the *actual cautery*.

18. *B. Dysphagy from organic change* of the parts directly concerned in the function of deglutition requires means the most diversified, according to the nature of the lesions to which it is attributable. — (*a*) When it is *congenital*, but little can be done excepting in the slighter forms occasioned by cleft palate, or by adhesion of parts within the mouth. In these, the expert surgeon may afford complete relief.— (*b*) Difficult deglutition from diseases of the *tongue*, *fauces*, *tonsils*, or *larynx*, is of itself of minor importance; but as respects the primary lesion, of the utmost moment, requiring the most energetic measures pointed out in their treatment. (See these articles.). — (*c*) Dysphagy from *inflammations*, or their usual *consequences*, whether seated in the *pharynx*, the *œsophagus*, or the *cardiac* orifice of the stomach, should be treated according to the sthenic or asthenic form they may assume. After general or local depletions, especially cupping between the shoulders or over the sternum, emollient, cooling, and febrifuge linctuses ought to be taken at short intervals. I have prescribed, with advantage in such cases, especially when ulceration has been suspected to exist, linctuses containing the nitrate of potash, or the muriate of ammonia, or the sub-borate of soda, or the sub-carbonates of the fixed alkalies with the nitrate of potash and ipecacuanha, in addition to the other means described in the articles on the diseases of these organs. When foreign bodies are lodged in the pharynx or œsophagus, appropriate measures should be resorted to, either for extracting them, or for pushing them onwards into the stomach.— (*d*) When dysphagy is occasioned by *tumours developed in, or pressing upon, the œsophagus* or *cardia*, it is not always that their nature, or even their existence, can be fully ascertained. If their presence be inferred, or when they are developed in external parts, or if the diathesis be scrofulous, then iodine may be prescribed internally as well as externally, with potash, conium, &c.*

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* I was consulted, in 1826, in the case of a young lady born in India, but who had resided some years in London. The glands in the neck, and underneath the sternal ends of the clavicle and sterno-mastoid muscles (as well

If *abscesses* have formed between the upper part of the œsophagus and cervical vertebræ, or between the former and the trachea, or about the pharynx, an unfavourable issue might possibly be averted by incisions made into them. If *aneurisms* press upon the gullet, the treatment recommended when discussing *Diseases of the* ARTERIES should be put in practice.—(*e*) When *thickening of the parietes* of a portion of the œsophagus, with more or less of *stricture* or *scirrhus* of this canal, or of the *cardia* of the stomach, is the cause of dysphagy, cupping, or leeches applied over the sternum; issues and moxas in the same situation, or in each side of the neck; the linctuses recommended above (§ 18. *c.*); mercurial and other alteratives, with conium, hyoscyamus, camphor, &c.; the iodide of mercury, or the hydriodate of potash, internally and externally; the sub-carbonates of the alkalies, or the liquor potassæ in emollients, &c., with various other means noticed in the article on the ŒSOPHAGUS, may be employed. If these fail, a careful trial may be made of the bougie; but the utmost attention should be paid not only to the manner of using it, but to the effects produced by it; for if the stricture be connected with sacs, pouches, or diverticula, or hernia of the inner coats through the muscular, or even with simple ulceration,—changes which not infrequently take place in the part immediately above the strictures—much mischief may result from even a cautious introduction of a bougie. The frequent and obvious connection of dysphagy with scrofula shows the propriety of prescribing the medicines found most serviceable in that disease, particularly when occurring in the scrofulous diathesis: and in such cases, the muriate of lime or of barytes, conium, liquor potassæ, and especially the preparations of iodine, should be fully tried.

19. *C.* The treatment advised by the best writers on this and its related affections consists of much that has been now stated; in addition to which, however, I may briefly add, that, the *muriate of baryta* has been recommended by KERKSIG; *cold and iced fluids*, by TODE and MONTAT; *conium*, by WICHMANN, COLLOMB, HUFELAND, and JOHNSTON; *hyoscyamus*, by WITHERING; *opiates*, by FERREIN and CONRADI; the *liquor potassæ*, by HALLER; *emetics*, by FERREIN; and *local bleedings*, by FRANCK and BANG. *Calomel* and some other preparations of *mercury* have been prescribed by SEQUIRA, STEVENSON, ENGELHARD, BRANDIS, and others,—to the extent of producing salivation, by KRAMP, MUNCKLEY, BRISBANE, and FARQUHARSON—in the form of mercurial ointment, either alone or with the volatile liniment, rubbed over the sternum and throat, by DOBSON, PATTEN, KERKSIG, and WATHEN—internally, with antimony, by VAN GEUN—and with aloes and camphor, by HALLER, PATTEN, BANG, and BRANDIS, who contend strenuously for the occasional origin of dysphagy in suppressed rheumatism and repelled eruptions, and also recommend external derivatives and irritants, as sinapisms, issues, setons, blisters, repeated or kept open, &c. The *surgical measures* to be resorted to in various circumstances of the disease are fully discussed in the writings of J. HUNTER (*Trans. of a Soc. for the Imp. of Med. and Chirurg. Knowledge*, vol. i. art. 10.), DESAULT (*Surgical Works, &c.*), RICHTER (*Chirurg. Biblioth.* b. xii. p. 11.), C. BELL (*Surgical Observ. &c.*), and S. COOPER (*Surgical Dictionary, &c.*).

20. *D.* The *diet* should be chiefly farinaceous, excepting in the nervous and spasmodic forms of the disease; and it ought always to be easy of digestion, and taken without any heating condiments. All substances which irritate or excite by their direct or indirect action, are injurious. The stomach also should never be loaded; and, in every circumstance, the secretions and excretions ought to be carefully regulated and promoted by gentle and appropriate means.

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DELIRIUM.

—SYN. *Paraphrosyne*, *Paraphronia* (from παρα, erroneously, and φρονέω, I understand), Auct. var. *Paracope*, Swediaur. *Irvereden*, *Aberwitz*, Germ. *Délire*, Fr. *Delirio*, Ital.

CLASSIF.—PATHOLOGY; *Symptomatology*.

1. Delirium has been defined:—*Disorder of the intellectual powers, with or without derangement of the moral sentiments.* But this definition is too extended and vague, and embraces the whole circle of mental diseases. J. FRANCK, and some

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as in various other parts of the body), were so greatly enlarged as to impede deglutition and respiration. She had been treated by several eminent practitioners; but the tumours had increased. In consultation with Mr. ANNESLEY, who had requested me to see her, a course of iodine was recommended; and the hydriodate of potash was employed, chiefly internally, for eight or nine months, with occasional intervals not exceeding a fortnight each. The glandular enlargements gradually subsided, the catamenia appeared, and she perfectly recovered. She is now well, and married.

other pathologists, have restricted it by adding — *this disorder assuming an acute form.* Several writers, retaining the preceding extended definition, have divided delirium into the *acute*, and the *chronic;* the former consisting of various morbid states of the brain, attended by mental disturbance and fever —the latter of mental alienation, unattended by fever or active bodily disorder. *Chronic delirium*, therefore, comprises all those states of disordered mental manifestation treated of in the article INSANITY. *Acute*, or *febrile delirium* refers to those morbid affections of mind supervening in the course of febrile, inflammatory, and some chronic diseases, and which have been denominated *symptomatic*, or *sympathetic delirium;* and those which are produced by acute diseases, or injuries of the brain or its membranes, and by intoxicating or narcotic substances; and which have been termed *idiopathic delirium* by some writers. The common acceptation of the word delirium, and that in which it has been used by the best authors, accords with the acute form as occurring in the manner now stated; and in this light I shall also view it. But it is more doubtful in how far it is ever an idiopathic affection. Indeed, in many of the diseases in which it is admitted by all to be a symptomatic or sympathetic disorder, its more immediate dependence upon a morbid state of vital endowment and circulation in the encephalon is as manifest as in some of those which have been viewed as idiopathic. The distinction, therefore, cannot be maintained, especially as it appears to have been founded upon a mistaken idea, viz. upon the supposed existence, in the reputedly idiopathic form, of inflammatory irritation or action of the brain or its membranes; which action does not obtain in the other. That delirium is most frequently occasioned by such a pathological state, cannot be doubted; but it is equally certain that it sometimes also proceeds from a different condition; and that either of them — either inflammatory action, or simple disturbance of the cerebral functions without inflammation — may exist in each of the divisions thus distinguished,— in the idiopathic, as well as in the sympathetic form. If the distinction in question be still retained, it would be more accordant with the generally admitted acceptation of the word idiopathic, to consider, as J. FRANCK has done, all the manifestations of delirium as symptomatic, excepting when it is occasioned by intoxicating and narcotic substances: but, when it proceeds from inflammation of the brain or its membranes, whether primarily or consecutively induced, to view it merely as a symptom, but by no means a constant, although a very general symptom, of this state of disease.

2. Delirium, as well as other cerebral affections, has been too generally imputed to inflammatory action; and the state of the ganglial or organic nervous power, which evidently influences both the functions and the circulation of the brain, has been entirely overlooked, particularly as respects this affection. There can be no doubt of the difficulty of appreciating correctly the nature or extent of the disorder which this part of the system experiences. But this circumstance surely does not preclude us from tracing ultimate phenomena to their true origin, instead of stopping at intermediate effects; nor from inferring, from the nature of these phenomena, and of the causes which increase or remove them — from the *juvantia* and *lædantia*—certain general conclusions respecting the condition of that power whence morbid conditions primarily emanate; each successive effect being the cause of further change, until organic lesion, and ultimately death, result. Believing, therefore, on physiological grounds, that delirium is often the consequence of changes in the state of organic nervous power —of the functions of that part of the organic or ganglial system supplying the encephalic organs— influencing, in some cases, one or more of the mental manifestations, without any appreciable change of vascular action or of structure; in others, both function and circulation; and in many, not only function and circulation, but organisation also; and that our knowledge of these changes, of their signs, and of their various related circumstances, are too imperfect to enable us to come to accurate conclusions; but that we should proceed nevertheless with the aid of the dawn of knowledge now opening upon us; I shall briefly consider, first, the phenomena and diagnosis of delirium— afterwards, its pathology and treatment conformably to the doctrine now alluded to.

3. i. PHENOMENA.—*A.* The *invasion* of delirium is generally preceded by sleeplessness, headach, vertigo, heaviness of the head, noises in the ears, change of voice, absence of mind, forgetfulness of pain, by an air of surprise, and acuteness of the senses; the eyes are brilliant, and intolerant of light; the head is often hot, the face flushed, and the circulation of the brain more or less increased. In some cases, however, these symptoms are either altogether absent, or inappreciable; and in others the countenance is collapsed, pale, and cool, and the eyes sunk. To the foregoing phenomena succeed those which constitute delirium, and which vary remarkably in character and intensity. In many cases, particularly when there are few or no signs of augmented determination of blood to the head, a simple agitation or merely absence of the mind, or reverie, or wandering from the objects before it, or a slight incoherence in the ideas, is all that is observed; but, from this slight state of affection, we meet with every grade and form of mental disorder — sometimes with fright, visions or *illusions*, often connected with present objects; occasionally with *hallucinations*, or the reproduction, in confused or unconnected forms, of previous impressions;—in certain cases, with the most furious mental and physical agitation; in others, with the greatest depression and the most sombre taciturnity; — in one case, with tears and signs of great mental distress; in another, with a lively but incongruous current of ideas, or even with laughter and gaiety.

4. *B.* Delirium is frequently *present* at first only during the intermediate states between sleeping and waking, which patients in acute diseases experience; the mind still perceiving objects, but imperfectly. In this state the patient appears to dream aloud; and when fully awakened, returns rational answers to questions put to him; but he soon lapses into a state of dreamy incoherence, or into that of more complete delirium. This condition nearly approaches that of *coma vigil*, into which it often passes. In some instances, this state is characterised by a loss of recollection of all objects observed, and of all ideas with which the mind had been stored during the greater period

of life, and by the recovery of the memory of languages and of ideas acquired at a very early age, and long forgotten. Thus old persons, when delirious, although their minds are blanks as respects every thing present, or which have become known to them from youth or manhood, will talk of matters which had interested them previously to such periods, and sometimes in a language which they had then spoken, but of which objects and language they had no recollection long before their delirium, nor retained any after their recovery. Here, again, the remarkable similarity between several manifestations of delirium and dreams is strongly evinced; the objects and ideas about which the unconscious mind is engaged in the states of both delirium and dreaming being frequently those which had made a vivid impression in youth, which had become erased by the cares and employments of life, but which are recalled during certain conditions of the brain. The production of these in incongruous forms, and the giving utterance to the morbid conceptions formed of them, constitute *hallucinations*; whilst, owing to the nearly inconscious state of the mind, the imperfect and erroneous impressions made by surrounding objects on the senses of the patient, give rise to inconclusive and unconnected conceptions, in consequence of the morbid condition of the brain, and occasion the *illusions* characterising the delirious affection.

5. In addition to disorder of the mental powers, the organs of locomotion are remarkably affected. In the low or quiet delirium, and in the less dangerous states, in which the brain is only functionally deranged, the muscles are either somewhat agitated, or very much enfeebled, and the voice is very weak or nearly lost. In more severe cases, the voice and the muscular force are greatly increased; the patient, however, sinking into a state of profound collapse after a few violent efforts. In the most dangerous form of delirium, particularly when it proceeds from organic disease of the brain or its membranes, it is attended, but more frequently followed, by general convulsions, by spastic contractions of one or more of the voluntary muscles, by entire loss of consciousness and sensibility, or by paralysis.

6. C. Delirium, as M. GEORGET has remarked, may be *continued* or *intermitttent*, even in the continued affections of the brain. When it is intermittent, it usually returns with the exacerbation of fever that takes place in the evening and night. When the patient recovers his reason, he is generally weak and exhausted; his senses are readily and painfully impressed by their respective stimuli; and he complains of thirst, and pains of the head and limbs. If the delirium has been slight, and consciousness has not been entirely abolished, he retains more or less recollection of what had passed during its continuance. But when it has been intense, or of some duration, he has no knowledge of what has occurred. The *epidemic* appearance of delirium mentioned by QUELMALZ (*De Epidem. Mentis Alienatione*. Lips. 1752.) and MICHAELIS (*Med. Pract. Biblioth.* b. i. st. 1.) is to be imputed to the prevalence of those diseases in which delirium is apt to supervene, and especially in that form on which it is most frequently an attendant. The *duration* of the paroxysm of *intermittent* delirium varies from one to several hours; but the *continued* form, particularly when occasioned by disease within the head, may last several days, or even many weeks. Sometimes, as in the more severe cerebral cases, it alternates with profound coma. When it terminates fatally, it generally passes into coma; but in some instances the patient recovers his reason for a few hours before dissolution.

7. ii. DIAGNOSIS.—It is of the utmost importance that delirium should not be mistaken for *insanity*, and especially that the delirious patient should not be removed to an asylum for the insane. On two occasions I have seen such a mistake made, and about to be acted upon, when my opinion was requested. But these cases recovered perfectly: to one of them—a professional man—the removal to an asylum, or the supposition even of being insane, might have been ruinous. There can be no doubt that delirium often passes into insanity, especially when it has been caused by inflammatory states of the brain, and by fevers with determination to the part; or when it occurs in persons hereditarily predisposed to insanity; but until it has assumed the features of that form of mental disorder, it certainly in no respect should be viewed and treated as such.

8. The causes and circumstances originating *delirium* are often of themselves sufficient to show its difference from insanity. Its occurrence in the advanced stages of acute diseases, or of chronic maladies when the powers of life have become exhausted and febrile action of an acute kind has supervened, is especially characteristic of delirium. The *insane* patient has all his senses, as well as his digestive, assimilative, and locomotive powers, but little or not at all impaired. His mental faculties and intelligence are also but partially deranged. M. GEORGET has very justly remarked that the mental disorder of the insane is often confined to a single faculty; and even in the most extended, or maniacal affections, the faculties are rather perverted, or insulated, and without the bond of association, rather than extinguished. The most maniacally insane person wills and reasons, and is not always absurd in his actions. But in the delirious, all the cerebral functions are severely affected. His sensations are imperfect and incorrect, his ideas unconnected, his passions disordered, his voluntary motions irregular, feeble, and defective; his intelligence and recollection nearly abolished; and he is impassive to all that surrounds him. Whilst the *delirious* patient presents many of the physical signs of exhausted vital energy, or of the gravest state of disease, the *insane* has all the appearances of unimpaired health, particularly in the early stages of insanity, and before consecutive organic change has taken place. In the former, the sensations and perceptions are more or less abolished; in the latter, they are but little or not at all impaired,—the judgment only, or conviction of the understanding respecting them, being erroneous. The false conviction of the insane is too strong to be removed by the evidence of the senses: the sensations and perceptions of the delirious are always too weak, even when consciousness is partially present, to become the basis of sound

conclusions. Hence the insane person cannot be convinced by objects seen, heard, and understood by him, in opposition to his perverted judgment respecting them; and the delirious patient perceives objects so faintly, if he perceives them at all, as to be unable to distinguish between such as are in any respect similar, or to recognise one person from another. Besides the circumstance, also, of delirium being generally an *acute*, and insanity a *chronic* affection, it may be remarked, that in the former, when occurring from inflammatory states of the encephalon, or from fevers complicated with such states, the return to the healthy function is often so slow as to occasion fears of the supervention of the latter. In some instances, however, the restoration from febrile delirium has been quick, and the mental manifestations have become even more active than previously to the seizure.

9. iii. Pathology. — It is of the utmost practical importance to distinguish the different forms of delirium, particularly in respect of the grade of vascular excitement and vital power, and the existence or non-existence of inflammatory action, for, without such a step is previously taken, no rational method of cure can be adopted. I shall therefore attempt to make this distinction.

10. *A. Delirium attended by exhausted nervous and vital influence* is sometimes occasioned by excessive hæmorrhages or venæsection, by inanition, prolonged lactation, and profuse seminal or other discharges, by old age, hysteria, fear, &c. It also occasionally supervenes from exhaustion in the last stages of some acute and chronic diseases, or from whatever directly or indirectly depresses the powers of life, as shown in the article Debility. In many such cases, however, although the vital energies are sunk, yet the brain is more or less excited relatively to the other parts of the body; and in some, the state of delirium is connected with an impure or contaminated condition of the circulating fluids, particularly when it occurs in the advanced course of malignant diseases. The delirium, also, which is caused by excessive pain, by capital operations, by the suppression of the appearances of pain or suffering, or by the apprehension of the consequences of operations, and which M. Dupuytren has very appropriately denominated *nervous delirium*, chiefly falls under this form of the affection; and to it may be added many of the instances of delirium caused by excessive irritation in remote but related organs or parts, as consumption, ulcerations of the bowels, worms, &c. Although it is often obvious that a relatively increased determination of blood to the head exists in some cases of this form of delirium, yet it may be inferred, with equal justice, that a deficient supply of blood to the brain obtains in others. This conclusion may be legitimately drawn from the pale, cool, shrunk features, sunk eyes, the weak and small pulsation of the carotids, the effects of various kinds of treatment, and the absence of increased or even common vascularity of the brain upon examination after death, in some cases of this form of delirium. This opinion has been supported by M. Georget and several other pathologists, without having been imputed by them to its obvious source, *viz.* exhausted power of the organic nerves supplying the vessels of the brain.

11. *B. Delirium characterised by depressed or exhausted vital power, and morbidly excited vascular action*, is by far the most common form; and is very frequently observed in the advanced progress of continued, remittent, intermittent, malignant, and exanthematous fevers; of acute inflammations; and of several chronic diseases, particularly when they pass into the acute form. It may also be occasioned by any of the narcotic or acro-narcotic poisons, or from their exhibition in enemata; and in some temperaments and constitutions, by a small quantity of those in common use, — as by opium, stramonium, belladonna, &c. I have more than once seen it produced even by the preparations of hop and hyoscyamus taken in moderate doses. Its occurrence from the medicinal exhibition of various narcotic and poisonous substances is noticed by various writers; — from cicuta, by Wepfer and Smetius (*Miscell.* p. 569.); from belladonna, by Pelargus and Valentini (*De Maniacis ab Usu Bellad. &c.*); and even by the superacetate of lead, by Stoll (*Rat. Med.* par. vii. p. 317.) and Knight (*Lond. Med. and Phys. Journ.* vol. iv. p. 286.). — Dioscorides (*Mat. Med.* l. iv. cap. 63.), Westphal (*Pathol. Dæmoniaca*, p. 33—36.), and Horn (*Archiv.* Nov. 1811, p. 540.), have noticed the occurrence of delirium from hyoscyamus exhibited in clysters. Poisoning by various substances, as the Lolium temulentum, and some of the narcotics just mentioned, generally occasions delirium. It may also arise from indigestible substances taken into the stomach. In all these cases, in addition to the states of the system connected with the appearance of this affection, there is generally increased excitement of the circulation in the brain, relatively to that in the rest of the body; and not infrequently an impure or altered state of the circulating fluid. The delirium occasioned by the protracted use, and the sudden disuse, of narcotics or spirituous liquors, by erysipelas, and retrocedent exanthemata, is of this kind, between which and *delirium tremens* there is often a close resemblance.

12. *C. Delirium occasioned by inflammatory action of the brain or its membranes*, when the inflammation takes place primarily, is seldom attended by very manifest exhaustion of vital power, at least to the extent of the preceding forms. When, however, the inflammatory action is very general throughout the brain or its membranes, or when it supervenes on continued fevers or erysipelas, and is attended with serous effusion, vital depression is more apparent, and its termination in, or alternation with, coma, more common. This state of delirium, particularly when it proceeds from concussion or external injuries, is often phrenitic or maniacal — the *Delirium ferox* of authors — as respects the exaltation of muscular force. It is occasioned by all the causes stated to produce inflammation of the brain, particularly suppression of critical or accustomed evacuations, eruptions, or discharges; anger; the exciting passions; metastasis of specific inflammations; the ingestion of spirituous liquors, &c. Whilst the protracted use of intoxicating beverages, &c. occasions delirium tremens, unaccustomed intoxication sometimes produces the

delirium now being noticed, by inflaming the brain. This form of the affection is often complicated with convulsions, contractions of the limbs, paralysis, &c., particularly when the substance of the brain is organically changed; and is, when thus attended, very much more dangerous. (See Brain — *Inflammations of*, § 164.)

13. iv. Lesions observed in fatal Cases. — In the *first* form of this affection, scarcely any, or no evident change, is found in the brain or its membranes, beyond either a somewhat increased or diminished vascularity, occasionally with a slight increase of the consistence of the cerebral substance, or of the fluid in the ventricles. In many cases, all the parts within the cranium are apparently sound. In the *second* variety, and wherever delirium is unattended by marked disorder of the muscular actions — when it is without extreme prostration, or convulsions, or paralysis — the chief changes are, increase of the consistence of the brain, and of the fluid contained in the ventricles, injection of the pia mater, sometimes with infiltration of serosity, and occasionally a somewhat deeper shade of colour in parts or the whole of the cerebral substance. M. Georget remarks that pathological investigations do not confirm the opinions of some authors, who impute the cause of delirium and convulsions to inflammation of the arachnoid; and that even epileptics and the insane seldom present the appearances usually caused by arachnitis. They have probably confounded inflammation of the membranes and periphery of the brain with the usual manifestations of delirium; and thus imputed the changes observed in the former, to the latter. In the *third* form of this affection, or when it is attended by the lesions of muscular action noticed above, the appearances observed are more completely those usually found after inflammation. Indeed, delirium frequently occurs, but not uniformly, or even generally, in nearly all the inflammatory diseases of the brain or of its membranes, and occasionally in the advanced stages of the organic changes limited to parts of this organ. (See art. Brain.)

14. v. Prognosis. — The great diversity of the results furnished by *post mortem* investigations will show the difficulty of appreciating aright the conditions of the brain in delirium, and of coming to a correct conclusion as to its issue. When it is sympathetic of disease of remote organs, the worst opinion should be formed of the result. Delirium occurring in the advanced stages of diseases of the lungs, stomach, or bowels, is a most dangerous symptom; and when it supervenes in slow and consumptive maladies, it rarely remits, and death is not far distant. It seldom appears as a sympathetic affection, until the powers of life are greatly depressed, and the pulse is very much increased in frequency and diminished in tone. Dr. Gilbert (*Krankheiten der Französ. Arm.* p. 48.) observes, that delirium prevailed in the fevers which accompanied the French wars in Germany, in proportion to the frequency and weakness of the pulse, — a fact fully supporting the inference at which I had long ago arrived. On the other hand, when it appears in an intermittent or slight form, or from the operation of the less intense causes upon de- and nervous constitutions, and without other grave symptoms, although evincing the severity of affection, it is not, in itself, a dangerous occurrence. When it follows capital operations, or severe injuries of any kind, it very often indicates the developement of inflammatory action of the brain of a most dangerous or rapidly fatal form. Delirium is most frequent in females, in the nervous temperament, and in young persons above the age of eight or ten years; but it is, in such cases, a less unfavourable symptom. It is seldom observed previously to the fourth or fifth year, — convulsions usurping its place at an earlier age: but, when it occurs thus early in life, it is a sign of great febrile excitement, with either determination to, or acute inflammation of, the membranes or periphery of the brain. If it be continued, or alternate with coma; or if it be *complicated*, with extreme prostration of muscular power, or with convulsions, spastic contractions, paralysis; the existence of inflammation of the brain, to the extent of producing organic change and extreme danger, may be inferred. Perrius, Piso, and many other writers, have contended that furious and sad or fretful delirium is more unfavourable than that which is tranquil or lively; and the observation seems to be nearly correct. The prognosis of sympathetic delirium should, however, not be founded so much upon its form, and the other symptoms referrible to the cerebro-spinal system, as upon the nature of the primary malady; for it is not the delirium which is in itself dangerous, but the disease upon which it supervenes; the circumstance of its occurrence evincing the very sinking condition of vital power. M. Georget truly states, that the sudden cessation of delirium and agitation, attended by want of recollection of the previous state, by great debility, irregularity of the action of the heart, and loss of temperature in the extremities, nose, and ears, is a most unfavourable omen; and often accompanies the termination, by gangrene, of inflammation of some important organ, always indicating approaching dissolution. When delirium accompanies fevers, particularly those with determination of blood to the encephalon, or inflammations of the brain or of its membranes, it often yields favourably to epistaxis, copious alvine discharges, and other critical evacuations. (See art. Crises.)

15. vi. Treatment. — When the inexperienced practitioner, in his endeavours to obtain information as to the treatment of this affection, finds remedies of the most opposite kind very confidently recommended by writers, — venæsection by one, bark and stimulants by another, emetics or purgatives by a third, and digitalis, antimonials, &c. by a fourth, — he is at a loss how to act; and arrives at the conclusion, that if one be right, the others must necessarily be wrong. The fact, however, is, that all of them are partly right, but also partly wrong. The circumstance of this affection having been hitherto viewed without reference to the very different states or grades of vital energy with which it is often associated, or to the condition of circulation in the brain, and its division into idiopathic and symptomatic, — either of these divisions presenting the different forms I have endeavoured to distinguish, — has led to, and perpetuated, the empirical manner in which it has been treated. It is necessary to ascertain not only the origin and morbid relations of this affection, but the

phenomena attendant upon it at the time of investigation; more especially the condition of the secretions and excretions, the temperature of the head, the state of the pulse in the carotids and temples, the appearance of the countenance, and the state of muscular power and motion. These will at once indicate to the observing practitioner the existing pathological condition causing the affection, — will enable him to assign it to one or other of the forms above distinguished, and thereby to prescribe for it appropriate remedies.

16. *A.* The *first* form of this affection (§ 10.) will be most benefited by quietude, gentle restoratives, and nourishment; by a moderately cool, pure, and frequently renewed air; by the tepid affusion on, or cooling applications to, the head, if there be any increase of its temperature; by warm pediluvia; by camphor conjoined with refrigerants and cardiacs, or with sedatives; and, if the vital depression be very great, the head cool, and the carotids pulsating weakly, by the preparations of quinine or bark, of assafœtida, valerian, musk, camphor in large doses, with those of ammonia, opium, &c., exhibited by the mouth, and in clysters: or by small quantities of mulled wine or negus. In the more purely *nervous delirium*, or when it occurs from operations, anxiety, fear, and injuries of parts at a distance from the head, opium, given by the mouth, or in enemata, as recommended by M. Dupuytren, will be most beneficial. If it be attended by much agitation, narcotics — as opium or hyoscyamus — in full doses, either alone, or with camphor, assafœtida, soda, or ammonia, &c.; the acetate or muriate of morphine, with aromatics and cardiacs; quietude, in a cool, well-ventilated, and darkened apartment; the tepid affusion on, or cold-sponging, the head, if its temperature be increased; and warmth to the lower extremities; are the chief remedies.

17. *B.* In the *second form* of this affection (§ 11.), if there exist signs of determination of blood to, or of congestion in, the head, bleeding by cupping, or leeches applied behind the ears and below the occiput, the affusion of a stream of cold water on the vertex, and purging, are amongst the most efficient means that can be employed. If the delirium be attended by stupor, or tendency to *coma*, or by *subsultus tendinum*, picking of the bed-clothes, &c., blisters to the nape of the neck, and the treatment advised in the article Coma, will be requisite. If the delirious stupor be not removed by the more usual remedies, and if it have arisen from erysipelas of the head, incisions of the scalp of the occiput, as recommended by Copland Hutchison, may be practised. When there is no very considerable heat of the head, or when the extremities are cool, and the morbid secretions have been purged off, full doses of camphor (F. 494. 496. 903. 906.) may be exhibited. If the pulse be very weak, and the prostration of strength very great, the preparations of quinine or of bark, or of ammonia, camphor, assafœtida, valerian, musk, &c., with aromatics and cardiacs, or even wine in the form of negus, should be resorted to. When, with the vital depression and increased vascular action characterising this form of delirium, there are appearances of a morbid state of the circulating fluid, we should endeavour to rouse the vital energies at the same time that we excite the secreting and depurating organs, by exhibiting camphor with the chlorates (the oxymuriates) of the alkalies (see F. 439. 845. 847. 928.), and the resinous purgatives with bitter tonics and stimulants (F. 492. 504. 572.). In such cases, the treatment recommended in the articles Blood (§ 156, *et seq.*), and Fever, will also be appropriate. As soon as stupor and a tendency to coma appear, in addition to the medicines now suggested, cathartic and stimulant enemata (F. 139. 149.), or an active purgative draught (F. 216.), should be exhibited, and repeated according to circumstances; and if these fail, blisters, sinapisms, rubefacient cataplasms or liniments, may be resorted to. The terebinthinates have been employed by me since 1819, with great benefit, in this and some other forms of febrile delirium. The practice has lately been favourably noticed by Dr. Graves (*Med. and Surg. Journ.* vol. ii. p. 782.). If the head be cool, and the pulse, particularly in the carotids, be weak, small, and very frequent, either in this or the preceding form, all revulsants from the head, even the keeping it elevated, or warm pediluvia, will be injurious; and may convert, as Dr. E. Gilchrist (*Edin. Med. Essays and Observ.* vol. iv. p. 358, *et seq.*) long ago remarked, a tranquil, into a most violent, delirium, which may soon terminate in fatal exhaustion. In both the *first* and *second* forms of this affection, the practitioner should not be induced to resort to lowering measures, merely because the muscular force is momentarily increased, and the patient is violent, restless, and agitated. If, with this state, the pulse is very frequent, small, weak, or irregular, and the head not very hot, a restorative and soothing treatment will be more beneficial. I have repeatedly observed, that this form of the affection, when supervening on protracted and exhausting disease, has been almost immediately subdued by small quantities of warm spiced negus; by camphor, with capsicum and opium or hyoscyamus; and by frequently sponging the head with cold or tepid water, when its temperature has been increased, or by the tepid affusion.

18. *C.* The *third* or inflammatory form of delirium should be treated in every respect as described when discussing inflammation of the brain or its membranes. (See art. Brain.) General and local bleedings, cold affusions and applications to the head, &c., are indispensable in it. If the delirium be *complicated* with stupor, or coma, convulsions, contractions or paralysis of muscles, &c., vascular depletions and active alvine evacuations should be followed by external derivatives of a permanent kind; by incisions of the scalp; by issues, open blisters, moxas, the use of the tartar emetic ointment, dry-cupping, &c.; whilst the secretions, &c. should be promoted by mercurial and other alteratives, and the bowels fully evacuated from time to time by a cathartic draught (F. 216.), and enema (F. 149.). In every form of the affection, the patient should be irritated as little as possible by opposition, but indulged as much as is consistent with safety.

19. *D.* I shall conclude by noticing the *treatment recommended by some authors.* — (*a*) The topical application of *cold* has been advised by every writer on this affection, particularly since Bartholinus so strenuously recommend

(*De Usu Nivis Medico*, cap. 25.). It may be prescribed in the form of cold affusion, pounded ice, cold epithems, evaporating lotions on the head, or simple sponging. If, however, it be continued too long, or after the morbid heat has been subdued, and the features have shrunk, it will be injurious, by depressing the nervous energies too low, and favouring the supervention of coma, or violent agitations, terminating in fatal exhaustion. It is required chiefly in the *third* form of the disease; but in the *first* and *second* forms, when the temperature of the head is increased, it should be cautiously employed, or the tepid affusion substituted for it. In these, however, I have preferred that the scalp should be sponged with a tepid and very weak solution of the nitro-muriatic acid. — (*b*) *Camphor* has been nearly as universally prescribed. Büchner (*De Præstantia Camphoræ in Deliriis.* Halæ, 1763.), and Tode (in *Soc. Med. Hann. Coll.* ii. No. 34.) especially recommended it, — the latter with mineral acids. It is a most excellent remedy when judiciously exhibited. If given at all in the *third* form of the affection, it should be in small doses, with nitre and antimony, or with digitalis. In the *first* form, it may be prescribed in larger quantity; and in the *second*, especially if there be stupor or coma, or a morbid state of the blood, in still larger doses, with tonics, antiseptics, aromatics, and cordials. — (*c*) *Opium* or *hyoscyamus* is noticed by Percival (*Lond. Med. and Phys. Journ.* vol. i. p. 443.), Goubier (*Journ. de Méd.* t. lxxxv. p. 244.), Dupuytren, and Kortum (*Beyträge sur Pract. Arzneywiss.* No. 9.). In some states of the *first* and *second* forms of the affection, when it is purely nervous, or is attended by much agitation, watchfulness, &c., either of these medicines may be employed. In the more doubtful cases, either of them may be safely exhibited with camphor and James's powder. In the *third* form, particularly when it assumes a *maniacal* or violent character, and after depletions have been carried as far as may be thought prudent, and the bowels have been freely evacuated, I have repeatedly seen a full dose of opium or hyoscyamus, given either alone, or with antimony, or James's powder, and camphor, produce the happiest effect. Any unpleasant symptom that may result either from too large doses of these narcotics, or from their inappropriate use, will readily be removed by the cold or tepid affusion on the head. The acetate or muriate of morphine, taken in a full dose of the spirits of pimenta, or in any other aromatic spirit, has proved equally beneficial with opium, in my practice. The *external* employment of opium has been found very successful in delirium, by V. Chiarugi (*Sull' Uso Esterno dell' Opio*, 8vo. Flor. 1797.), Ward (*Lond. Med. and Phys. Journ.* vol. i. p. 441.), and Percival (*Ibid.* p. 444.), who have used it in the form of liniment (ʒj. triturated with ℥j. of adip. præp.), either with or without camphor. — (*d*) *Purgatives* have been justly praised by all writers on this affection. The ancients prescribed them in very large doses, and preferred the hellebores, which, with calomel and those I have already particularised, should be actively exhibited, according to the strength of the patient. When the debility is great, they must be associated with a tonic and stimulant treatment. — (*e*) *Emetics* have been mentioned by several writers; and when delirium proceeds from the ingestion of narcotic, indigestible, irritating, or poisonous substances, or is connected with the accumulation of saburræ in the upper portions of the digestive tube, they are then requisite. — (*f*) *Antispasmodics* and *cordials*, particularly valerian (Warburg, *Med. Beobacht.* No. 16.), assafœtida (Wanters, *Journ. de Méd.* t. lvi. p. 115.), musk (Kortum, *loc. cit.*), warm negus, and similar medicines, have been recommended; and are often of service, when the powers of life are much depressed. — (*g*) *Blisters* have been applied to the head much too indiscriminately: I have seen them prove most injurious in this situation. Dr. E. Gilchrist, one of the best writers of his time, directs them both to the head and to the insides of the legs. I believe that they will prove beneficial in the former situation, only when the powers of life are sinking fast, and the delirium is attended by stupor, a cool head, and sunk or collapsed features, as in cases of low or adynamic fevers. When this affection is consequent upon febrile determination of blood to the head, blisters on the insides of the legs, &c. may be useful derivatives; but they often occasion so much pain and irritation in this situation, as to thereby counteract, particularly in the turbulent state of delirium, any good they might otherwise produce. — (*h*) Of the *sedatives* or *contra-stimulants* prescribed by writers, the preparations of antimony, particularly James's powder—digitalis, and the nitrate of potash, are the most deserving of notice. Wherever the delirium is connected with increased vascular action in, or determination to, the head, these medicines are of more or less service when judiciously combined with other appropriate remedies. Withering (*On Digitalis*, p. 33.) and Patterson (*Med. and Phys. Journ.* vol. v. p. 442.), strenuously advise the preparations of digitalis; but they, as well as those of antimony, require much caution, if ventured upon in the delirium attendant on low or malignant fevers. It is chiefly in the maniacal or *third* form of this affection that they are most beneficial, and in it they should be exhibited in a decided manner; but in the *first* and *second*, particularly in the delirium of typhus, they are generally injurious. — (*i*) The *actual cautery* on the nape of the neck, and *moxas*, have been advised by M. Valentin (*Med. and Phys. Journ.* vol. xix. p. 432.), and several other Continental writers. — (*k*) Dr. Grant (*On Fevers*, 8vo. 1771.) recommends the patient to be allowed to dress and sit up when he feels anxious to do so; but this, and several judicious observations of this writer, are more fully adverted to in the article on Fever. The observations made on convalescence from *Inflammations of the* Brain, and from Fever, are perfectly applicable to the management of convalescence from delirium. (See these articles.)

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DELIRIUM WITH TREMOR.—Syn. *Delirium Tremens*, Sutton. *Brain Fever*, Pearson. *Brain Fever of Drunkards*, Armstrong. *Mania à Temulentia*, Klapp. *Mania à Potu*, Snowden and Carter. *Delirium Ebriositatis*, Blake. *Idiopathic Delirium; Delirium tremefaciens*, Author. *La Folie des Ivrognes, Délire Tremblant*, Fr.

Classif. — 4. *Class*, Nervous Diseases; 1. *Order*, Affecting the Intellect (*Good*).
I. Class, IV. Order (*Author*).

1. Defin.—*Delirious illusions, with constant tremor of the hands and limbs, watchfulness, and great frequency of pulse.*

2. This form of delirium is variously modified, according to the causes in which it originates, and the habits and constitution of the patient. Although it is here divided into two species; the one being evidently connected with inflammatory irritation of the arachnoid, or with excited vascular action in the membranes of the brain, and associated with great irritability — the other consisting chiefly of this last state, attended by exhausted nervous energy; yet it often presents intermediate forms or modifications, which cannot be referred to the one species more than to the other. Nevertheless a distinction should be made, inasmuch as the predominance of the characters of either species will indicate the propriety of employing more or less of that treatment which is appropriate to it; for, owing to the want of such a distinction, the delirium which arises chiefly from intoxicating liquors has been too generally treated after one fashion, and in too empirical a manner, merely because it has presented one or two characteristic symptoms, — its numerous other phenomena being entirely overlooked. Thus, when the disease arises, as it commonly does, from the abuse of intoxicating liquors, it may assume more or less of the features of either species, according as it is directly or indirectly produced by this cause; but if it be viewed as a consequence of inflammatory action only, or as proceeding from nervous exhaustion exclusively, the conclusion will in either case be only partially correct, and the practice founded upon it frequently injurious.

3. I. Delirium with Tremor and excited Vascular Action in the Membranes of the Brain (*Encephalitis Tremefaciens* of J. Frank).

4. Defin.— *With great terror and irritability of temper, and violence upon being opposed; a frequent, full, or hard pulse; countenance often wild or flushed, and the head hot.*

5. This species of delirium forms the connecting link between that which is purely nervous, and that depending upon inflammatory action of the membranes and periphery of the encephalon. That it may run into, or form a slight grade, or modification, of inflammation of these parts, in some cases, I will not dispute; but that it always is strictly inflammatory, is opposed by the fact that it will often subside spontaneously, in a short time after its cause has ceased to act. The "*Delirium Ebriosum*" of Darwin and some other writers, or the delirious affection which is immediately consequent upon intoxication, is an example of this; it sometimes subsiding in a few hours, or in a day or two, when not injudiciously interfered with; but this is only an occasional occurrence, and cannot be trusted to. This state of delirium, when directly produced, as it commonly is, by intoxication, is not always characterised by tremors at the commencement; but, when thus accompanied, it is often mistaken for the true form of delirium tremens, into which, however, it not infrequently passes, chiefly owing to the cause in which it had originated. It is generally attended by extreme irritability, often by great violence, and sometimes by general spasms and constant vomiting. The head is usually hot, and the face flushed. This species of idiopathic, or primary delirium, is caused, not only by the use of intoxicating liquors, opium, &c., but also by the excitement of the cerebral organs by intense or prolonged study, particularly when prosecuted under the influence of depressing causes. Dr. J. Johnson states, that he has seen delirium tremens in young ladies, whose mental powers had been exhausted by this cause; and most probably it was this species of disease that he had observed, as the treatment which he found successful in it is essentially the same as that which is most beneficial in this affection. Delirium with tremors is also, in some rare instances, chiefly occasioned by excessive venereal indulgences, or masturbation; most probably, however, assisted by various concurrent causes.

6. II. Delirium with Tremor from exhausted Nervous Power (the *True Delirium Tremens* of modern writers, and *D. Traumaticum*, or *D. Nervosum*, Dupuytren).

7. Defin.— *With a morbid recurrence of the patient's ideas to his avocations; a frequent, weak, or small pulse; cool, humid, or perspiring surface; and loaded, but moist tongue.*

8. This disease was very generally confounded with phrenitis, until Dr. Sutton directed attention to it as a specific affection, requiring a peculiar treatment. As Dr. Ryan has remarked, it most probably constituted a large proportion of the cases named "*Demonomania*" by the writers of the 16th and 17th centuries. It had not, however, altogether escaped attention, previously to the notice taken of it by Dr. Sutton. Dr. Pearson, of Newcastle, had written, for private circulation, a small tract respecting it; and cases illustrative of its nature and appropriate treatment had been shortly before published by Dr. M'Whirter (*Med. and Phys. Journ.* vol. xviii. p. 153.): Dr. Saunders had also mentioned it in his lectures, delivered at Guy's Hospital, about the close of the last century; and that manifestation of it observed after external injuries is stated by Dr. Blake to have been noticed in Dr. Colles's Lectures on Surgery, with an accurate reference to its chief, although apparently the predisposing cause, and to the means of cure which repeated observation has shown to be most successful.

9. i. Causes, &c. — Whilst the former state of delirium is often *directly* occasioned by drunkenness, this is as frequently *indirectly* produced

by the same cause; the one being immediately consequent upon or accompanying intoxication, the other commonly resulting from the abstraction of the accustomed stimulus, after an habitual or continued indulgence in it, or after a protracted fit of ebriety. A slight form of it, or merely tremors of the hands or limbs, with deficient nervous power, and occasional illusions, will sometimes appear after habitual tippling, without intoxication having once been produced. The use of intoxicating liquors, and the neglect of sufficient food; a protracted debauch, followed by sudden privation, or by depressing causes; large or repeated depletions employed to remove the headachs or stupor of drunkards, or the first species of this delirium; the treatment indicated by the diseases with which such persons may be affected; the debility caused by the diarrhœa or cholera sometimes consequent on intemperance; the shock arising out of severe injuries, particularly fractures; exposure to cold, a course of mercury, and the puerperal state*; are principally concerned in the production of this affection. That the delirium which has been called "*D. Traumaticum*" by British writers, and "*D. Nervosum*" by **Dupuytren**, is in every respect the same as that now being considered, is proved by the fact of its appearance chiefly in persons of intemperate habits, by identity of phenomena, and by the effects of various modes of treatment upon both being alike.

10. Although the chief cause of delirium tremens is evidently the abuse of intoxicating, especially spirituous, liquors, yet this is not the only cause. It may also be occasioned by the drugged beverages prepared in Eastern countries, particularly in the East Indies, when too freely indulged in; and by the excessive use of opium. But it is chiefly when sobriety has followed a protracted debauch; and when, during the first days of the abstraction of the accustomed stimulus, the additional causes mentioned above, come in aid of the efficient cause,—when the habits and indulgences of the patient have produced that state of the nervous system which readily passes into serious disease upon its being influenced by depressing agents; that true delirium tremens takes place. Inattention to this fact, by nearly all the writers on the disease, excepting Dr. **Blake**, has led to serious misapprehensions. Practitioners have too generally concluded that the delirium of drunkards is always of the same kind; and have overlooked differences very generally subsisting between that immediately produced by intoxication — the *first* species of this affection; and that indirectly occasioned by it — the *second* species, or true delirium tremens. An occasional, or even a single indulgence in intoxicating liquors to excess will sometimes give rise to the former; a repeated, habitual, or protracted indulgence is requisite to the appearance of the latter. The frequency of this affection, particularly in the lower classes, justifies the attention recently paid to it; and I believe that it is more common now than formerly, owing to the cheapness, and facilities of procuring spirituous liquors. Between 1820 and 1832, I treated 19 cases, about two-thirds of which were in consultation with Mr. **Houlton**, Mr. **Barnwell**, Mr. **Winstone**, and Mr. **Painter**; the others in dispensary and private practice. In some manufacturing and trading towns, it is of frequent occurrence. In the United States of America, it is, however, much more common than in this country. Dr. S. **Jackson** states, that he has treated upwards of 200 cases; Dr. **Carter**, of Philadelphia, mentions nearly the same number; Dr. **Ware** says, that he has seen more than 100; and Dr. **Wright**, that he has received, in the institution at Baltimore, from 60 to 70 cases annually. But it is evident, from the details they have furnished, in the works referred to at the end of this article, that they have included under the same head delirious affections immediately consequent upon intoxication; and that, owing to this circumstance, has arisen much of the contrariety of opinion respecting the nature and treatment of the disease, which is as remarkable amongst physicians on the other, as on this, side of the Atlantic.

11. ii. Symptoms.—The phenomena of delirium tremens vary remarkably, from the slightest forms of nervous tremor with spectral illusions, and accelerated pulse, to the most alarming state of vital depression, muscular agitation, and mental alienation, about to be noticed. Dr. **Blake** has marked out three stages into which the disease may with propriety be divided. It should, however, be recollected, that they are not always obvious or clearly defined; that they exist only in those cases which supervene on the abstraction of the intoxicating stimulus; that the first stage is wanting in those that more immediately follow intoxication, and consequently in most, if not all, the *first* species here described; and that, in the species now being considered, it is but seldom brought under the cognizance of the physician,—medical aid being seldom required until the second period is developed. As the treatment may be more precisely stated when the disease admits of a division into stages, I shall adopt that suggested by Dr. **Blake**, and which differs but little from that which has been followed by Dr. **Lyon**, Dr. **Ryan**, and Dr. **Barkhausen**.

12. The *first stage* of true delirium tremens frequently appears from two to eight or nine days after a protracted debauch, or a prolonged fit of intoxication; and is commonly attended by slight febrile action, and gastric derangement, often aggravated by some accidental cause, external injury, or contingent ailment (§ 9.), generally the immediate effect of excesses; but the length of time which elapses between the abstraction of the accustomed stimulus, and the commencement of the symptoms, is often uncertain. The first indications of the disease are, according to Dr. **Blake**, a peculiar slowness of the pulse, coldness and clamminess of the hands and feet, general debility, and diminution of the animal temperature. In addition to these, nausea and occasional vomiting, particularly in the morning; much diminution of appetite, and aversion from animal food; excessive perspiration from trivial exertion; frightful dreams; vertigo, and sometimes cramps of the extremities, are complained of. The bowels are often constipated, but sometimes open, or even relaxed, and the tongue is tremulous, furred, and moist. In

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* I have only seen two cases in females, and these were habitual drunkards; the disease appearing a few days after delivery.

most cases, the peculiar tremor of the hands is present in this stage; but in a few it is not remarked until the next. The spirits are much depressed; the patient sighs frequently; his countenance is anxious and dejected; he complains of oppression of the præcordia; is anxious about his affairs; and is either restless and watchful, or has short and broken slumbers. This state seldom continues longer than a few days. It is generally of longer duration in the old or worn-out drunkard, than in the younger and more robust, in whom it may be followed by increased vascular action in one or two days.

13. The *second stage* commences with restlessness, a peculiar wildness of the countenance, and a hurried anxious manner; marked susceptibility of the nervous system, and irritability of the muscular system; great excitability of temper, acceleration and smallness of the pulse, and various mental illusions and alienations. The heat of the surface of the trunk increases, but the hands and feet retain the same coldness and clamminess already noticed. The mental delusion becomes more constant as this stage is developed, and is generally of a low or melancholic kind, with continued reference to the patient's ruling passions and occupations, and anxiety respecting them. He sees objects where their presence is physically impossible; is continually haunted by frightful creatures, or occupied with most extravagant ideas, and is constantly endeavouring to avoid them. He now becomes altogether deprived of sleep; the restlessness and quickness of manner increase; the countenance is more anxious; the tongue is more deeply furred; the tremor of the hands and tongue continue, without remission; the bowels are either constipated, or, if relaxed, the evacuations are very dark and offensive; the urine is scanty; the pulse is soft, or small, and ranges between 100 and 120; the pupils are contracted, but the eyes are not intolerant of light; and the patient is talkative, constantly occupied with the objects of his delusions; he cannot be kept in one place; and, when opposed, is violent and noisy. This stage usually continues from one to three or four days; when it terminates, either in a general mitigation of symptoms, or in more profound collapse of the vital powers, thereby constituting the third stage.

14. The *third period*, in the slighter or more *favourable* cases, is ushered in with mitigation of the foregoing symptoms; yawning, drowsiness, and profound sleep, which generally terminate the disease; but in the more *dangerous cases*, the preceding phenomena become more severe, and accompanied by more complete depression of vital power, and increased irritability of mind. The patient makes violent and excessive struggles, which are attended by very copious perspiration. As the malady advances, and the energies sink, the coldness and clamminess of the hands and feet, which had been extending upwards during the second stage, spread over the whole surface; and the pulse becomes still more frequent, small, weak, or thready, and sometimes can hardly be counted: the tremor increases in the hands, and often invades the whole frame; and is rather a constant trembling, more nearly resembling that occasioned by severe cold, than the subsultus tendinum of typhus, or the nervous rigors of some other affections. The perspiration becomes more and more cold, and exhales a peculiar smell, which is, as Dr. HODGKIN has remarked, between a vinous and alliaceous odour. The countenance is commonly pale and anxious; the pupils very contracted; the tongue loaded, furred, and often brownish at the centre and root, and occasionally red at the point and edges; the patient talks incessantly, and with great rapidity; the delirium increases in violence; and the mind is excessively irritable, and continues so until shortly before death, when a calm takes place. In some cases, instead of this calm occurring, the patient is carried off in a convulsion.

15. *Modifications, &c.* — Such is the more common form of true delirium tremens; but whilst it sometimes occurs in slighter grades, in which the symptoms differ but little from simple nervous tremor, excepting that they are associated with mental illusions, great restlessness, and talkativeness, it also presents more severe forms, in which the phenomena approach those characterising the former species, or the delirium ebriosum, in which the vascular excitement generally, and that of the brain in particular, is greater, and relatively of a more sthenic kind. At the commencement and *second* stage of this state of the disease, the pulse is tenser and harder or fuller, the skin drier on the trunk, the delirium more violent, and comprehension less quick, than in the other cases. The eyes, also, are injected; the temperature of the head is somewhat increased; and the tongue is often dry or cracked, and red at its edges. In the *last* stage, the skin is bedewed with a cold clammy perspiration; the pupils are contracted; the pulse very small and frequent, often scarcely perceptible; the stomach is irritable, and the delirium becomes low and muttering. The tremors are constant, but the watchfulness is sometimes interrupted by short restless slumbers, which afford no relief; or it ends, in some cases, in a condition approaching to coma, passing at last into fatal convulsions. Thus some cases of the *second* form of the disease very nearly approach the *first*, and differ from it chiefly in being caused indirectly, instead of directly, by intoxication. The second species is, however, sometimes consequent upon the first, particularly when treated by too copious depletions; the vascular excitement of the one passing insensibly, but often rapidly, into the profound collapse marking the latter stages of the other; and this may even occur, although the delirium at the commencement was not attended by tremors. It should also be recollected, that the three stages into which true delirium tremens has been divided, are not always separated by any obvious limits, or even so distinctly defined as generally observed and stated above; the phenomena often surpervening in so gradual and continuous a manner, as to render it difficult to determine the end or commencement of each, without much attention to all the symptoms and to the history of the case.

16. iii. DIAGNOSIS. — This disease, which is so difficult to describe, when once seen, can never be forgotten. It may, however, be mistaken for the first species, for phrenitis or inflammation of the membranes and periphery of the brain, for the delirium of fever, and for confirmed mania or insanity. — (*a*) It is to be distinguished from the

first species (the *encephalitis tremefaciens*) of this kind of delirium, by its coming on a short time after a protracted intoxication, instead of immediately upon it; by its being caused *indirectly*, instead of *directly*, by the abuse of intoxicating liquors; and by the pulse being stronger and fuller, the head hotter, the face more flushed, the surface of the trunk warmer, the delirium more violent, and the patient more irritable, the tongue drier and redder, and the vascular excitement comparatively greater and more sthenic, in the *first* species (§ 3.), than in the *second;* although occasionally a few cases of the latter approach these characters of the former. — (*b*) The same differences, but in greater degree, exist between delirium tremens and *phrenitis*, in which are wanting the cold, copious, clammy and peculiar perspiration, the soft pulse, and the moist tremulous tongue and hands. The impatience of light, and fulness of the vessels of the eyes, which accompany the latter, are not present in the former. The illusions, also, of delirium tremens are peculiar, and are accompanied with an anxious, fearful, and constant reference to concerns which had previously interested the patient in a particular manner. He can recognise his friends, and return a rational answer to some questions; and he is more tractable and manageable, when not irritated or opposed, than in phrenitis. — (*c*) This affection may be readily distinguished from the *delirium of fever* or *typhus*, by the history of the case — it being the primary and the most prominent ailment; delirium generally supervening late in fever. In this disease, the patient is quick in his movements; is agitated and talkative; is desirous to be up; walks about, when permitted, in a hurried manner; is anxious to follow his occupation, or to avoid, or to find out, or to chase away, some spectral illusion that haunts him; and is violent when opposed: in the delirium of fever, the patient is prostrate, his countenance less wild, his delirium is lower and quieter, and seldom attended by attempts to get out of bed, &c. (See DELIRIUM, § 3. 7. 10.) In the former, there is a marked tremor of the hands, &c. from the beginning, and the patient in the last stage seems to search after objects which he thinks he sees creeping over his bed, or floating before him: in the latter, the peculiar tremors are wanting; but there are subsultus tendinum, and picking at the bedclothes, or floccitation. — (*d*) From *maniacal insanity* it is to be distinguished chiefly, as stated above (*b*), by the great frequency and softness of pulse; by the copious, cold, and peculiar perspiration; the tremulousness; by the history of the case, — this being an acute, the other a chronic malady. When, however, it occurs in the puerperal state, in which I have seen it, the difficulty of distinguishing it from the mania sometimes supervening at that period may be considerable: the tremors, the greater frequency of pulse, and more copious and colder perspirations, will point out the nature of the affection, and will lead the physician to treat it according as the symptoms indicate a greater or less predominance of nervous exhaustion over vascular excitement.

17. iv. PROGNOSIS. — A first attack, in a constitution not yet much injured by the cause of the disease, generally terminates favourably. I have seen even a third attack end so; but its more frequent recurrence, particularly if it be attended by signs of vascular irritation or erethism of the encephalon (§ 5. 15.), or by dryness of the tongue, and its complication with some other disease, are circumstances indicating great danger. A want of correspondence in the pupils, and the supervention of subsultus tendinum or convulsions, or of low and muttering delirium, the pulse becoming quicker and smaller, are generally fatal signs. It is also more dangerous when caused by opium, than when proceeding from intoxication. On the other hand, a general mitigation of the symptoms, less frequency of pulse, with quiet or sound sleep, are indications of a favourable termination being at hand. In all cases, however, a cautious prognosis should be given, particularly in broken down constitutions; for success may elude our best efforts, even when most anticipated; and recovery may take place in the most apparently desperate circumstances.

18. v. PATHOLOGY. — *A. The appearances on dissection* have furnished only negative information as to the nature of the disease. In the true delirium tremens, the membranes of the *brain* evince but little change; the chief lesion consisting of slight opacity of the arachnoid, especially at the base of the brain and vicinity. The pia mater is somewhat injected, and a slight effusion of serum is occasionally observed in the ventricles. These appearances are, however, not constant; but they are more marked, and more manifestly inflammatory, in those cases which have accompanied or directly followed intoxication (§ 3.). In these, the vessels are often much congested, particularly those of the velum interpositum, the arachnoid thickened, and the serum more abundant, and occasionally even sanguineous. The *stomach* generally presents appearances of chronic gastritis, the villous membrane being either thickened or softened, or both, and the villi effaced. The *liver* is variously diseased, — often enlarged, granulated, of a yellow or fawn colour, or presenting the fatty degeneration. The lesions, however, of the stomach and liver, are coincidences only, or changes contingent on the habits of the patient, and not necessarily connected with the pathology of this disease.

19. *B. The nature* of this disease has been a subject of much discussion with modern writers, in consequence of no clear distinction having been made between that form of delirium with tremor, which is the result of vital, and particularly nervous, exhaustion; and that which depends chiefly upon excited circulation, vascular erethism, or inflammatory action, within the head. Although numerous instances will present themselves in which the former as well as the latter pathological state exists, the one, however, predominating over the other; yet the fact of either being present, almost solely, if not altogether so, perhaps, in a still greater number of cases, should not be overlooked, as it has been fully demonstrated, both by the post mortem appearances, and by the juvantia and lædantia during life. It is most probably in consequence of having noted the changes observed principally in the *first* species, or in such instances of the *second* as approach it the nearest, that Dr. CLUTTERBUCK and Dr. BRIGHT have viewed this latter as the consequence of inflammatory action in the arachnoid and pia mater.

I believe, however, that inflammatory irritation, although sometimes an attendant on this affection, is not necessarily connected with it, and certainly is not the pathological state which produces it; and that, when present, it is not the only condition which is requisite to the developement of its pathognomonic characters; exhaustion or depression of both the nervous and sensorial powers being equally necessary to its supervention. It is probable, also, that the vital and nervous depression is increased by the morbid impression produced by accumulated secretions of a vitiated kind in the biliary system, and on the digestive mucous surface. This conclusion is deduced from a careful comparison instituted between the symptoms, the agents controlling them, and the morbid appearances observed upon dissection. From this it may be inferred that the pathological states in true delirium tremens, and in the delirium of typhus, are not widely different. It is probable that the state of the blood, the presence of congestion, and the greater affection of the substance of the brain, and of the organic functions, in the latter than in the former, may occasion all the differences of symptoms which exist between them; the vital exhaustion being nearly the same in both, or perhaps greater in typhus, and the nervous disturbance being more prominent in delirium tremens.

20. vi. Treatment. — Very opposite means of cure have been resorted to in delirium with tremor, owing to the circumstances above stated (§ 2.), and to the evidences of general as well as of local vascular excitement in some cases, or of nervous and sensorial exhaustion in others, or even of their co-existence with more or less predominance of either pathological condition. When it is considered that the inability to distinguish between such manifestations of the disease as depend in a great measure upon vascular excitement within the head, and those which result almost or altogether exclusively from exhausted nervous and sensorial power, must, in some cases, lead to an unsuccessful if not an injurious treatment, the necessity of investigating these points, of enquiring into the history of each case, and of arriving thereby at a correct diagnosis — which can be reached only by a strict reference to the existing pathological condition causing the morbid phenomena — before entering upon the treatment, will be evident. Having pointed out the means most beneficial in each of the species of this delirium above distinguished, the practitioner may apply them accordingly, and adopt more or less of either method, in order to meet the predominating characters which intermediate or more anomalous cases may present.

21. *A. Of the first species, or that with increased vascular excitement.* — This form of the disease requires moderate depletion, preferably by cupping, or leeches applied behind the ears, and below the occiput; cold washes or lotions, or the tepid or cold affusion, to the head, whenever its temperature rises above the natural standard; the tepid bath, or the surface of the body to be sponged with tepid water; purgatives combined with cordials, &c., if the nervous power be much depressed, or if the attack be occasioned by intoxication, particularly calomel with camphor or ammonia, or with both; aperient and antispasmodic enemata (F. 134. 149.); and the liquor ammoniæ acetatis with excess of ammonia, and camphor julap. Purgatives are well borne: they may be given energetically, and be often repeated, in this state of the disease; but they should always be associated with stimulants and restoratives, and their action promoted by enemata containing assafœtida, the terebinthinates, &c. When the affection is caused by spirituous liquors, we should be extremely cautious not to carry the depletion, although local, too far; and upon the first indication of the subsidence of vascular excitement about the head, we should endeavour to anticipate, and prevent the consequent depression which will otherwise ensue, by exhibiting, in addition to the ammonia-camphorated medicine now recommended, moderate doses of opium, or of laudanum, with the view of quieting the perturbation of the frame, and inducing sleep.

22. In the cases of this form of the disease, in which the vascular excitement either is not so great as to require bleeding, or has been somewhat reduced by this practice, emetics may be immediately exhibited. Dr. Klapp, and other American writers, prescribe tartar emetic in frequent doses, in those cases which are referrible to the present species of affection, until it either has an emetic action, or nauseates and purges the patient; and Dr. Blake confirms the result of my experience, as now stated, in recommending emetics of sulphate of zinc, assisted by the administration of antispasmodics and stimulants, such as æther, camphor mixture, coffee, &c., with the application of cold to the head, while the surface of the body and extremities are sponged with tepid water; and, in some cases, bleeding, without being pushed so far as to increase debility. This treatment is, however, most appropriate when the affection is the direct result of intoxication; but when it arises from other causes (§ 5.), vascular depletions, purgatives, cold applications to the head, and a more sparing use of stimulants, are most appropriate.

23. *B. Treatment of the second species, or true delirium tremens.* — *a.* During *the first stage* we should endeavour to cut short the disease, by exhibiting, every hour, very small doses of laudanum in effervescing draughts, with the carbonate of ammonia, in camphor mixture; or the opium with full doses of camphor and ammonia; and by administering clysters, with assafœtida, camphor, and tinct. opii. Dr. Carter, of Philadelphia, advises the mistura assafœtidæ with tinctura opii to be taken every hour or two. Dr. Blake recommends the accustomed stimulus in moderate quantity, and at short intervals; but it may occasion a too violent reaction, unless the head be guarded by having frequent recourse to the tepid or cold affusion on it. In some cases, however, warm spiced negus or punch may be allowed, especially in exhausted and old drunkards. This is the only period in which blisters should be employed — if employed at all. The nape of the neck, or the epigastrium, is the preferable place on which to apply them. Anodyne and stimulating liniments (F. 297. 308.) rubbed over the epigastrium are, however, more efficacious. In some cases, a warm bath will precede use the of liniments with marked benefit.

24. Of all the cases of the disease I have seen, there has not been one that has not indicated the

propriety of prescribing cathartics, in order to remove accumulated secretions. From the quantity of very dark, offensive, bilious evacuations which they have procured, — often not until after their repeated exhibition, and even in cases where the bowels had been open or relaxed, — I have concluded that collections of vitiated bile in the gall-bladder and hepatic ducts have favoured the supervention of this peculiar affection. Under this conviction, I have always exhibited, as early as circumstances would permit, an active chologogue purgative, generally a bolus consisting of about ten grains of calomel, with as much camphor, and a grain of opium, in conserve of roses; and, in a few hours afterwards, a warm stomachic and aperient draught, followed in an hour or two by an enema (F. 135.). The advantages arising from conjoining camphor, or large doses of ammonia, or capsicum, or other stimulants, with purgatives in this disease, are manifest; for, by these or similar means, we shall succeed either in arresting its progress, or in preventing the depression which might follow copious evacuations — fears of which have paralysed the treatment of it. In all cases, but especially in diseases accompanied by low or melancholic delirium, accumulations of vitiated bile or other secretions should be suspected, and be removed :- nor should we infer, from having at first failed in procuring their discharge, that no such disorder exists; for the most active, and even the most judiciously selected, cathartics may long fail in evacuating the thickened and morbid contents of the gall-bladder and hepatic ducts, particularly when their excitability has become exhausted by spirituous potations.

25. *b.* In the *second stage* — if it supervene notwithstanding the above means, or if the patient be not seen until it has appeared — the treatment should be commenced by the exhibition of the calomel, camphor, &c., as prescribed above (§ 24.), if they have not been already exhibited, or if they have not procured copious, dark, and offensive stools; and evacuations ought to be promoted by warm and stimulating aperient draughts, and by purgative enemata containing assafœtida, camphor, &c., or consisting of F. 130. 149. The greater number of the cases I have seen had been treated by able practitioners, according to the plan advised by the best writers, but without success — although purgatives had been given where the bowels had not been sufficiently open. In all these, this treatment was immediately put in practice, and assisted by cordial draughts containing some one of the ammoniated spirits, and æthers, &c., and by the enemata already alluded to. As soon as alvine evacuations were procured by these means, *opium*, either alone, or with ammonia or camphor, or with both, was prescribed in full doses, and repeated according to its effects; and although they were all severe cases, one only terminated fatally.

26. At this period of the disease, the *warm bath*, at a temperature of about 90°, will assist materially in tranquillising the patient, and promoting the effects of opium. Dr. Wright, of Baltimore, strongly recommends it; but it is not a new practice in delirium tremens, as he supposes; and he is favourable to the use of Dover's powder, which, however, is more suitable to the preceding species. Although opium should be given in full or decided doses, combined as stated above,— (in from one to three or four grains — the smaller quantity being repeated twice or thrice, the larger not oftener than once, and after a longer interval), — it should not be persisted in, unless sufficient time be allowed to elapse after each dose; for, as Dr. Pearson has observed, if it does not succeed after its exhibition at first in a decided manner, it increases the intellectual confusion and danger. Some of the American physicians have recommended enormous doses of this medicine. Dr. S. Brown gives from ʒj. to ℥ss., or even more, of laudanum for a dose. Dr. S. Jackson prescribes from ten to fifteen or even twenty grains of solid opium every two hours; and states, that four ounces of good laudanum having been given in twelve hours, partly by mistake, a sound sleep of twenty-four hours' duration, and perfect recovery, were the result. I only am surprised that the sleep was not that of death. These are not solitary instances of the extravagance, if not rashness, of some American practitioners; nor, indeed, has the practice of giving excessive doses of laudanum in this affection been limited to them. When we find thirty or forty leeches ordered to be applied to the throat of a child five or six years old in croup, and repeated oftener even than once, and the bleeding promoted, should we wonder that death ensues? Feats of hardihood in medicine are too often the consequence of clerical and practical ignorance; and they may be allowed to meet their own reward, as long as they are not obtruded into the annals of our science, and thereby set forth to the inexperienced as examples to be followed. But when this distinction is conferred on them, it becomes the duty of those who record the progress of medicine, to note also, and to oppose, its backslidings by the severest reprehensions.

27. I believe that large and frequently repeated doses of opium in this disease, as Dr. Wright, of Baltimore, has remarked, favour the supervention of coma, convulsions, or paralysis; and that the effects of an excessive quantity of this drug very nearly resemble the phenomena of the last stage of the disease, particularly towards its fatal close. This fact should not be overlooked, and should lead us to distinguish between the consequences of an injudicious treatment, and the worst features of the malady. It is the abuse of opium that is here argued against; its truly medicinal exhibition that is contended for, — in a quantity which sound sense will dictate, and after accumulated and morbid secretions and excretions have been removed, the discharge of which might be impeded or interfered with by the immediate employment of this valuable remedy. I consider opium as necessary to the cure of this disease, as bark and analogous medicines are to the cure of ague; but, as in their case, the morbid colluvies, which has at least disposed the system to be affected, and aggravated the malady, should be removed, in order that recovery may be ensured and be permanent.

28. In this stage of the disease, particularly when the delirium is attended by much agitation or violence, it is necessary to obtain an influence over the patient's mind by moral means. All irritating contentions, however, should be avoided;

and the patient's wishes, when not likely to prove injurious to him, be indulged. By thus granting what is less material, he will more readily submit to what is important; but he ought not to be left a moment without an attendant. Coercive measures will generally be found unnecessary, if soothing and indulgent but firm treatment be adopted, and the warm bath be occasionally resorted to. In a majority of instances, the above means will be followed by a remission of the symptoms, and a disposition to sleep will manifest itself, — sometimes, however, accompanied by nervous rigors. Opium should now be left off, or its dose much diminished; and the patient kept as quiet as possible. His first slumbers are often short, broken or interrupted by startings, or terminated by fright. If he awaken alarmed, his distress should be soothed, and a moderate dose of opium with warm spiced negus or punch may be given him; these will generally secure a sound sleep, from which he will awaken in a rational state of mind. Afterwards it will only be necessary to support the strength by light and nutritious diet, and gradually diminish the quantities of the restoratives that have been prescribed.

29. In cases characterised by much vital depression, very frequent pulse and cold surface occurring in old and habitual drunkards and broken constitutions, a liberal use of cordials, and even a moderate quantity of the accustomed stimulus, in addition to the opium, should be administered from time to time; particularly if the head be cool, the face pale, and the action of the carotids not strong. On the other hand, in those cases which were described (§ 15.) as approaching the first species of the disease, cupping, or the application of leeches on the occiput, or nape of the neck, or behind the ears, will be requisite early in this stage; and full doses of calomel, and the rest of the *purgative* treatment, with cold applications, or tepid affusions on the head, should be more actively employed, and precede the exhibition of opium. In this state of the disease, opium often aggravates the symptoms, unless it follow a judicious use of these remedies; and other excitants are equally injurious. In these cases, James's powder, or antimony, either previously to, or conjoined with, camphor and opium, will also be productive of much benefit.

30. That state of the disease which comes on after external injuries or operations (§ 9.), I have imputed chiefly to the previously intemperate habits of the patient. It requires the same treatment as the more nervous or vitally depressed cases now alluded to (§ 29.); and, as well as these, will be remarkably benefited by small clysters containing moderate doses of laudanum, administered after the bowels have been sufficiently evacuated, and repeated according to circumstances. This treatment has been much relied upon by M. Dupuytren; but if it remove not the disorder, after sufficient time has been allowed for its operation, camphor may be added to it; and ammonia, musk, ether, &c. be given in suitable vehicles; or a moderate quantity of the patient's favourite beverage allowed him, as suggested by Dr. Colles. Of two cases recently reported (*Med. Gazette*, vol. vii. p. 287.), which confirm the view I have taken of the origin of traumatic delirium in that state of constitution which intemperance induces, opium failed in one; and *prussic acid*, which was tried in the other, was equally unsuccessful.

31. *c.* If the *third stage* appear notwithstanding the above treatment, little hope of recovery can be entertained, as most likely serous effusion has become superadded to exhausted vital and nervous influence. Nevertheless, medical aid should not be withheld, especially if the patient have not received it in the earlier periods, or have been treated injudiciously. The hair should be removed from the head, and either a blister applied, or one of the liniments (F. 299. 308.) rubbed upon it. A blister, sinapism, or other rubefacient, should also be applied over the epigastrium; and camphor, ammonia, musk, capsicum, &c. liberally administered; restoratives and stimulants being also exhibited in clysters. Mercurial liniments containing camphor may likewise be rubbed upon the inside of the thighs, and the warm bath resorted to.

32. *d.* Certain *modes of practice* have been employed, to which a brief reference may be made. Dr. Klapp, and some other physicians of the United States, have recommended *tartar emetic* in frequent doses, until it nauseates and purges the patient; but this treatment is more appropriate in the first species, or in such cases of the second as approach it most nearly (§ 15.). Dr. Speranza, of Parma (*Bullet. des Scien. Méd.* Sept. 1830.), directs leeches to the head and anus, applies ice to the scalp, and gives calomel and jalap, and subsequently *prussic acid*. This method is obviously suited only to the first species, and would be injurious in most instances of the second. From the preference he has given to the appellation adopted by J. Frank, — *Encephalis tremefaciens*, — I would infer that he has never prescribed it in the true delirium tremens. Dr. A. L. Pierson (*N. Eng. Journ. of Med. and Surg.* vol. ix. No. 2. Ap. 1820.) states, that he gave very large doses of *digitalis* (sixty drops every three hours) after bleeding, and the patient recovered; but this was evidently a case of this first form of the disease. Dr. Pauli informs us that he has prescribed from three to six drachms of fresh ox-gall, in aromatic water, half a glass of brandy each morning, and two grains of the watery extract of opium at night, in forty-three cases, and has lost only one (*Med. Gazette*, vol. ix. p. 776.). The propriety of having recourse to moderate quantities of the stimulus to which the patient has habituated himself, in the depressed periods of the disease, and especially in those cases which present the more marked signs of exhausted nervous and vital power, has been insisted on by Dr. Blake, Dr. Ryan, &c., and admitted above, as well as by others; and quinine, capsicum, the preparations of hop, and various aromatics and cordials, may be also used as adjuvants of opium.

33. *e.* During the treatment, little or no *nourishment* is desired, or even required: arrow-root and sago, with a little brandy or white wine, may however, be given from time to time, particularly if the patient wish it. When he becomes convalescent, the *diet* should be very light, but nutritious; and a suitable beverage, in moderate quantity, be allowed. During recovery, the state of the digestive functions ought to be attended

to, and promoted by tonics, and by aperients whenever the bowels are torpid. I have never known or heard of an instance wherein the state from which the patient has escaped, or the representations of the medical attendant or friends, has effected a reformation of the habits which produced the disease. However, the physician should discharge his duty, by stating to him the consequences that will accrue from persisting in them.

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DENTITION, DIFFICULT.

— Syn. *Dentitio difficilis*, *Odontio Dentitionis*, Good. *Dysodontiasis*, Ploucquet. *Difficult Teething*.

Classif. — 1. *Class*, 1. *Order* (*Good*). II. Class, I. Order (*Author*).

1. Defin. — *Slow or delayed evolution of the teeth, with signs of local irritation, and constitutional disturbance, often with disorder manifested especially in the digestive organs and nervous systems, occurring chiefly in weak or overfed children.*

2. A general view of the pathological relations of dentition was exhibited in the article Age (§ 10.); and, therefore, only that morbid condition of the process which is unattended by disease of an important organ, and is referrible chiefly to this process itself, although often causing disease, or being accidentally associated with it, will be here noticed.

3. i. Dentition, in the most favourable cases, is preceded by slight salivation, by heat and fulness of the gums, occasional flushings, increased thirst, restlessness or fretfulness, and frequent endeavours to thrust things into the mouth, evidently to allay irritation or itching. These symptoms generally appear about the third or fourth month, and precede the appearance of the teeth sometimes by several weeks; and occasionally subside, and reappear shortly before the tooth makes its way through the surface. These signs of disturbance are merely the necessary attendants on the formative processes going on in the gum. But very commonly in children of deficient vital power, and occasionally in those which are apparently robust, or rather plethoric from overfeeding, dentition is either delayed, or is attended by more serious disorder, particularly while the canine teeth are being protruded. In delicate children, particularly those living in crowded towns, and low and ill-ventilated localities, this process is both late and slow in taking place, and is often attended by signs of increased irritation, as redness or tumefaction of the gums; by various cutaneous eruptions; by greater fretfulness, sometimes sickness and feverishness towards night, with restlesness, fits of crying, and sudden startings from sleep. These may be the only ailments, which may subside either partially or altogether as soon as the tooth has passed the surface, and return shortly before others come in sight; but not infrequently, particularly in this class of patients, disorders of the prima via, particularly chronic diarrhœa, slight dysenteric affections, or slow remitting forms of fever, obstruction or enlargement of the mesenteric glands, obstinate and recurring coughs, tubercular degeneration in the lungs or digestive tube, marasmus, &c., supervene more or less rapidly.

4. ii. In children who are of a plethoric rather than of a robust habit of body, and which Dr. J. Clarke has, with much justice, ascribed to overfeeding, the gums are often swollen and painful, the face flushed, the head hot and pained; and all the symptoms of inflammation of the membranes of the brain, or of inflammatory fever with determination to the encephalon, frequently supervene. In them, the symptomatic fever is generally high, and attended by great thirst, nausea, vomitings, constipation, and occasionally by drowsiness or stupor, or by great irritability and restlessness, or by both states of disorder alternately; sometimes by short broken slumbers, from which the child awakens in a state of alarm, or in a fit of crying; or by convulsions, diminished secretion of urine, and other signs of cerebral affection. These are the usual concomitants and symptoms, or consequences, of difficult dentition; but they do not always stop here; for they often run on into more serious disease, — such disease, however, occasionally appearing more abruptly and without these precursory ailments, at least in such degree or duration, as to become objects of attention to the attendants, or to lead them to resort to medical aid. These maladies, although often occasioned either partly or chiefly by dentition, when occurring in children at that epoch; and whether affecting the cerebral; the thoracic, or the abdominal organs, or the skin; are still more frequently independent of this process, and therefore cannot be further alluded to in connection with it, than they have already been in another place (see Age, § 10.); — and, indeed, in most instances in which a close connection between them and difficult or morbid dentition is observed, it is that of concurrent effects of constitutional predisposition and of anterior changes in the organic functions; the local irritation and sympathetic febrile disturbance either exciting morbid action in such organs or tissues as, from hereditary conformation or vice, are disposed to it; or aggravating previously existing disorder, and rendering evident what was before latent, or unobserved. In these cases, therefore, dentition is to be looked upon either as a principal, or as a concurrent exciting cause of many of those diseases which occur at the period of dentition, — but a cause most frequently concurrent with improper feeding and clothing.

5. iii. A natural or slightly difficult dentition may be converted into serious disease, by the not

uncommon habit of giving the infant food whenever it cries from the irritation attending upon the process, and thereby overloading and further disordering the digestive processes, which are already disordered by the febrile disturbance generally accompanying it; whilst determination of the circulation to the head is favoured by the practice of covering the head in-doors or when asleep, and by wearing thick felt hats during mild or warm weather. Brandis believes that difficult dentition is the consequence of obstruction of the salivation which accompanies, and is salutary in, this process: Hecker, that it results from a morbid state of this secretion: Mylius, that it is the effect of disorder sympathetically induced in the liver: Thom, that dentition often occasions an acrimony of the abdominal secretions, which react upon the original seat of disorder, and upon the system generally; thereby rendering it difficult or morbid: Wigand, that the affections attending, delaying, and otherwise disordering, this process, are accidental complications merely; and John Clarke, that all such disorders are commonly the consequences of plethora arising from overfeeding. Now, in all these opinions, there is much truth; and one or other, or several of them, obtain in many instances, more, however, as contingent and related effects of the local irritation, than as causes of the difficulty of the process, — which irritation is the chief or concurrent cause of febrile disturbance, of disordered function, and at last of more palpable disease, according to the condition of particular organs at the time, and constitutional or acquired predisposition.

6. iv. The *irruption* of the *second* or permanent teeth may also be delayed or attended by sympathetic disorders, particularly in persons whose *maxillæ* are insufficiently developed, and when the *dentes sapientes*, and the canine teeth, are appearing. In delicate, nervous, and irritable subjects, swelling of the parotid and sub-maxillary glands, painful and sometimes periodic affections of the ear or face, slight or recurring ophthalmia, irregular convulsions, or epilepsy, and chorea, have, in some instances, been excited by this cause; and have disappeared upon the eruption of the teeth, or the removal of the local irritation.

7. v. The Treatment of difficult dentition should be directed with the intention — 1st, of removing the local irritation; and, 2d, of subduing the sympathetic disorders associated with it. — *A.* The local irritation requires scarification of the gums whenever they are at all swollen or red; and particularly in the second stage of the process, when the tooth has reached the surface, whether there be redness and swelling, or not. The propriety of this operation has been, however, called in question, particularly by Sternberg, Storch, Thom, and Brandis, on the plea of its inutility, of it occasioning ulceration or disease of the capsules of the teeth, and of the cicatrix which is soon afterwards formed being absorbed with greater difficulty than the other parts. But these are by no means valid objections — for its utility has been proved by the experience of Harris, Cowper (*Anat. of the Hum. Body, &c.*), Bromfield (*Observations, &c.* vol. ii. p. 17.), Behdmore (*Treatise on the Teeth, &c.* 8vo. Lond. 1770.), Hurlock, Riedlin, Wedekind, Kennedy, Marley, myself, and most modern writers of experience: and, as to the contingent ulceration of the gums, it seldom or never occurs when the operation is judiciously performed; when the lancet is clean, not carried too deep into the gum, if lancing be performed early in the process; and when its edge is directed rather outwards, as recommended by Mr. Marley. That the cicatrix may oppose the passage of the tooth is certainly not proved; but this, if it did, is no objection, as a repetition of the operation, is often necessary, and generally beneficial. M. Brouzet (*Sur l'Éducat. Médic. des Enfans*, t. i. p. 234.) advises the surface of the gum to be divided, from time to time, by the point of the nail, — a practice which possesses the advantage of not alarming the child, of being easily and readily performed, and of delaying the closing of the divided part. But care should be taken not to perform it until the nails have been well cleaned.

8. The propriety of allowing the infant to rub the gums with hard substances has been questioned by Auzebi, Marley, and others, from an idea that they will hereby become more callous, and absorbed with greater difficulty. But the truth of this is questionable. I believe that substances pressed frequently between the gums, materially lessen the irritation and distressing itching felt in them, and promote the flow of saliva, — results of no mean importance in preventing the supervention of sympathetic disturbance. These results will be ensured, in cases of existing irritation, by frequently moistening whatever substance is thus employed with borax mixed in a little syrup of senna.

9. Besides the above, various other means have been recommended in order to subdue the local irritation: the chief of these are — a preservation of a lax state of the secretions and bowels; leeches, particularly behind the ears (Sydenham, Kortum, Stoll, Leroy, *Journ. de Paris*, 1784.); internal emollients (Paulus Æginata, l. i. cap. 9., and Bekker, *Hermet. Rediviv.* p. 705.); various derivatives (Hufeland); calomel (Mylius and others); the alkalies (Hecker); cold applied to the face (Wigand); opium (Wedekind); and active purging (Vandermonde and Portal, *Anat. Médicule*, t. i. p. 211.). The best means of promoting the secretions and alvine evacuations are, small doses of hydrarg. cum creta, conjoined with the dried sub-carbonate of soda, and, if the state of the bowels requires it, with the pulv. jalapæ, given every night. Leeches behind the ears, and cold applied to the head, should never be neglected whenever the temperature of this part is increased, and other signs of determination of the circulation to it are observed. In such cases, active cathartics, calomel with James's powder, and the rest of the treatment recommended for cerebral diseases, are necessary. Blisters applied also behind the ears are the best external derivatives; but they should be removed as soon as redness is produced. Opium is very seldom admissible; but, if much irritation exist, the tepid bath and syrup of poppies, with small doses of the sub-borate or the sub-carbonate of soda, may be prescribed. If the gums become ulcerated, borax, or sulphate of alumina, or the boracic acid, in honey or syrup of roses, should be employed.

10. *B.* The *sympathetic disorders* should be subdued as soon as they appear. — (*a*) If the head indicate vascular excitement, the means already specified (§ 6. 8.) should be directed; and if

the symptomatic fever, with or without determination to this quarter, be considerable, cooling aperients, and saline and antiphlogistic diaphoretics, are requisite, with the cold affusion on the head, the tepid bath, &c.—(*b*) Constipation, or colicky affections, which are not infrequent during this epoch, should receive immediate attention; and aperients, emollient laxatives,—as castor oil with two or three drops of oleum anisi, hydrarg. cum creta with sub-carbonate of soda,—and, if requisite, purgative and antispasmodic enemata, ought to be prescribed.—(*c*) Care ought to be taken not to check a slight diarrhœa; but if it passes beyond this, emollients, demulcents, refrigerants, diaphoretics, alteratives, tonics, absorbents, &c. should be prescribed, according to the circumstances of the case, and be assisted by the semicupium, warm clothing on the lower part of the body, and occasional doses of rhubarb with magnesia and hydrarg. cum creta.—(*d*) In some cases, both vomiting and purging, or a slight form of cholera, or of choleric fever, supervene; the stools being greenish, spinach-like, and offensive, sometimes terminating in a gelatiniform softening of the mucous surface of the stomach and bowels, as described by M. Cruveilhier; but more frequently without such disorganisation, as M. Guersent has remarked. The classes of remedies just now particularised are also admissible in this affection. (See Choleric Fever of Infants, and Diarrhœa.)—(*e*) Watchfulness, irritability, frequent startings from sleep, with crying, &c. should always be dreaded, especially when the canine or anterior molar teeth are about to appear, as not infrequently being the precursors of convulsions, and indicating much sympathetic irritation of the nervous system with disorder of the digestive organs, and excited circulation in the encephalon. On the other hand, somnolency, particularly in plethoric children, evinces congestion within the head, which may be readily converted into inflammatory action; or it may terminate in effusion of serum: and either condition may usher in *convulsive spasm of the larynx*, the nature and morbid relations of which have been so little understood. In all these varying states and relations of disease, leeches applied behind the ears, lancing the gums, purgatives, emollients, refrigerants, a cautious exhibition of narcotics, laxative and antispasmodic enemata, the tepid bath, cold or tepid affusion on the head, rubefacient and anodyne liniments (F. 298. 308. 311.) rubbed along the spine, and, in delicate children, gentle tonics, are requisite, and should be modified according to the habit of body, and the particular features of the case. (See Convulsions *in Children*; and Larynx—*Convulsive Spasm of*.)—(*f*) The occurrence of obstinate *coughs* at this period should suggest attention to the state of the gums, with the use of demulcents and emollients, conjoined with laxatives, external derivatives, and diaphoretics. Leeches, also, ought to be resorted to, if the cough be attended by heat of skin, quick pulse, accelerated respiration, or if the child be plethoric.—(*g*) *Eruptions*, also, on the head, behind the ears, or on any part of the surface, ought not to be suppressed by external applications; but the functions of the abdominal and depuratory organs ought to be promoted by alteratives and gentle aperients, and the utmost cleanliness of the skin preserved.

11. *C.*—(*a*) During dentition, the head should be washed with cold water night and morning; and no other covering than that with which nature has provided this part should be put upon it when within doors or asleep; and on no occasion should warm felt hats be worn, thin straw or white hats being lighter and cooler.—(*b*) The *diet* should be carefully attended to, and that only allowed which is easily digested; and even it ought to be taken in moderate quantity. The child ought also to be much in the open air; and, if the process threaten much constitutional or local disease, an entire change of air will often be advantageous.

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DIABETES. *Excessive Secretion of Urine.*—Syn. Διαβήτης (a siphon; or from διαβαίνω, *transeo*). *Lienteria Urinalis, Tabes Urinalis, Diarrhœa Urinosa, Hydrops ad Matulam, Profluvium vel Nimia Profusio Urinæ, Cito Emissio Rerum quæ bibuntur*, Auct. Vet. *Polyuria*, Seidel. *Diabetes Anglicus*, Mead and Sauvages. *Phthisuria Saccharina, Diabetes Saccharina*, Nicolas, Gueudeville, Hufeland. *Diabetes Mellitus*, Cullen and Sagar. *Dipsacus*, Hecker. *Phthysuria*, Reil. *Harnfluss, Honigartige Harnruhr*, Germ. *Urinflod*, Dan. *Diabète*, Fr. *Flosso d'Orina*, Ital. *Urine-Flux.*

Classif.—2. *Class*, Nervous Diseases; 3. *Order*, Spasmodic Disorders (*Cullen*). 6. *Class*, Disease of the Excreting Function; 2. *Order*, Affecting Internal Surfaces (*Good*). 1. Class, II. Order (*Author*, in *Preface*).

1. Defin.—*Urine secreted of a sweet taste and violet smell, generally in large quantity, with great thirst, dryness of skin, debility, and emaciation.*

2. This disease was but slightly alluded to by Celsus. Aretæus gave a tolerably complete history of it, which the majority of his followers merely copied. Alexander of Tralles added

nothing to either its pathology or treatment, excepting the drawing of a comparison between it and lientery; and **Aëtius**, taking up the same idea, states, that the one affection differs from the other in as far as that the undigested aliments pass off, in the former by the urine, in the latter by the stools; an opinion which was afterwards adopted by **Fernel**, **Duret**, **Zacutus-Lusitanus**, and others. But **Willis** was the first who advanced a rational theory of the disease. Since his time, opinions as to its pathology have been various, and the remedies recommended still more diversified.

3. Even up to the present day, the term *diabetes* has been applied to various states of disease:—1st. To that consisting chiefly of *diuresis*, or morbidly increased flow of urine, without reference to its quality; 2d. To that in which the urine is voided not only more frequently, and in larger quantity than natural, but also of changed quality, as respects certain of its constituents, viz. albumen and urea, either of which may be in excess; and, 3d, to that in which a saccharine matter is either superadded to the other ingredients contained in the urine, or in part replaces them. To the last of these morbid states I shall limit the term diabetes, conformably with the views of Dr. **Prout** and M. **Renauldin**. The other morbid conditions of the urine will be noticed when treating of the pathology of this secretion. (See **Urine**.) Restricting, therefore, the term diabetes to that state of the urine characterised by the presence of saccharine matter, I have defined it accordingly. In consequence of the very vague ideas which have but too generally been entertained both as to the phenomena requisite to constitute this malady, and as to its various morbid relations, diabetes has generally been considered with reference to the quantity of the fluid secreted, without regard to the circumstance alluded to by Dr. **Parr** and others, and judiciously insisted on by Dr. **Prout**, that the disease may exist for a long time, and the urine be extremely saccharine, without much, or even any, increase of its quantity; and, when the urinary discharge is augmented much beyond natural, that it is much easier to reduce it even to the usual quantity, than to restore it altogether to its natural quality.

4. **Symptoms.**—*A.* The *urine* of diabetic patients is generally of a pale straw or greenish colour; of a faint and peculiar odour, sometimes resembling that of sweet whey or milk, or of violets. Its taste is always more or less saccharine; and its specific gravity usually varies from 1.025 to 1.052. The quantity of urea is generally much diminished in diabetic urine: Dr. **Prout** and Dr. **Henry** have never observed it altogether absent; and there is little or no lithic acid. The usual saline ingredients in healthy urine exist in the urine of diabetes, but in diminished quantity, whilst their relative proportions continue nearly the same. Dr. **Watt** has found a little blood in it; but this is a rare occurrence: it much more frequently contains albuminous matter analogous to that of chyle. Dr. **Henry** has given a useful table, showing the quantity of solid extract in a wine pint of urine of different specific gravities from 1·020 to 1·050. The following abstract of this table will enable the reader to ascertain the quantity of solid matter diabetic urine may contain:—

Specific gravity compared with 1000 parts of water at 60°.	Quantity of solid extract in a wine pint.	Quantity of solid extract in a wine pint, in			
	grains.	oz.	dr.	scr.	grs.
1020	382·4	0	6	1	2
1021	401·6	0	6	2	1
1022	420·8	0	7	0	0
1023	440·0	0	7	1	0
1024	459·2	0	7	1	19
1025	478·4	0	7	2	18
1026	497·6	1	0	0	17
1027	516·8	1	0	1	16
1028	536·0	1	0	2	16
1029	555·2	1	1	0	15
1030	574·4	1	1	1	14
1031	593·6	1	1	2	13
1032	612·8	1	2	0	12
1033	632·0	1	2	1	12
1034	651·2	1	2	2	11
1035	670·4	1	3	0	10
1036	689·6	1	3	1	9
1037	708·8	1	3	2	8
1038	728·0	1	4	0	8
1039	747·2	1	4	1	7
1040	766·4	1	4	2	6
1041	785·6	1	5	0	5
1042	804·8	1	5	1	4
1043	824·0	1	5	2	3
1044	843·2	1	6	0	3
1045	862·4	1	6	1	2
1046	881·6	1	6	2	1
1047	900·8	1	7	0	0
1048	920·0	1	7	1	0
1049	939·2	1	7	1	19
1050	958·4	1	7	2	18

This table enables us to ascertain with considerable precision the quantity of solid matter voided by a diabetic patient in a given time. Thus, suppose 10 pints are passed in 24 hours, of the average specific gravity 1·040, it is evident that this will contain 10 × 1..4..2..6 = 15..7..2, or upwards of a pound and a quarter of solid extract.

5. Besides the *saccharine* condition of the urine, the next most striking and constant symptom is its *increased* quantity. Sometimes the quantity voided is enormous. P. **Frank** details a case in which 52 lbs. were passed in twenty-four hours; and instances are by no means uncommon of from twenty-five to thirty-five pints having been discharged in the same time for weeks, or even months together. In some cases the urine has been said so have been nearly double the quantity of the whole ingesta,—a circumstance which has puzzled physiologists to explain, and has induced some to believe that, in addition to the colliquation of the solids of the body, absorption of moisture from the air actually takes place during the disease in some cases, either through the medium of the respiratory organs or cutaneous surface, or both. I believe, however, that so great a difference between the quantity of the ingesta and urine, as here stated, is extremely rare; although a considerable excess has been proved by Dr. **Bardsley**; and the experiments of modern physiologists have shown that the lungs may absorb moisture from the atmosphere, although the skin may be incapable of doing so.

6. *B.* The *constitutional symptoms* are often ushered in by weariness and aversion from any exertion; by dryness and disagreeable taste in the mouth, the saliva becoming white and frothy; and by a sense of weight, heat, or pain, in the epigastrium, accompanied with alternate chills and flushings, or burnings of the palms of the hands and soles of the feet. To these supervene dryness of the skin, much thirst, costiveness; a saccharine state of the urine, with, and sometimes without, an increased secretion of it; a craving

appetite, and all the symptoms constituting the disease. In many cases, the urine has evidently been saccharine, without much increase in its quantity, long before the attention of either the patient or practitioner had been directed to this secretion. In other cases, the disease attacks more suddenly, generally with dryness of the mouth and throat; dry skin; a feeling of heat and pain in the epigastrium, occasionally with headach, commonly with aching of the back and loins, and pain in the course of the urinary passages; sometimes, as mentioned by BALLONIUS, a sense of cold in the loins is complained of. The urine generally, now much increased in quantity, presents the appearances already described, and deposits no sediment. The breathing is short, sometimes difficult or oppressed, with a short tickling cough; sometimes muco-puriform expectoration, and flying pains through the chest. The desire for drink and food increases; the skin becomes rough or scaly; the tongue either loaded with a dark-coloured fur, particularly at its base, or unnaturally clean, and of a dark red, or purplish red hue; the mouth foul, dry, and clammy; the bowels constipated, the evacuations being difficult, painful, dry, and often without their natural odour. A hay-scent sometimes issues from the body, as first noticed by Dr. LATHAM, and a similar halitus occasionally from the lungs. As the secretion of urine increases, the thirst and hunger become intolerant, and, in some cases, the latter amounts to complete pica, as stated by SPRENGEL. The sense of heat and burning at the epigastrium is exasperated, and extends in the direction of the urinary passages, frequently with phymosis, and some degree of uneasiness or inflammation about the external orifice of the urethra. The secretion of the prostate — but not the semen, as loosely stated by some writers — is sometimes voided after the discharge of urine; and the patient loses his sexual propensities and powers. To these symptoms are generally added, chilliness, and great sensibility of cold; cold extremities, often alternating with burning of the soles of the feet, and slight œdema; acid eructations, flatulence; painful muddy eyes; indistinct vision; headach or vertigo; dyspnœa or cough, and weariness on the least exertion; a sense of sinking at the epigastrium; weight and tenderness about the præcordia; frequent sighing; listlessness; a weak, forgetful, distrusting, anxious, wavering, and peevish state of mind; and great depression of spirits. As the disease advances, the debility and emaciation increase. The skin becomes rugous and scaly, particularly over the abdomen; and the veins large and distended. The fauces and tongue now assume a dark red tint, and are unnaturally clean; the gums spongy or partially absorbed; the teeth loose, and the breath fœtid. In some cases, aphthæ appear in the mouth, and the gums ulcerate. The pulse is at first but little affected. Occasionally it is somewhat hard or frequent, particularly after a meal, or during the febrile exacerbations which usually occur in the advanced state of the malady. In the last stages, the pulse is often quick, sharp; or weak, small, and compressible. It is, however, very variable in different cases, or even in the same case.

7. C. The *blood* taken in the progress of the disease generally separates into a loose, dark crassamentum, containing a smaller proportion of fibrine than the clot of healthy blood; and a whitish or light-coloured serum, resembling whey. Its analysis has been made by several eminent chemists, with the view of detecting saccharine matter in it. NICOLAS and GUEUDEVILLE considered it less animalised, and to contain a smaller quantity of fibrine, than healthy blood; but they found no saccharine matter. WOLLASTON, MARCET, HENRY, and PROUT, also failed in finding any of this matter in the serum; whilst RICHTER conceived that he could detect it by the taste, and, with many other pathologists, believes that it exists in small quantity in the blood, from which it is so constantly eliminated by the action of the kidneys, as never to accumulate to the extent of being detected by chemical agents; or that it is concealed by its combination or admixture with albumen.

8. ii. COMPLICATIONS. — I have scarcely met with a case of this disease which was entirely uncomplicated with pulmonic symptoms; and a similar remark has been made by Dr. BARDSLEY. On this account I conceive that the appellation given to the disease by NICOLAS and GUEUDEVILLE, of *Phthisurie Sucrée* to be extremely appropriate. It should, however, be conceded, that, in many cases, other organs participate in functional, and even in organic disease, particularly the digestive mucous surfaces, and the liver. Indeed, it may be often looked upon as a result of a breaking down of the system, often in consequence of intemperance and illicit indulgences, and exhaustion of the vital energies and assimilative functions, whereby several, or even all, of the organs concerned in the perpetuation of life suffer more or less.

9. iii. TERMINATIONS. — If unchecked by treatment, the debility increases, and pulmonic symptoms, with hectic fever, if they have not already existed, seldom fail of appearing. Occasionally the disease passes into incurable dropsy. Not infrequently the discharge is much diminished, and more urinous, for a short time before death; and, in some instances, the patient is suddenly cut off either by apoplexy, or, as observed by Dr. PROUT, by a peculiar affection of the stomach occasioned by improper food, or by overdistension of this viscus from the excessive quantity of solid and fluid ingesta.

10. iv. DURATION. — Diabetes generally continues for an indefinite time, according to the suddenness or acuteness of the attack, the previous health of the patient, the nature of the exciting cause, the form of the complication, the diet and regimen prescribed, and the means of cure employed. It is always exasperated during cold and moist weather. FRANK states, that it is also worse in autumn. HECKER, THENARD, and DUPUYTREN, have known it to continue, with intervals of improvement, for many years; and OOSTERDYCK states that he treated a case that terminated unfavourably in a few days. When the issue is fatal, it commonly runs its course in a few months, and is seldom of shorter duration than several weeks. I believe that the disease not infrequently exists, for a considerable time at least, without any very sensible increase of the quantity of the urinary discharge, and that it is hence often far advanced before it comes before the physician; and that many cases which have been

believed or stated to have been cured, have experienced merely a temporary benefit,— the malady returning in all its severity from the slightest exposure to its more common exciting causes, or the least want of attention to the requisite diet and regimen.

11. v. ORGANIC CHANGES are by no means constantly observed after diabetes, even in the *urinary organs;* and, when present in them, are not such as may account for the disease; but, as HECKER has justly contended, are rather its effects than its causes. RUTHERFORD, HOME, DUPUYTREN, SEGALAS, and DEZEIMERIS, have found the *kidneys* somewhat enlarged and vascular. BONET, MORGAGNI, MONRO, HERTZOG, CAWLEY, DESAULT, and HECKER, have observed them only more flaccid than natural: and CRUICKSHANKS, REIL, RUTHERFORD, DUNCAN, and BAILLIE, have remarked merely a more turgid state of their blood-vessels; which FRANK and VETTER have stated to have been more lacerable than in the healthy state. In rarer instances, one or even both kidneys have been observed much smaller than usual (P. FRANK, MÜLLER). Hydatids have been found, by BEER, filling and distending them enormously; and calculi have been detected in their pelvis by BAILLOU. RUYSCH and HECKER met with cartilaginous induration of their envelopes and cortical substance; and BRODIE found their structure hard and gristly. MÜLLER mentions enlargement of their nerves; and DUNCAN states that the splanchnic nerves were all enlarged to three or four times their natural size, in a case he has recorded. CONRADI observed the pelvis of the kidneys enlarged so as to contain a small orange; and RUYSCH, RUTHERFORD, REIL, HECKER, and CLARKE, remarked considerable dilatation of the ureters. Increased size of either the pelvis of the kidneys, or of the ureters, or urinary bladder, or even of them all, is not infrequent. In some instances, the bladder is thickened, or contracted, and slightly inflamed, and the prostate enlarged. All the urinary organs, however, have been found as frequently natural, even by the authors now mentioned, as presenting the above changes.

12. Next in frequency to enlargement and flaccidity of the *kidneys*, the *mesenteric glands* have presented morbid appearances. MASCAGNI, JUNCKER, HIMLY, REIL, HOME, CAWLEY, and HECKER, have found them enlarged, obstructed, and otherwise changed; but they also have been met with perfectly natural, by the same authors, as well as by others. RUTHERFORD and MONRO have observed enlargement, softening, and increased vascularity of the absorbent glands generally. The thoracic duct has, in a few instances, been found greatly enlarged and dilated. The *lungs* are, perhaps, as frequently diseased as any other organ. I have never seen a case examined in which they were perfectly healthy. LUROTH, SEGALAS, DUPUYTREN, and HORN, have severally observed tubercles in every stage of their progress; ulcerations, tubercular excavations, hepatisations, and purulent collections or disseminated vomicæ, in the lungs, as well as inflammation of the pleura, and its consequences — adhesions of the pleura, &c., of the pericardium and pleura, serous effusion into the pleural cavity, &c. M. LUROTH detected, in addition to hepatisation of, and excavations in, the lungs, aneurism of the pulmonary artery, the kidneys being sound. Similar states of the pulmonary artery, lungs, and kidneys, were found in a case recorded by M. LOBSTEIN; the lungs being extensively tuberculated, hepatised, and adherent to the thorax, without any manifest thoracic symptoms during life. The *digestive organs* have been next most frequently diseased. DUPUYTREN and SEGALAS have observed a more vascular state than natural of the digestive mucous surface, but without any organic change of the stomach, or intestines, beyond dilatation of the former, and of the duodenum. RUTHERFORD and BAILLIE always found the stomach healthy. The *liver* is more frequently diseased. MEAD states that it was always altered in structure; whilst CULLEN, FRANCK, and HOME, generally observed it natural. CAWLEY and HECKER have commonly detected organic change of this viscus. The *spleen* and *pancreas* have seldom presented any lesion. MICHAËLIS, CONRADI, and HECKER, detected chyle imperfectly mixed with the *blood* in the large vessels and cavities of the heart; and the same authors, and MARSHALL, remarked a chocolate appearance of the blood in all the vessels. Dr. RUTHERFORD states that the blood was black and fluid in all the cases he inspected. In the cases I have seen examined, the mucous surface of the stomach, and of the upper parts of the small intestines, was rugous and vascular. The lungs were congested or hepatised, or tuberculated and excavated, or their pleuræ adherent. The heart was flaccid, soft, and small; the blood dark and semi-fluid; the kidneys congested with dark blood, and somewhat large; the super-renal capsules somewhat indurated; and the renal ganglia more than usually large. But these changes were not uniformly observed; several of them were wanting; and in one or two instances, no decidedly morbid change was detected. Upon the whole, therefore, *post mortem* research has thrown but little light on the nature of diabetes, further than showing that it is the result of a morbid condition of several, if not all, of the assimilating and excreting viscera, and not of any one of them.

13. II. PROGNOSIS and DIAGNOSIS. — *A.* Although patients whose constitutional powers are not greatly reduced, may sometimes live for many years, under judicious treatment, in this disease, yet should the *prognosis* be upon the whole very unfavourable: a cure may, however, be effected by appropriate means adopted early; but this result is comparatively rare, and should never be considered as perfect, unless the healthy quality, as well as quantity, of the urine be altogether recovered, and the strength and bulk of the body be restored. Partial, or even very great, relief is often afforded; but the malady after a while returns, and may proceed without admitting of relief to a fatal issue, or be again and again checked by treatment. Much depends upon the patients themselves, and the strictness with which the prescribed regimen is followed; for, as the disease often originates in excesses, a return to them upon partial, or tolerable, recovery, will bring back the disease. When we find it complicated, as it most commonly is, with organic disease of the lungs, liver, or lymphatic system, a favourable issue cannot be expected. Out of from twelve

to fifteen cases I have treated, I know of two only at the present time that have perfectly recovered. One of these, a married woman, who had previously been attended by an eminent writer on the disease, has continued perfectly well for six or seven years; but although not yet thirty-five, the catamenia, which had disappeared before the developement of diabetes, has not returned. The chances may, perhaps, be estimated at about five or six, or even higher, against the patient; but much will depend upon the quantity and quality of the urine, the progress of the disease, the age, visceral complications, constitutional powers, the state and functions of the skin, the degree of emaciation, and circumstances and character of the patient. I believe that the prognosis should be much more unfavourable where the urine is mellitic, than when it is not so changed, however abundant it may be.

14. *B.* The *Diagnosis* of diabetes mellitus is very readily formed from the sensible properties of the urine. (See the *Symptoms*, § 4.; and art. URINE.)

15. III. CAUSES.—*A. Predisposing.* Hereditary predisposition to this disease has been remarked by several authors. Dr. PROUT has observed it in four instances. ISENFLAMM states that he knew of seven of the descendants of a diabetic patient, who died of the malady. MORTON, BRISBANE, ROLLO, BLUMENBACH, FRANK, STORER, and CLARKE, also furnish similar facts. Diabetes is more frequently met with in the male, than in the female sex; and in persons who either are past the period of puberty, or are advanced in years. The true diabetes mellitus is rare in children, whilst albuminous urine and enuresis are frequent complaints in them. It is much more common in cold and moist countries, particularly those in which the inhabitants live chiefly on rye, or any other vegetable food, or are imperfectly nourished, than in warm and dry climates: and is hence oftener met with in Great Britain, Ireland, Holland, Denmark, and Sweden, than in France and Germany; and in the western, than in the eastern side of this island. J. FRANK states that he saw a greater number of cases of it in Italy, than in any part of Germany. Dr. CHRISTIE observed it more frequently amongst the inhabitants of Ceylon, than in any part of continental India; and imputes it to the moist state of the atmosphere, and their poor vegetable diet. The scrofulous diathesis also predisposes to it.

16. *B.* The *Exciting Causes* are not so precisely ascertained as the predisposing, and their connection with the origin of the disease not so obvious as could be desired; but the following, acting either individually or in conjunction, particularly in the latter mode, may be considered as most commonly productive of diabetes, where a predisposition to it exists, either hereditarily, or from visceral disease:—Continued or repeated exposure to cold and moisture; drinking cold fluids when the body is over-heated; suppression of an habitual perspiration, by whatever means; acidulous or fermented liquors, particularly in malt liquors, cyder, &c.; the exhaustion arising from excessive evacuations and morbid discharges, or from undue sexual intercourse; great bodily and mental exertions; the depressing passions, such as anxiety, disappointment, &c.: and whatever occasions great exhaustion of the powers of life, and of assimilation, is sometimes productive of this malady. Besides these, authors have adduced others as its occasional causes. AUTENRIETH mentions the use of acids and acidulous fluids; BOERHAAVE, LISTER, STEDMAN, and FRANK, the abuse of diuretics and diluents; SYDENHAM and SENAC, excessive horse exercise; RUYSCH, CHESELDEN, and LATHAM, the existence of chronic abscesses and carbuncles; FRANK, the carrying of heavy weights; BENNEWITZ (*Ossann's Jahresbericht, &c.* July, 1828.) relates the case of a female who was affected by the disease during two successive pregnancies; PLOUCQUET and others have observed it result from falls, and injuries on the back, loins, and hips; and BAILLOU, BRENDEL, WEBER, LANZONI, and FRANK, the drying up of chronic eruptions, exanthemes, fluor albus, &c., or the suppression of hæmorrhages. It may be suspected, however, of the last named phenomena, that, instead of being causes of the disease, they are actually the effects resulting from the internal changes constituting its early stages—diabetes, or the internal changes leading to it, having commenced previously to the disappearance of the external disorders—for it has been often remarked that sores heal rapidly during the disease. Diabetes may, indeed, be frequently considered a remote effect in the chain of morbid causation; functional or even structural change of the assimilating viscera, particularly the lungs and digestive organs, existing for many months, or even years, before the increase, or the saccharine state, of the urine has attracted attention.

17. *C.* The *proximate cause* of diabetes is still extremely obscure, although several authors of deserved reputation have endeavoured to explain it.—1st. It has been ascribed to a morbid condition of the kidneys. This is the oldest opinion that has been entertained respecting its nature. The Greek writers considered diabetes to be owing to relaxation, debility, and increased irritability of these viscera; the irritability being, as they supposed, the cause of their morbid activity; and the relaxation and debility allowing the more liquid parts of the blood to pass through the excretories without restraint or change, and, consequently, in a crude state, like the food in lientery. The supporters of this doctrine adduce, in proof of it, those morbid changes that have been observed in the kidneys, without agreeing amongst themselves as to the particular changes which really constitute the disease. Some consider that they are essentially inflammatory. But they overlook the facts, that decided and unequivocal marks of inflammation of the kidneys are seldom found in diabetes; and that when these marks are observed in other diseases, they have uniformly been accompanied by a diminished, or an entirely suppressed, instead of a more profuse, secretion of urine. Others, who conceive that diabetes is a disease seated in the kidneys, ascribe it to spasm, without stating in what tissues, or vessels, this spasm exists; and even without mentioning precisely whether the spasm is in the vessels of the kidneys, or of other parts. CAMERARIUS first proposed this doctrine, in which he was followed by CULLEN, who afterwards abandoned it, and ascribed it to "some

fault in the assimilatory powers." **Gueudeville**, likewise, partially adopted this opinion, but conjoined it with another which I shall have to examine in the sequel, and stated that this disease "is a consumption arising from a continual spasmodic deviation of the unassimilated nutritive juices to the urinary organs." Here, however, the spasm is not ascribed to the tissues of the kidneys, and we are left quite in the dark as to the parts thus spasmodically affected. But amongst the various supporters of the doctrine that the kidneys are the seat of diabetes, there is not one who has attempted to name the specific affection or state of those organs which constitutes the disease. **Ruysch**, **Ritter**, **Stoeller**, **Cruickshanks**, **Richter**, and **Good**, have considered it as resulting from a morbid affection of the kidneys; and several of them, besides others whom it is unnecessary to adduce, have contented themselves merely with stating this very vague opinion. **Stoeller** and **Richter**, however, conjoin this undefined "morbid affection" with depraved function of the skin; and **Good** considers that the morbid state is one of excitement. He remarks that the whole of the phenomena, observed during the progress of diabetes, are consequent upon the renal mischief, and that it is a much less complicated disease than has hitherto been imagined. How far this is correct, the experienced practitioner may decide for himself; but it is certainly not in accordance with my observations, nor with the closest attention I have been able to give the subject. It is certainly indisputed, and the observation of the most experienced physicians have placed the matter beyond a doubt, that other organs and parts manifest disease very early in diabetes, and that the assimilative viscera and circulating fluids are very evidently affected. Now, the kidneys, being strictly eliminating organs, or emunctories, removing matters which are hurtful to the system from the blood, how can we conceive that excitement of these organs, the proximate cause of diabetes according to Dr. **Good** and others, can occasion a diseased state of other organs, diminished assimilating function, and especially a morbid condition of the blood itself, the morbidity of which it is the chief office of these organs to prevent, or to remove if in any way produced? Dr. **Wollaston** attributes diabetes to a change in the animal electricity of the kidneys; and M. **Dupuytren**, to their perverted, equally with their increased action. But the remarks now offered are also applicable to these opinions; for the cause of these morbid states must be sought after either in the kidneys themselves, or in some other quarter. If the kidneys be primarily affected, how can the early disorder of other viscera be explained?

18. 2d. The disease has been imputed to a morbid action of the stomach, or some of the assistant chylopoietic viscera. This opinion has derived support from the feeling of heat, pain, and sinking, which is so generally and so early complained of in this disease; as well as from the morbidly increased action of these viscera, particularly of the stomach. Dr. **Mead** ascribed it to the liver, from observing the disease most frequently in those who were addicted to the intemperate use of spirituous and fermented liquors. Dr. **Rollo** confines it chiefly to the stomach; and states that it proceeds from "an increased action and secretion, with a vitiation of the gastric juice, and probably too active a state of the lacteal absorbents, — while the kidneys and other parts of the system are affected only secondarily." According to this hypothesis, the chyle is imperfectly formed, and exists in the blood either in a saccharine state, or in such a condition as to be readily converted into a saccharine fluid during its circulation, and its passage through the kidneys. That it is not at once converted into a sweetish fluid, and therefore that the morbid secretion is not elaborated in the stomach and other digestive viscera, seem to be proved by the fact, that no saccharine matter has been satisfactorily detected in the blood, although **Wollaston**, **Marcet**, **Bostock**, **Dupuytren**, and **Thenard**, and more recently MM. **Henry**, **Soubeiran**, **Vauquelin**, **Segalas**, and Mr. **Kane** have endeavoured to ascertain its existence. It may, however, be admitted, that the saccharine matter may exist already formed in the blood, as is sometimes evidently the case in respect of urea, as has been demonstrated by MM. **Prevost** and **Dumas**, and be so rapidly eliminated by the action of the kidneys, as never to accumulate it so as to admit of detection by analysis; or it may be granted, that the first part of the morbid process commences in the digestive viscera, and that it is afterwards fully perfected in the kidneys. But these are merely probable suppositions, which scarcely admit of proof.

19. 3d. It has been supposed that a saccharine and imperfectly elaborated chyle, instead of being conveyed into the blood, is carried to the kidneys and urinary bladder, by a retrograde action of the absorbents. This hypothesis was first proposed by Dr. C. **Darwin**, who conceived, that when a greater quantity of inebriating fluid than usual is drunk, at the same time that the lacteals are quickened in their power of absorbing it, the urinary branches of the absorbents, which are connected with the lacteals by many anastomoses, have their action inverted, and a large quantity of pale, unanimalised urine is hereby discharged. Where the ingurgitation of fermented or other exciting liquors is continued, or occurs often, the urinary absorbents at length gain a habit of inverted action whenever the lacteals are stimulated; and a whole or great part of the chyle is then carried to the bladder without entering the circulation, and the body becomes emaciated; and the urine is necessarily sweet, and the colour of whey. Numerous objections may be offered to this hypothesis. It is altogether founded on postulata; and, moreover, it proceeds on the gratuitous idea, that the chyle is generally a saccharine fluid, nearly, if not altogether, resembling the diabetic discharge. Now, such is not the case; for chyle contains but little saccharine matter. Besides, the structure of the lymphatics, and their connection with the vascular system, is completely opposed to their retrograde action. P. **Frank** has very materially moulded this hypothesis, and into a more plausible form, by relinquishing the untenable idea of a retrograde action of the absorbents. He conceives that diabetes is a disease of the lymphatic system, conjoined with excitement of the urinary organs; that it proceeds from stimulation of both these by some virus formed within, or introduced from

without, and producing a reverse effect to that occasioned by the virus of the rabies canina; so that, while the latter produces a dread of liquids, the former excites a constant desire for them. In support of this doctrine, he adduces the opinion of the ancients, that diabetes is occasioned by the virus of a serpent called *dipsas*, and hence the common name generally given by them to this malady. That it may be excited by the bite of reptiles, or even higher animals, is not impossible. Dr. Latham mentions a case produced by the bite of a rat; and it not infrequently arises, as remarked by Cheselden and Latham, from carbuncles, or chronic abscesses, where it may be presumed that a partial absorption of morbid matter takes place. Frank supposes that the morbid matter occasioning the disease acts by inducing a morbid irritability of the lymphatic system, owing to which every other part of the frame is exhausted of its nutrition; that the fluids, thus morbidly absorbed, are rapidly conveyed into the circulation, particularly the chyle to the kidneys, which concur in the morbid action; that the cutaneous and other exhalations are hence completely arrested; and that the flux of saccharine urine is thus produced. This is certainly a more plausible doctrine than that on which it is evidently founded; but, even conceding the morbid excitement of the lymphatic system and of the kidneys, the origin of this excitement in a morbid virus or matter is much more gratuitous, and the cause of the saccharine properties of the urine is wholly unexplained.

20. 4th. Dr. Clarke, and more recently Dr. Marsh, impute the disease, in a more especial manner than has been done by other pathologists, to the cutaneous surface, which, indeed, may be viewed as an important organ of the animal economy; and they consider it "as a sweat driven in upon the kidneys, where this morbid determination keeps up a profuse discharge." This opinion seems to have been partially entertained by Ritter, Stoeller, and Richter, who, whilst they ascribed diabetes, as we have seen, in part to a morbid state of the kidneys, conceived that a depraved function of the skin was also concerned in its production. There can be no doubt that suppression of the cutaneous functions is an early change, and that it contributes to the perpetuation and aggravation of the malady.

21. 5th. One of the most plausible theories which have been advanced, is that which refers diabetes to a dyscrasy or morbid condition of the blood, arising from a diseased state of the assimilating powers of the frame. This doctrine is not materially different from that which was proposed by Willis and Sydenham, and more recently by Place, Desault, and Latham; and, as well as being more accordant with the procession of morbid phenomena, has a more obvious relation to the exciting causes, terminations, and morbid appearances in fatal cases, than any of the theories now reviewed. According to this doctrine, diabetes is not to be imputed to the derangement of a single organ or system of vessels merely, but rather to defective energy of the whole frame, particularly impeding the advanced stages of the processes of digestion and assimilation. That the blood is not in a healthy state, and the chyle imperfectly assimilated to it, as well as the crasis of the whole circulating mass deficient, is sufficiently manifested in the appearances which the blood presents when taken from the patient during life, and when observed in the vessels after death. Upon examining specimens of the blood taken from diabetic patients, MM. Henry and Soubeiran found the quantity of its fibrine and albumen one fourth less than is assigned to healthy blood by Berzelius and Darcet; and Bachetoni remarked that oil of almonds passed off with the urine, unchanged in its passage through the digestive and assimilating organs. The state of the blood, also, in the veins and cavities of the heart, is somewhat peculiar — generally being semi-fluid, sometimes resembling treacle, and very dark-coloured. That this state is not primary, but is a consequence of deficient vital energy of the organic nerves, and of the assimilating organs, in connection with impeded exhalation and secretion from all surfaces and organs excepting the kidneys, seems most probable. Hufeland supposes, that, owing to the changed action of the kidneys, and the unassimilated state of the chyle with the blood, the former of these fluids, with the nutritious parts of the latter, containing the saccharine principles, are excreted with the urine, and occasion the phenomena of the disease. This opinion, in its general bearing, comes as near the truth, perhaps, as any that has been offered; but still it admits of reference to antecedent disorder.

22. 6th. I should, therefore, conclude, from what I have seen of, and thought respecting, this malady, that, owing to deficient or exhausted influence of the nerves supplying the assimilating viscera and vascular system, the chyle is not readily or perfectly changed into blood, nor are the nutritious parts of the blood attracted by, and identified with, the various structures; that this imperfect performance of the assimilating functions must necessarily be attended by deficiency of all the secretions and excretions excepting the urinary, particularly the cutaneous, the pulmonary, the intestinal, and the hepatic, as both classes of functions are under the influence of the organic system of nerves. Thus a redundancy of imperfectly elaborated blood must be the result, a portion of which will be carried off by the kidneys, as in ordinary circumstances; for as long as these emunctories retain their powers, they are the appropriated safety-valves of the vascular system, by eliminating both the watery, the saline, and other elements of the blood, when they become excessive. These states and changes account for the simple excess of urine; the more watery parts of the blood being carried off by the kidneys, instead of being secreted from the cutaneous, the respiratory, and intestinal surfaces; and the action of the kidneys, being once excited in the manner now stated, becomes excessive, from the superabundance of the imperfectly elaborated and stimulating matters contained in the blood circulating through them. The saccharine matter in the urine evidently arises from the morbid condition of the blood originating in the manner now explained; the unassimilated elements readily assuming the mellitic combination, probably in consequence of the state of vital action exerted by the kidneys during their excretion. What the precise nature of this action may be, cannot be easily ascertained; but it probably is,

as Dupuytren and others have supposed, a perverted as well as an excited action: the morbid condition of the organic nervous influence, and of the blood, changing the vital functions of the kidneys, in addition to simply exciting them. That a morbid state of organic nervous influence throughout the tissues, and of the blood, exists in this disease, is shown by its principal phenomena, and by the fact that diffusive inflammation followed bleeding in two instances recorded by Dr. Duncan.

23. IV. Treatment.—The means of cure employed in this disease have been varied exceedingly, according to the opinions entertained respecting its nature. Many remedies have also been resorted to empirically, without reference either to their mode of operation, or to the presumed pathology of the malady. As it will be useful to the practitioner, I will first exhibit a succinct view of the different modes of treatment which have been recommended, venturing such remarks as my experience enables me to suggest; and afterwards I shall proceed to state the plan which has seemed most successful in my practice.

24. i. *View of the Treatment proposed by Authors.* — In estimating the degree of success which writers state they have derived from various remedies, it should be kept in recollection that other morbid states of the urine, besides that which is characterised by the presence of saccharine matter, particularly those consisting of excess of albumen and urea in, conjoined with augmented discharge of, the urine, have been considered as constituting a variety of diabetes, — the *diabetes insipidus*; and that, owing to this circumstance, many of the methods of treatment which have been stated to have cured diabetes, have been successful only so far as respects a less difficult and dangerous form of disease, and one which is frequently no closer related to true diabetes than as respects the increased quantity of the urinary secretion.

25. *A. Astringents* have been recommended by many writers, and various remedies belonging to this class have received approbation. The greater number of the mineral, and some of the vegetable acids have been used, either alone or in combination with other medicines.—*α*. Gilby, Earnest, Scott, and Brera have employed *nitric acid*, sometimes with much benefit. Brera recommends the internal use of this acid to be conjoined with mercurial inunction. I have given it combined with *opium*, the patient at the same time using the warm bath and animal diet. Some advantage was derived from this treatment for a considerable time; but the disease returned. I have likewise conjoined the *nitric* with the *muriatic* acid, in equal quantities, and employed it internally combined with opium, and externally in the form of the *nitro-muriatic lotion* applied warm over the epigastrium and loins. This has certainly appeared a very beneficial treatment; but as it was not confided to alone, but conjoined with other means which I shall adduce in the sequel, it is difficult to determine the degree of benefit derived from it.

26. *β.* The *phosphoric acid*, both alone, and in combination with, or neutralised by, other substances, has been recommended by Nicolas, Gueudeville, Latham, Sharkey, and Venables. Dr. Sharkey speaks favourably of the *phosphate of soda*. It has the advantage of preserving a free state of the bowels, whilst it tends, in a very marked manner, to diminish the flow of urine: but I believe that more advantage will be derived from it, as well as from the *phosphate of iron*, which has been strenuously recommended by Dr. Venables, in the excessive discharge of albuminous urine,—an affection frequently observed in young subjects,—than in the disease under consideration.

27. *γ*. The *sulphuric acid and its salts* have received the sanction of numerous writers, who have generally prescribed them in combination with preparations of *cinchona*, *aromatics*, *opium*, &c. I have exhibited the acid with the *sulphate of zinc*, and with the *sulphate of quinine*, as one part of the treatment adopted in the cases which have occurred to me; and, as from a large proportion of the means employed, benefit was derived from it for some time. The *sulphate of alumina* has been prescribed in a variety of forms, but most frequently dissolved in whey, by Dover, Brocklesby, Herz, Lindt, and many others. But its want of efficacy has been satisfactorily shown by Brisbane, Oosterdyk, and Frank; the last of whom carried the use of it to a large extent, in order to test its effects. Dr. Wintringham applied the sulphate of alumina, dissolved in vinegar, as an epithem on the loins. The *sulphate of iron* and the *super-sulphate of potash* have likewise been employed in this disease. The latter of these possesses the advantage of acting as a deobstruent aperient, and is hence often of much service. Dr. Fraser entertains a favourable opinion of the former.

28. *δ*. Several other astringents, as *sumach*, *kino*, *catechu*, in the form both of tincture and decoction, *lime-water*, &c., have been recommended; but they seem to have been of no further service than auxiliaries to other means. The *aqua calcis*, used as common drink, either alone or with milk, has been praised by Willis, Schutz, Jarrold, Fothergill, Watt, and Frank. Although astringents have been very generally employed, some doubts have been thrown upon their utility by Amatus Lusitanus, and others. Sydenham, however, expresses himself favourably respecting them when conjoined with aromatics and opiates,—a mode of exhibiting them which is certainly the most preferable, and the only way in which I have employed those now enumerated (§ 42.) in this disease.

29. *B. Tonic astringents* have received much attention, particularly from Stoeller, Ferriar, Morton, Fahner, Frank, and others. Amongst those, *cinchona*, in decoction with the *elixir of vitriol* or with *simarouba*, or in powder with the *uva ursi*, in doses of a scruple or half a drachm of each, with half a grain or a grain of *opium*, and repeated every four or five hours; and the *preparations of iron*, either alone or with cinchona or *cascarilla*, deserve a particular notice. Tonics with catechu, kino, &c., and the vegetable bitters, as well as the mineral tonics, in conjunction with opium, have severally been employed, particularly by Shee, Abrahamson, Roeber, &c. Under this head, I may notice the use of astringent wine, as having been recommended by Celsus, and, in modern times, by Willis and Morton.

30. *C. Diaphoretics* have been very generally

recommended, and particularly by Roeber, Stoeller, Werner, M'Cormick, and Marsh, with the view of restoring the suppressed functions of the skin, and diminishing the determination towards the kidneys. Amongst the various medicines which have been exhibited with this intention, the *pulvis ipecacuanhæ comp.* and *opium with antimonials* deserve a particular notice. I have prescribed these with full doses of *camphor* on several occasions with much benefit. This last named substance has been much praised by Shee and Richter, who recommended it to be exhibited in large doses in mucilaginous emulsions. Of this class of remedies, there is certainly none more decidedly useful than the *warm* and *vapour baths*. Salzburger, Ritter, Werner, Richter, Heineken, and Marsh justly place much reliance on them. To these may, perhaps, be added the *sulphur baths;* but I have had no experience of them. The promotion of a free and even copious *perspiration* by the constant use of woollen clothing next the skin, and active exercise, has been noticed by several writers; and, I am enabled to add, forms a most important part of the regimen to which diabetic patients should be subjected.

31. *D. Alvine evacuations.*—*a. Emetics* have been employed with advantage in some cases by Ettmuller, Riverius, Brendel, Michaëlis, Rollo, Wintringham, Watt, and Richter, particularly early in the disease. It is chiefly at this period, or in subjects whose constitutions still retain some degree of vigour, that they are admissible. *b. Purgatives* have received less attention from writers on diabetes than they deserve. Trnka, however, has passed very just encomiums on them; and they have likewise received some notice from Dr. Marsh and a few other recent authors. I believe them to be very generally beneficial, not only in as far as their occasional exhibition may remove morbid accumulations, and obviate constipation, which is so frequently an attendant on the disease, but also as regards a continued and decided use of them, so as daily to procure two or three copious evacuations. With this view, full doses of *rhubarb*, or of the *infusion of senna*, with compound infusion of gentian, or of the *phosphas sodæ*, should be exhibited daily. There are few remedies that deserve a more favourable notice in diabetes than *rhubarb*. It received the warm approbation of Baglivi and Lister, who recommended it in conjunction with *aromatics*, and of Brocklesby, Morton, Buchwald, and Harris. Dr. Baillie prescribed it with laudanum. I have employed it frequently as an aperient, both in powder and infusion; and combined it with vegetable tonics, aromatics, and opium, with the intention of promoting the digestive and assimilating powers. It is one of the best medicines that can be used in this disease.

23. *E.*—*a. Sulphur* and the *alkaline sulphurets* have received a deservedly favourable notice from Autenreith, Redfearn, Bang, Rollo, and Michaëlis. The *hepatised ammonia* was particularly noticed by Dr. Rollo, with the view of furnishing to the system, along with a liberal animal diet, the elements which seemed to be wanting to the chyle and to the urinary secretion. The free use of *sulphur*, so as to produce an aperient effect, is often beneficial. I have seen much advantage derived from it; and I conceive that the sulphurets are often serviceable as adjuvants to the general plan of treatment. Dr. Christie mentions them with approbation in his interesting details of cases treated by him in Ceylon. *b. Cantharides*, either in the form of powder or tincture, exhibited alone or combined with *camphor*, have received a favourable notice from Morgan, Werner, Herz, Stoeller, &c. Wolff combined them with *cinchona:* but Brisbane, Busch, and Frank derived no advantage from them.

33. *F. Opium*, either in substance or tincture, alone, or combined with tonics and aromatics, or with astringents or with diaphoretics, with *camphor*, *valerian*, or with *assafœtida*, or even with the *sulphurets*, according to the varying features of particular cases, is, perhaps, the most generally applicable and beneficial remedy that has been employed. But it should be given in large doses, and its use persisted in, and so managed as not to prevent a free and continued action on the bowels. If the dose be sufficiently large, it will seldom constipate the bowels in this disease, or impede the action of purgatives and aperients; and it will determine more sensibly to the skin, while it will more decidedly diminish the urinary flux than when prescribed in small doses. It is chiefly to Archigenes, Sydenham, Buckwald, and Warren, and afterwards to Gueudeville, Heineken, Money, Marsh, Carter, and others, that we are indebted for proofs of the great advantage to be derived from this medicine in diabetes.

34. *G. a. Mercurial inunction* has been recommended by Scott, Lubbock, and others. Brera prescribed it at the same time with the internal use of nitric acid; and Frank, with tonics: he even advised it to be carried so far as to produce salivation. When diabetes is complicated with hepatic disease, this treatment will be requisite. I have seen it employed with some advantage, alternated with the *nitro-muriatic* lotion applied on the hyponchondria and loins, in a case of this description. When biliary derangement exists, the occasional exhibition of a full dose of calomel with rhubarb, or the compound extract of colocynth at bed-time, and followed, in the morning, by an active purgative medicine, will be found of service.—*b.* Medicines that act as *diuretics* may be supposed to be contra-indicated in diabetes. But they are not necessarily injurious; for, if they have a beneficial effect on the body generally, or on the visceral disorders with which diabetes is associated, they may even be of benefit; and if the action of such medicines on the kidneys be energetic, they may change the morbid action induced in these organs by the disordered state of organic nervous influence and of the circulating fluid, and in this way prove beneficial. Among the different substances that have a diuretic effect, *colchicum* may be mentioned as having lately been sometimes prescribed in this disease, but chiefly on account of its sedative operation. It may be of some service in promoting the biliary secretion, in increasing the quantity of urea and uric acid in the urine, and in diminishing the irritability of the frame. Its good effects, however, require confirmation, and may probably be ensured by combining it with ammonia or its preparations, or with camphor.

35. *H. Nutrients* in various forms have been

strenuously recommended by Home, Rollo, Dupuytren, Nicolas, Oswald, Frank, Christie, and many others. Dr. Rollo particularly insisted upon the nearly exclusive use of animal food, with the view of resisting the secretion of saccharine matter, and furnishing the elements of urea and the animal salts to the blood. There can be no doubt that the greatest benefit has been derived from this treatment. It should, however, be admitted, that it often fails; and that, when it is too freely indulged in, it sometimes occasions a diarrhœa, which exhausts or even carries off the patient. With a knowledge of these occasional effects, Dr. Prout recommends it with very judicious restrictions, and to be taken with a moderate proportion of farinaceous food; and Frank advises, in addition to it, the decoction of Iceland moss, or of the althæa officinalis with milk.

36. *I.* Besides the foregoing, various other remedies have been prescribed. The *cuprum ammoniatum* (in doses of half a grain to a grain twice or thrice a day), *myrrh*, and *valerian*, have received the commendations of Frank and Richter. *Assafœtida* has been favourably noticed by Wolff; and *tartar emetic* combined with *valerian* has been directed by Richter. A combination of assafœtida with myrrh and valerian has also been very generally used by Continental physicians. Dr. Watt has employed the *volatile alkali*; and it will certainly often prove an useful adjuvant, combined with other medicines, particularly with opium, or with tonics or diaphoretics; and be serviceable in combating such nervous or sinking symptoms, as sometimes occur in the course of the disease. It may, moreover, counteract the tendency to the formation of saccharine matter, and promote the animalisation and assimilation of the chyle, as well as the formation of urea. Even *urea* itself has been recently tried as a remedy in this disease by Segalas, but instead of changing the mellitic urine, it was found to increase its quantity. Hufeland, and some other physicians in Germany, have prescribed recent *ox-gall* in as large doses as the stomach will bear, and frequently with the effect of causing the disappearance of the saccharine state of the urine during its use; the disease, however, has generally returned upon discontinuing the medicine.

37. *K. Blood-letting* in diabetes had been mentioned as far back as the Commentaries of Archigenes on Aetius; and it was noticed as an occasional measure by Le Fevre and Rollo. But it is to Dr. Watt that we are indebted for the introduction of this practice in a most decided form. This physician advises full and often-repeated blood-lettings, with the view of arresting the inflammatory determination to the kidneys. This plan has been adopted by Dr. Satterly and others with manifest advantage, whilst it has failed with some. Drs. Prout and Hufeland consider it beneficial only in the early and acute stage of the disease. Dr. Marsh offers a similar opinion. And my own experience would lead me to employ it, only when the disease is recent, the strength of the patient not much exhausted, and the pulse remains of good strength and volume. When the patient feels much pain in the loins, an additional indication is thereby furnished for resorting to it. Sir David Barry has advised frequent cupping on the loins in the course of the disease, — a practice which is deserving of adoption in cases of the above description, or when much pain is complained of in that situation. I have found advantage from the application of a number of leeches on the epigastrium, and cupping on the hypochondria, both in relieving the sense of pain and heat complained of in the stomach, and in lessening the quantity of the urine, and of the saccharine matter contained in it. Depletion, as Dr. Watt first observed, certainly improves the state of the blood, and renders the weak and imperfect crassamentum more firm.

38. *L. Blisters and external applications* of a derivative and irritating nature have been recommended by Ritter, Desault, Van Swieten, Whytt, and Reidlin, to be applied chiefly to the loins and epigastrium. Frank and Weiz advise repeated blistering of the sacrum. *Setons, issues*, and *moxas* have likewise been employed in the latter situation; but I believe without any permanent benefit. The most efficacious modes of derivation are the vapour bath, warm alkaline baths, and thick woollen clothing worn next the skin. *Topical applications* of a tonic and an astringent nature have also been directed to be kept constantly applied to the loins by Whytt, Reidlin, and Van Swieten. Of these, however, I have had no experience. I have, however, prescribed liniments to this situation, as well as to the epigastrium, generally composed as follows: —

No. 165. ℞ Liniment. Camphoræ, Olei Terebinth., Linimen. Saponis Comp., āā ʒj.; Pulv. Opii Puri ʒj.; Pulv. Capsici Annui ʒss.; Olei Limonis ♏xxx. M. Fiat Linimentum, cum quo assiduè illinantur regio lumbalis et spina dorsi mane nocteque.

I have found this application extremely useful in the excessive discharge of albuminous urine, which is not infrequently met with in young subjects. I have likewise employed it with other means in the mellitic state of urine; but it was difficult to determine what share of the temporary benefit derived was owing to it.

39. ii. *The Treatment in which the Author is most disposed to confide.* — It is not easy to form to ourselves precise and rational indications of cure in this disease, particularly as opinions respecting its nature are not supported by a sufficient number of accurately recorded facts; nor are those which have been observed so constantly present, or so uniformly grouped, as to permit us to draw indisputable pathological inferences, for the basis of therapeutical indications. I shall therefore state succinctly the method of cure, which is sanctioned by my own observation, and by experienced physicians. The remark which has been made by Dr. Parr, Dr. Prout, and others, that this disease should be viewed in a two-fold light — namely, 1st, as respects its saccharine state independently of the increase of its quantity; and, 2d, as regards this state in connection with an augmented secretion — should be kept constantly in recollection; and, although the discharge of an increased quantity of urine, in addition to its saccharine condition, generally indicates either a more advanced or a more severe state of disease, yet we should be aware that the saccharine change is the more important of the two; and that it is much more easy to diminish the quantity than to improve the quality of this

secretion. Dr. Prout justly remarks, that it is exceedingly doubtful if there be any remedy that exerts a specific action in improving the quality of the urine — at least, there is none at present known. The improvement can therefore be attempted only by those agents that have a tendency — 1st, *to restore the general health and assimilative energies of the frame; and, 2d, to diminish the quantity of the secretion.*

40. These ends are generally all that we can reach; and, by attaining them, we sometimes advance still further, and thereby improve the quality also of the discharge. There are, however, other subordinate objects, which, although they might be accomplished with the fulfilment of the chief ends now proposed, yet often require an immediate regard; and the more especially as their attainment very frequently promotes the chief intentions of treatment. These are — *a.* To remove a congested, loaded, or oppressed state of the vascular system, and reduce the quantity of the circulating fluid more nearly to a level with the amount of vital power and assimilative function. *b.* To promote and improve the secretions employed in digestion, and excite the exhalations and secretions from the respiratory and intestinal surfaces. *c.* To remove the unperspirable and harsh state of the cutaneous surface, to increase perspiration; and thereby to lessen the determination to the kidneys. *d.* To diminish the morbid sensibility and irritability of the frame, with the other morbid phenomena allied to them. The means which we employ in attaining both the principal and the subordinate objects which I have now stated, will, of course, vary exceedingly, according to the particular features of individual cases, and the constitutional powers of the patient. The previous duration of the disease — the degree of activity it may present — the age of the patient — the state of the circulation — and the particular condition of the urine, as respects both its density and quantity, should individually and collectively be considered by the practitioner as circumstances calculated greatly to modify the means of cure; and should weigh so entirely with the judicious, as to lead them to consider even the best practical suggestions which can be offered as applicable merely to some cases, and as requiring to be varied, and rendered appropriate to others. It must be obvious that we cannot endeavour to attain, *seriatim*, the ends now proposed; for a judicious and an active treatment will often fulfil two or more of them contemporaneously.

41. I have already noticed the opinions of Dr. Watt and others (§ 37.) as to blood-letting. In cases of recent occurrence, with an active state of the circulation, and pain in the loins, with much heat and pain in the epigastrium, or where congestion or oppression of the vascular system exists (§ 40. *a*), I consider general blood-letting, repeated as often as the circumstances may require, as requisite to fulfil the intention stated above (§ 40. *a*). The frequency of, or even the propriety of repeating, the operation will depend much upon the appearances of the blood drawn, and the effects produced by it. If the crasis of the blood be weak — the coagulum being loose, and dark — I have seen no benefit derived from it until the vital energies have been somewhat excited by appropriate means. If, however, doubts respecting the propriety of its repetition be entertained, cupping upon the loins, or upon the hypochondria, or the application of leeches on the epigastrium, according as the sensations of the patient may direct the practice, should be substituted, and carried to an extent, as respects quantity and frequency of repetition, on which the observation of the practitioner will enable him to decide. In protracted cases, when the disease occurs in old subjects, when the debility is great, and the pulse quick, small, or weak, general blood-letting is not productive of benefit. If, even in these cases, much pain, tenderness, or fulness be complained of about the epigastrium, local depletion, as now recommended, may be employed in its vicinity. It will often happen that blood-letting—especially general blood-letting—will, at first, either be inadmissible, or of little or no service; and yet it will subsequently prove of very great benefit, after the other parts of the treatment have prepared the system for it. This fact should not be overlooked at any period of the disease, even in the most unpromising cases.

42. Immediately after depletion, a complete evacuation of the bowels, either by a dose of castor oil, or by the following pill, repeated according to circumstances, will generally be directed with advantage: —

No. 166. ℞ Extr. Colocynth. Co. ʒss.; Pulv. Ipecacuanhæ gr. iij.; Saponis Castil. gr. viij.; Olei Crotonis Tiglii ♏ ij. M. Fiant Pilulæ xij. Capiat binas statim, et repetantur binæ quartâ quâque horâ donec plenè dejicerit alvus.

The bowels being freely evacuated by the above means, assisted in more obstinate cases by enemata, of which I believe those with from one to two ounces of turpentine to be the most efficacious, a full dose of opium should be exhibited, or of the pulvis ipecacuanhæ compositus, or the following: —

No. 167. ℞ Camphoræ rasæ gr. v.; Pulv. Ipecacuanhæ gr. j.; Pulv. Opii gr. ij.; Pulv. Myrrhæ gr. vj.; Mucilag. Acaciæ, vel Conserv. Rosar., q. s. ut fiat Bolus, statim sumendus.

After having taken this, the patient may have recourse either to a warm or to a vapour bath, have the surface always well rubbed with the flesh-brush on leaving it, and clothe himself in a warm dress with flannel next the whole of the skin. The opium, or the Dover's powder, or the bolus above directed, and the warm bath, may be repeated at intervals varying according to the circumstances of the case. The effect of this treatment is manifested in the state of the skin, and urine, as well as in the feelings of the patient. But, in cases characterised by much debility and irritability, we must vary the means. Here the sulphate or ammonio-tartrite of iron, or the sulphate of zinc, or the sulphate of quinine, combined with opium and capsicum or camphor, and exhibited either in the form of pill or of draught, will often prove of advantage.

No. 168. ℞ Infus. Rosar. Co. ℥jss.; Quininæ Sulphatis gr. ij.; Zinci Sulphatis gr. ss. ad j.; Acidi Sulph. Arom. ♏ xx.; Tidct. Opii ♏ xx.—xxx.; Tinc. Aurantii Co. ʒj.; Tinct. Capsici ♏ xx. M. Fiat Haustus, ter quaterve in die capiendus.

In cases of the same description, Dr. Prout recommends an electuary with the *carbonas ferri*, and *opium*, and *albumen ovi*. I have given the carbonate of iron in the form of electuary, with confection of senna, &c. (see F. 79. 86. 93.), in order to preserve a freely open state of the bowels. The combination of tonics and astringents, or even of astringents with aperients, is sometimes useful. I have obtained advantage from the following: —

No. 169. ℞ Pulv. Cinchonæ, Pulv. Rhei, āā ʒ ss.; Magnes. Carbon. ℈ j.; Aquæ Cinnamom. ʒ jss.; Confect. Arom. gr. x. M. Fiat Haustus, bis in die sumendus. *Vel*,

No. 170. ℞ Pulv. Rhei, Pulv. Uvæ Ursi, āā ʒ jss.; Aquæ Cinnamom. ℥ jss.; Confect. Aromat. gr. xij. M. Fiat Haustus, bis terve quotidiè sumendus.

The above may also be taken with a full dose of laudanum, when the bowels have been sufficiently acted upon, and the irritability of the system is considerable. In order to counteract this symptom, I have on some occasions had recourse to the *hydrocyanic acid* in doses of from one to three minims, in a mucilaginous mixture, or employed it in combination with iron or with zinc, in the state of a *prussiate of iron* and *prussiate of zinc*. The following was lately prescribed, and continued for several days, with advantage: —

No. 171. ℞ Camphoræ rasæ et subactæ gr. xv.; Oxydi Zinci ʒ ss.; tere cum Mucilag. Acaciæ vel Tragacanth. ʒ ss.; Aquæ Cinnamom. ℥ ivss.; Acidi Hydrocyanici ♏ xv. Misce. Fiat Mist., cujus capiat cochlear. j. vel ij. larga, ter quotidiè, prius agitatâ phialâ.

43. Whilst tonics or astringents are employed, either of the kind now noticed, or of any other description, the bowels ought to be kept open, not less than two or three satisfactory evacuations being daily procured; and this action should be maintained perseveringly for a long time, either by purgatives given in the intervals between the exhibition of the tonics; or, what is preferable, in conjunction with them as in Form. 266., or as follows: —

No. 172. ℞ Infus. Gentianæ Comp. ℥ j.; Infus. Sennæ Comp. ℥ ss.; Tinct. Rhei ʒ ij.; Spirit. Ammon. Arom. ʒ ss. M. Fiat Haustus, bis terve quotidiè sumendus.

No. 173. ℞ Decocti Cinchonæ, Infus. Rhei, āā ʒ vj.; Tinct. Cinnamom. ʒ jss.; Ammoniæ Carbon. gr. vj. M. Fiat Haustus, bis terve quotidiè sumendus.

As the difficulty of preserving an open state of the bowels is great in this disease, the quantity of purgative ingredients in the above medicines may be increased, or others added, according to circumstances. Care should always be taken never to employ for this purpose saline medicines, excepting the phosphates in large doses, which are sometimes of service. Even calomel should be avoided, unless conjoined with opium, or when we find it requisite to act decidedly on the biliary secretions, and then a single full dose of it may be given. If the biliary organs require the use of deobstruent remedies, the *hydrargyrum cum creta* is the most suitable preparation in this disease; or the internal or external use of the nitro-muriatic acids (§ 34.), or mercurial inunction. I have seen benefit derived from *iodine*, and *nux vomica*, or strychnine, in several cases of diuresis, but I have had no experience of them in diabetes.

44. In addition to the foregoing, and contemporaneously with the use of purgatives, diaphoretics, opiates, &c., external irritation, and derivation may be resorted to. For this purpose repeated vesication on the loins or epigastrium, or the excitement of artificial eruptions on these parts by croton oil rubbed upon them, seem to be the preferable means. But, to be productive of any service, the external irritation should be kept up for a very considerable time, or frequently repeated. If the above measures fail, we must have recourse to such of the other medicines as have been noticed (§ 24—38.), as may seem most appropriate to the person under treatment; and we should not be content with trying the various remedies in succession; but so associate, and contemporaneously prescribe them, as to bring their combined action to bear upon the morbid conditions which seem to exist in particular cases.

45. Whilst these means are being employed, the *diet and regimen* of the patient should be regulated, and consist chiefly of animal food, with a small proportion of farinaceous substances. He should abstain from vegetables, particularly those which are sweet and acescent, and from fruits. Animal and farinaceous food are much more easily digested and assimilated than the more bulky vegetables; and, partly on this account, are more suitable to the patient. For, although the demand for food is urgent, owing to the call made upon the digestive organs to supply the waste arising from the nature of the discharge, and to the erethismal state of their mucous surface, yet the digestive and assimilative energies of the frame are defective, and insufficient for those articles which require much change to be effected in them during the process. Beside, animal food furnishes fewer of the constituents of saccharine matter. Much attention should also be paid to the quantity as well as the quality of both the solid and fluid ingesta. Dr. PROUT has very judiciously remarked, that the constant and pressing desire for food generally induces the patient to take by far too much at one time, the consequences of which are not only unfavourable to his recovery, but sometimes dangerous and even fatal: and he refers the greater number of sudden deaths, which is not an infrequent termination of this disease, to errors either in the quality or quantity of the food, or to both, the patient having been frequently cut off after what is commonly called a hearty meal. The diet, therefore, as to its quantity and description, should be strictly regulated by the physician, be chiefly of a solid form, and not taken at longer intervals than four or five, nor at shorter than three, hours. The patient ought also to abstain, to the utmost of his power, from all drink for an hour or two after his meal. Animal food ought not to be taken oftener than twice in the day; and beaf-steaks or mutton chops, under-done and plainly cooked, are perhaps the preferable kind. The other meals may consist of any of the farinaceous articles with milk, or occasionally of eggs.

46. The drink also should receive particular attention. Dr. PROUT expresses himself favourable to the use of distilled water. Of this, however, I have had no experience. Lime water, either alone or with milk, alum whey, and the Bristol Hotwell and Bath waters, have been long celebrated in this disease, and are certainly amongst the most quenching drinks that can be employed in it. I have prescribed the mineral acids, and particularly the nitric and muriatic acids, with seeming advantage. In a case which lately occurred to me, I employed a weak solution of the boracic acid, and afterwards of the sub-borate of soda, with much benefit. In order that the patient may not be induced to drink too largely, the beverages prescribed should be taken in a tepid state, and his resolution be fortified against the seduction of his appetites. In ad-

dition to this diet and regimen, he should remove to a dry and warm situation, should constantly wear woollen next his skin, and keep up a free cutaneous discharge by suitable exercise. Even when he is convalescent, or apparently recovered, this regimen ought not to be abandoned; and the bowels should be constantly kept open by the tonic aperients already recommended, or by an electuary composed of sulphur, magnesia, and confection of senna. Sulphur, in full and frequent doses, is one of the best remedies we can resort to either in the disease or during recovery, as it acts both on the bowels and skin. Errors in diet, or in the use of beverages, and even a single irregularity as to fruit and vegetables, will hazard a return of the disease.

47. iii. *Treatment in the dark-skinned varieties of the species.*— I have had occasion to see two cases of this disease in negroes; and Dr. Christie has given the particulars of ten or twelves cases which he treated among the natives of Ceylon. In all his cases, as well as in mine, the disease was evidently owing to a very poor vegetable diet, and a moist state of the air. Dr. C.'s cases terminated favourably from the use of animal food, the sulphuret of potass, lime-water, and purgatives. The cases which occurred to me were treated with tonics, purgatives, the warm bath, and diaphoretics and narcotics: they derived some benefit, but circumstances occurred which prevented me from knowing the ultimate results.

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DIAGNOSIS. See Symptomatology.

DIAPHRAGM (from διαφράσσω, I separate).—

Syn. Ὑπόζωμα, Aristotle. *Διάφραγμα, Φρένες. Septum transversum*, Lat. *Der Zwergmuskel*, Ger. *Diaphragme*, Fr. *Midriff*, Eng.

1. When we consider the musculo-tendinous structure, and varied connections of the diaphragm,— that it is situated between three serous membranes, and attached to the vertebral column, the ribs and their cartilages,— that it is traversed by the most remarkable nerves and blood-vessels of the body, and itself provided with important vessels and nerves, — that it is in more or less direct contact with the lungs, the heart, the liver, stomach, pancreas, kidneys, and spleen; and intimately associated by its nerves, its vessels, and its functions, not only with the mucous surface of the respiratory organs, as well as with these organs themselves, but also with the digestive and large secreting viscera,— its importance in a pathological point of view must be apparent. The extent of its organic and functional relations are such, that agents acting on either the external or internal surfaces of the body must necessarily influence its actions. It cannot, therefore, be a matter of surprise to find it frequently subject to disorder; but I am at a loss to conceive the reason for the very general neglect with which even its most serious diseases have been treated. This can be owing only to the circumstance of their being imperfectly understood, or referred to some one of the

adjoining organs, and viewed as merely symptomatic or secondary affections.

I. Inflammation of the Diaphragm. — Syn. *Diaphragmitis* (Hildenbrand, J. Frank, &c.); *Paraphrenitis, Paraphrosynis* (Rufus Ephesius, et Auct. Vet.); *Diaphragmite, Paraphrénésie*, Fr.; *Zwergmuskell-Entzündung*, Ger.

Classif. III. Class, I. Order (*Author*).

2. Defin. — *Acute pain and constriction of the lower part of the thorax, extending to the back and loins, increased upon respiration and raising the body erect, with singultus, convulsive distortion of the angles of the mouth, and very acute inflammatory fever.*

3. i. Seat. — Inflammation of only the musculo-tendinous structure of the diaphragm is a very rare disease, particularly in its primary form; and I believe is very seldom met with, excepting upon the disappearance of rheumatism from some external part, or after penetrating wounds and other external injuries. As a consecutive or secondary affection, and especially in conjunction with inflammation of one or more of its serous membranes, it frequently occurs, although often either entirely overlooked, or mistaken for inflammation of some one of the adjoining viscera. The advantages, of being able to distinguish it in practice are not diminished on this account; and it often becomes of great importance to ascertain its existence, whether as a primary or as a consecutive disease.

4. I believe that inflammation may originate in the cellular tissue connecting the serous membranes reflected over the diaphragm to its musculo-tendinous structure, in which case the disease will extend chiefly to either one or both of those surfaces; but that, in the more frequent states of diaphragmitis, — particularly its consecutive form, — the inflammation commences in one of the serous surfaces, and extends thence, through the medium of the sub-serous cellular tissue, more or less to the other structures of the organ.

5. ii. The Causes of diaphragmitis, particularly in its consecutive forms, are generally those which are productive of pleurisy, pneumonia, hepatitis, or peritonitis. In addition to those, I may adduce others, which have a more evident influence in producing this disease, viz. punctured and other wounds; external injuries and fractures of the lower ribs; concussions of the trunk, particularly from missing steps on descending stairs, or from falling upon the hips, immoderate laughter; violent retchings; continued crying and weeping; obstinate singultus; currents of cold air, when the body is perspiring; the incautious use of cold drinks, ices, &c.; the suppression of painful emotions; violent efforts of any description; the repression or metastasis of rheumatism; the stoppage of accustomed discharges; and the drying up of old eruptions or ulcers by external applications. Instances of the occurrence of inflammation of the diaphragm from the repression of rheumatism have been recorded by Paterson (*Mem. of Med. Society of London*, vol. v. No. 32.) and Portal (*Anat. Méd.* t. ii. p. 444.); and from healing up old sores, suppressing gout, &c., by Aaskow (*Act. Reg. Soc. Med. Hafn.* t. i. p. 205.), Boisseau (*Nosographie Organ.* t. xi. p. 620.), Wendt, Selle, and others. Hildenbrand considers the habit of wearing tightly laced corsets a cause of the disease. I doubt not that it is, at least, a predisposing cause.

6. iii. Symptoms, Complications, &c. — *A.* Either after rigors, chills, horripilations, &c., or consequent upon disease of some one of the abdominal or thoracic viscera, the patient experiences violent, sharp, burning pain, tension, and cord-like constriction, at the lower part of the thorax, particularly beneath the sternum and hypochondria, and stretching to the loins, — increased and descending lower during inspiration — diminished and ascending during expiration, — augmented by coughing, sneezing, fulness of stomach, and pressure on the abdomen; likewise by vomiting, by the expulsion of the fæces or urine, and by bending the trunk of the body in any direction. The breathing is short, frequent, anxious, small, and performed entirely by the intercostal muscles, the abdomen being nearly motionless. The hypochondria fall inwards, or are retracted, and, with the precordia, are sensible to pressure. There are frequently painful and difficult deglutition, referrible to the lower part of the œsophagus and cardia; great anxiety, with occasional interrupted sighs; singultus, particularly towards the close of the disease; involuntary retraction of the angles of the mouth, or risus sardonicus; delirium, which is sometimes furious; spasms, or great feebleness of the muscles of the abdomen and extremities; irritable, porraceous vomiting; leipothymia or sinking, &c. The pulse is always frequent — at first strong and hard, afterwards small, more quick, wiry, &c. The bowels are constipated and urine in small quantity; thirst is at first urgent, afterwards not felt; and restlessness, particularly as the disease advances, is extreme.

7. *B. Complicated Forms.* — *a.* The symptoms vary considerably with the surface of the organ chiefly affected, and according as inflammation of an adjoining viscus may have preceded, accompanied, or followed that of the diaphragm. When inflammation implicates the diaphragmatic pleura, or extends to the lungs, mediastinum, or pericardium, we must expect to observe many of the symptoms of those diseases; particularly those consisting of lesion of the function of respiration. Percussion will give out a somewhat duller sound than natural; cough will be more or less complained of, and be frequently attended with a watery mucous expectoration.

8. When the inferior surface of the diaphragm is inflamed, the stomach and liver seldom escape participation in the disease. In this case the pain and sensibility of the hypochondria are increased, and the stomach is more severely disordered. When the muscular or tendinous structures are chiefly implicated, the complaint assumes its most violent forms; and, owing to the nerves of the organ being then more seriously affected, the sympathetic effects of the disease, as delirium, the sardonic spasm of the muscles of the countenance, singultus, dysphagia, anxiety, retraction of the hypochondria, spasm of the abdominal muscles, &c. are more constant and severe.

9. Diaphragmitis is sometimes complicated with, at other times consequent upon, acute rheumatism; and I believe that it may be associated both with inflammation of the convex and

posterior part of the liver, and with acute rheumatism, in the same case and at the same time. I am at present attending a patient, in whom there is every reason to infer the existence of this very complicated malady; and am of opinion that similar associations of the disease would have been more frequently remarked in practice, if the severity of the rheumatic pains, and of the remote symptoms caused by inflammation of the diaphragm, had not masked those more directly connected with the affected organ, and thereby misled the practitioner.

10. There are several symptoms which have been adduced by authors as pathognomonic of this malady, but which are not uniformly observed: thus, Stoll, Aaskow, and Boisseau have found delirium frequently wanting altogether: and, in several cases, in which I have seen the disease complicated with hepatitis and pleuritis, — particularly the former, — neither delirium, nor the cynic spasm, was present. I agree, however, with J. P. Frank (*De Curand. Morb. Hom.* t. ii. p. 193.), in considering these symptoms as being more frequently met with in this disease, than in any other affecting the viscera of the large cavities, and particularly when the tendinous part of the organ is affected.

11. *C. Course and Termination.* — The course and progress of this disease are generally acute. If it terminate not in resolution within a few days, it produces either adhesion to the adjoining viscera, or disorganisation, followed rapidly by death. When adhesions form, signs of *chronic* disease of this and the adjoining viscera continue after the subsidence of the acute symptoms; but when disorganisation and gangrene supervene, the patient experiences, after a very few days, a sense of suffocation, sinking, with singultus, extreme frequency and smallness of pulse, faintings, &c., speedily followed by dissolution.

12. *D.* The *morbid Appearances* most frequently found after diaphragmitis are, effusions of coagulable lymph, or of sero-albuminous fluid, or of both, on either of the surfaces of the organ, generally with adhesions, more or less extensive, to the adjoining viscera; increased redness and vascularity, or deepness of colour, of one or more of the different structures composing the organ; false membranes upon its surfaces; portions of it ulcerated, or of a dark colour, softened, and nearly disorganised; and, more rarely, sphacelated in parts, infiltrated with pus, or containing one or more distinct purulent collections.

13. iv. Prognosis. — Recovery from this malady should be considered as very doubtful, until we have very unequivocal symptoms of resolution, without any sign of the extension of disease to the organs situated on either side of the diaphragm. *a.* The circumstance of diaphragmitis arising from external injury, or the extension of inflammation from the pleura and pericardium; the early accession of urgent anxiety, followed by delirium; singultus, and sobbing; depressed, collapsed, and anxious countenance, with spasms of the muscles of the face; irregularity, intermission, and smallness of pulse; coldness of the extremities; leipothymia; difficult deglutition; frequent and irritable vomiting, and restlessness; absence of thirst; convulsions; convulsive, frequent, and laborious respirations, &c.; are very *unfavourable* symptoms. *b.* The subsidence of the urgent symptoms; an improved state of the pulse, and appearance of the countenance; the occurrence of any of the critical evacuations, or restoration of the suspended secretions, or a sound and refreshing sleep; a more natural respiration, and the absence of serious disease of the collatitious viscera; are the most *favourable* circumstances.

14. vi. Treatment. — The intentions of cure are the same in this as in other acute inflammations. The antiphlogistic treatment promises us the principal aid; but to be successful, it must be employed early in a decided manner. Full *blood-letting* from the arm, the patient being in a semi-recumbent posture, until a decided effect ensues — until syncope approaches, but is not induced — as recommended in another place (see Blood, § 64.); afterwards *cupping* on the loins and back, on each side of the spine; *leeches* applied near the anterior insertion of the diaphragm; *purgatives*; refrigerating *diaphoretics*; febrifuge diluents; external fomentations and cataplasms: tepid baths; purgative, and subsequently emollient enemata, with complete stillness and silence; should be employed according to the exigencies of the case. The practititioner ought not to be deceived by the presence of singultus, and the great depression of the powers of life so frequently attendant on the disease; and thus be led to the exhibition of antispasmodics and stimulants, when opposite measures are requisite. Nor should he be induced by the state of the stomach, and of the matters discharged from it, to exhibit emetics. When vomiting is present, it should be allayed; and, for this purpose, as well as to prevent the formation of coagulable lymph and adhesion between the surfaces of the organ and the adjoining viscera, large doses of *calomel and opium* — from ten to twenty grains of the former, and from one to three of the latter, either with or without from one to three grains of *camphor* — should be exhibited, and repeated at intervals of six or seven hours; the first dose being given immediately after the first blood-letting. The danger of the disease requires prompt and powerful agents; and, after depletions, the combination of calomel, opium, and camphor, is particularly serviceable.

15. When the disease is associated with inflammation in the adjoining viscera, the calomel should be carried so far as to affect the mouth; and if the *pleura* or *pericardium* be also diseased, antimonials and diuretics ought to be added. If the convex or posterior parts of the *liver* and *peritoneum* be also inflamed, the use of mercurials are also required, and with nearly the same intentions, viz. to prevent adhesions, and procure the absorption of effused fluids. If the disease be associated with *rheumatism* or *gout*, then, after local depletions, active mercurial cathartics, and derivatives applied to the joints, colchicum, with large doses of soda or potash, or with magnesia, ammonia, or camphor, may be exhibited.

16. It often happens, that after the inflammation in this organ and its collatitious viscera is subdued, considerable irritability, evinced by the occurrence of singultus upon taking substances into the stomach, continues for some time. To remove this, the use of gentle tonics, combined with anodynes and antispasmodics, as the infusion of calumba, with opium, sub carbonate of

soda, hyoscyamus, or camphor, is generally required, or of the infusion of valerian, or of the oxides of zinc, or the sub-nitrate of bismuth, or musk, &c. *Convalescence*, and the *regimen* of the patient, are to be managed precisely as in other inflammatory diseases.

17. II. Diaphragm, Organic Lesions of. — i. Perforation of the diaphragm is not an uncommon consequence of abscess of the liver, pointing up towards the thorax. In the great majority of such cases, adhesion of the adjoining surfaces of the liver and diaphragm has preceded the perforation; and, when this has been accomplished by the disorganising process following the inflammation excited in the diaphragm, the contents of the abscess pass either into the cavity of the thorax, or, adhesion of the inflamed diaphragm to the lungs having also taken place, into the lungs, whence it may be expectorated, and the patient even recover. (See Liver — *Abscess of the.*) Instances have even occurred of the abscess having thus traversed the diaphragm, and opened into the pericardium.

18. Perforation of the diaphragm has likewise taken place from abscess of the spleen, and from ulcerations of the stomach, which had adhered to the diaphragm. It has very seldom been observed that the perforation of this organ has occurred in an opposite direction, namely, from the thorax downwards. But Portal (*Anat. Méd.*) met with a case, in which an imposthume of the lungs opened through the diaphragm, and burst into the abdominal cavity. The diaphragm may likewise be perforated in this direction by aneurism of the aorta. Meckel also found *ulceration* of the diaphragm, apparently resulting from chronic inflammation, in the dissection of a maniacal patient.

19. ii. Rupture of the diaphragm sometimes occurs from falls; violent succussions of the trunk; vomiting, or severe retchings; blows on the abdomen, back, hypochondrium, or epigastrium; suppressed efforts, and sudden muscular exertions. M. Percy states, that a young female, suppressing the pains of child-birth, uttered a plaintive cry, had her mouth hideously distorted, and shortly afterwards expired, giving birth to a child. On dissection, the diaphragm was torn obliquely in the fleshy part of the left side. Two thirds of the stomach, with a portion of the omentum and colon, had passed through the rupture into the thorax. On another occasion, M. Percy found, after a fall, the ribs of the patient very prominent; the abdomen, at its upper part, sunk inwards; and the countenance presenting the risus sardonicus. He prognosticated a rupture of the diaphragm, which was found after death. (Percy, *Dict. de Scien. Méd.* t. ix. p. 214.) Rupture of the diaphragm is not necessarily immediately fatal. Boisseau (*Nosog. Organ.* t. ii. p. 623.) mentions a case, where a patient lived six months, and followed his occupations, after the occurrence. A person having taken an emetic, died soon afterwards with convulsions, the cynic spasm of the muscles of the face, &c. On examination, the tendinous part of the diaphragm was found torn near the part where the intercostal nerve passes through it.

20. iii. Various Morbid Productions have been found more or less intimately connected with the diaphragm, in persons who had experienced disorder of the respiratory function. These have consisted of *tumours* of various descriptions, encysted or unencysted; *cartilaginous* or *osseous formations*, and *earthy concretions* in its surfaces (Schreiber, Leveillé, Voigtel); fleshy tumours; and large *fibrous cysts* containing hydatids (Portal), or merely an aqueous or serous fluid. It is not infrequently found partially *displaced* in aneurism of the heart and aorta. Cases of this description are recorded by Vetter and Blancard. It is also pressed high into the thorax by enlarged or suppurated liver.

21. iv. Spasmodic Actions. — The diaphragm contracts forcibly in crying, coughing, vomiting, during the expulsion of the excretions, child-birth, and tenesmus. It contracts slowly, but forcibly, and is rapidly followed by relaxation, in sighing. It contracts for a longer time, and is relaxed more quickly in yawning. The contraction is more rapid, forcible, and interrupted by closure of the glottis, in hiccup, sobbing, &c.; and sneezing is owing to convulsive contraction of the diaphragm, followed soon afterwards by convulsive action of the expiratory muscles. In all these, the other inspiratory muscles co-operate more or less energetically.

22. The motion of the diaphragm is generally more frequent, irregular, and unequal, than natural, in convulsive diseases, particularly when the irritation is propagated to this part, or influences the functions of the parvagum, by being extended to the top of the spinal chord, &c. This is evinced in epilepsy, hysteria, pertussis, &c. The contractions of the organ are still more disordered in tetanus, they being nearly permanent about the fatal close of the disease. Death is occasioned by this, rather than by any other circumstance; the permanent spasm of the diaphragm and other respiratory muscles preventing the expulsion of the inspired air, and consequently producing a variety of asphyxy. (See art. Hiccup.)

23. v. Paralysis of the diaphragm is incompatible with the duration of life, and can occur only during the last moments of existence. It may be induced by the inhalation of noxious gases into the lungs, and from virulent poisons, thus constituting another form of asphyxy: and it is produced by injuries of the medulla oblongata, or in its vicinity, or by whatever may interrupt the functions or injure the parvagum. I have met with a case where it followed, at a remote period, fracture by muscular action of the dentated cervical vertebra, as verified on dissection by Professor R. Quain and myself.

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DIARRHŒA.—SYN. (Διάῤῥοια, from διαῤῥέω, I flow through, διὰ and ῥέω). *Diarrhœa Cacatoria*, *Rheuma Gastros*, Galen. *Rheumatismus*, Alexander of Tralles. *Defluxio*, Cælius Aurelius. *Alvi Fluxus*, *Ventris Profluvium*, Auct. Lat. *Cours de Ventre*, *Dévoyement*, Fr. *Der Durchfall*, *Bauchfluss*, *Durchlauf*, Germ. *Diarrea*, Ital. *A Purging*, *Looseness*, *&c.*

CLASSIF.—2. *Class*, Nervous Diseases; 3. *Order*, Spasmodic Affections (*Cullen*). 1. *Class*, Diseases of the Digestive Function; 1. *Order*, Affecting the Digestive Canal (*Good*).

1. DEFIN.—*Frequent, loose or fluid alvine evacuations, without tormina or tenesmus.*

2. Although diarrhœa may occur as an independent or unassociated complaint, yet may it supervene as an occasional or even common symptom, in several maladies. Dr. CULLEN, whilst he admitted diarrhœa as a specific disease, yet viewed it as always symptomatic of other pathological states. That it is so in most cases, cannot be doubted; but that it also is, in some instances, an *idiopathic* disorder, in respect both of its primary manifestation, and of its independence of inflammatory action of the intestinal mucous surface, or of disease of immediately related organs, is equally certain; and fully demonstrated by its causes and progress,—by the effects of treatment, and the appearances observed in fatal cases.

3. I. SYMPTOMS AND VARIETIES OF DIARRHŒA.—This disease is usually preceded by various dyspeptic symptoms, sometimes by slight nausea, frequently by uneasiness in different parts of the abdomen, by flatulence, and by pain, particularly before an evacuation takes place. In severe cases, the abdomen is somewhat distended, and tender to the touch, and its temperature increased; and occasionally the stools are preceded by much pain in the tract of the intestines, and accompanied with vomiting, or with fainting or leipothymia; they are always without effort, but are rarely involuntary. Each evacuation relieves for a time the patient's uneasiness, which, however soon returns. The discharges are usually copious, offensive, and feculent at first; but they soon become more scanty, watery, or mucous—often in proportion to the frequency of the calls to evacuation, after each of which the patient feels more and more weakened. Their number varies from three or four to twenty or thirty in the twenty-four hours, but they are not so often voided in the night as in the day. At the commencement of the attack, and in slight cases, the pulse is generally not materially affected; but when vomiting or much griping pain is present, it is often increased in frequency. At an advanced period it is usually small, weak, and somewhat accelerated; the countenance being pale, the body somewhat emaciated, the strength diminished, and the skin dry and very sensible of cold. The tongue is often loaded from the commencement in the middle and at the root, and sometimes is red at the point and edges. The urine is generally scanty throughout the complaint. The evacuations vary remarkably as to the nature of the matters composing them, their colour, consistence, smell, and other appearances, not only in different cases, but even in the same case, at different periods. Nosologists have generally divided the disease into varieties or species, founded on the different states of the discharges. But this is not a satisfactory basis of classification, as the appearances of the evacuations do not depend upon definite pathological conditions, although furnishing important indications of the seat and state of disease. The most common of these appearances are, the *feculent*, which usually precedes the others; the *bilious*; the *mucous*; the *serous*; the *chylous*, or *white*; and the *lienteric*. But every practitioner must have observed that not only will these discharges present themselves during different periods of the disease, but that two or more of them may co-exist; thus, the evacuations are not infrequently, at the same time, bilious, mucous, and serous; or feculent, bilious, and mucous; or watery and bilious.

i. IDIOPATHIC DIARRHŒA. — CLASSIF. II. CLASS, I. ORDER (*Author*).

4. DEFIN. — *Copious, feculent, and frequent evacuations, sometimes preceded by griping, and unattended by fever.*

5. *A. Diarrhœa of Irritation.* — This form of the disease comprises most of the cases denominated feculent by authors, and termed *D. Stercorea* by SAUVAGES, *D. Crapulosa* by CULLEN, and *D. Fusa* by GOOD. (*a*) It is usually *caused* by any stimulating or irritating substance received into the stomach; by too great a variety or quantity of food or drink, or even by a small quantity of that which is unwholesome, or which may disagree with the patient's diathesis, or with the existing state of the digestive organs; by indigestible vegetables, particularly cucumbers, melons, salads, &c.; by various acid fruits, particularly plums, pine-apples, &c.; by acidities generated in the *primæ viæ*, and the quality of the nurse's milk; and by dentition in infants.—(*b*) The *symptoms* in this variety are frequently nausea; severe griping pains before each evacuation; foul, or loaded tongue; copious feculent stools, afterwards becoming frothy, watery, or mucous, and exhaling an offensive or sour odour; the pulse and temperature of the surface being but little affected.—(*c*) This form generally ceases spontaneously, owing to the evacuation of the offending substances; and the digestive functions are soon afterwards restored, if its cause be subsequently avoided. It may, however, excite some of the other pathological states to which this disease has been ascribed, and be thereby prolonged; or it may terminate in organic change.

6. *B. Diarrhœa of Relaxation associated with Irritation* (*Diarrhœa à Cibis corruptis*, SENNERT) —(*a*) may be *caused* by whatever relaxes the tone of the intestinal mucous surface, or of its vessels, by its septic influence, whilst it excites the peristaltic actions of the tube, as stale fish, high game, or any animal food approaching to putridity, over-ripe or decayed fruit, stale vegetables, &c., and putrid, stagnant, marsh, or running waters containing animal matters or exuviæ, or vegetable substances in a state of decomposition, or of minute division or solution, &c.—(*b*) The *symptoms* are, copious, feculent, offensive, and, in some instances, involuntary motions, becoming scanty, watery, and frothy, and preceded by borborygmi or gurglings in the abdomen — seldom by gripings or nausea; a natural or slightly foul, mucous, slimy, or clammy tongue; diminished temperature of the surface;

and a soft, weak, or a natural, or but little accelerated pulse. — (*c*) This variety either ceases as soon as the matters which occasioned it are expelled, or it assumes more severe characters. When it has been produced by unwholesome water, and particularly if this cause continues to operate, it frequently passes into the *mucous* variety, or into dysentery, or into a chronic state; and sometimes a low remittent form of fever supervenes, terminating in disease of the mucous follicles, and ulceration of the bowels, &c.

ii. Symptomatic Diarrhœa. — Classif. III. Class, I. Order (*Author*).

7. Defin.—*Frequent, and generally morbid, alvine evacuations, from disease of the bowels or collatitious viscera, often attended by fever.*

8. *A. Diarrhœa from acrid, or an increased Secretion of, Bile* (the *D. Biliosa*, of authors). — *a*. Bilious diarrhœa is a very common variety, particularly during summer and autumn, and amongst Europeans who have recently migrated to warm or intertropical countries. It also frequently occurs in persons who live intemperately, in respect either of eating or drinking; and in those who are harassed by anxieties or the depressing passions, especially if they be of the melancholic temperament. It may be induced also by violent fits of anger, or other intense emotions: an aperient or purgative medicine may even excite it, if the biliary organs be loaded at the time with morbid or acrid bile, and the liver be in an excited state. It appears probable that irritation of the duodenum, in the vicinity of the common duct, may be propagated to the liver and pancreas, occasioning an increased secretion both of bile and of pancreatic fluid; and that, whilst such irritation augments the vermicular action of the upper part of the intestinal tube, thereby accelerating the passage of the chyme along it, the quantity or quality of the secretions poured into the duodenum excites the internal surface of the bowels, increasing both their secreting and contractile functions.—(*b*) The *evacuations* in this form of diarrhœa are at first feculent, and commonly of a green or greenish yellow, or even bright yellow colour: they afterwards become more fluid and watery, vary in colour, and are mixed with thin feculent matter. If the diarrhœa continues, they frequently contain yellowish or greenish yellow mucus, either in large thick masses, or in thin, glairy, or gelatinous pieces, which fall to the bottom of the pan, and admit of being drawn into long filaments; or they consist chiefly of a serous fluid, coloured by the bile, and presenting either a glairy mucus or albuminous flocculi, evidently owing to the irritation caused by the acrid bile having been followed by increased vascular action in the intestinal mucous surface, and an excited state of its follicles. — (*c*) In this case, *bilious* may pass into *inflammatory* diarrhœa, in either of its forms, as constituting the two following varieties; or into dysentery.

9. *B. Diarrhœa from Determination to, or increased vascular Action in, the intestinal mucous Coat — Inflammatory Diarrhœa* (the *D. Serosa*, of Sauvages, Good, &c.; *D. Aquosa*, of Hoffmann). — (*a*) This variety is *caused* by whatever occasions a greater flux of blood to the intestinal mucous surface, and a freer exhalation and secretion than are natural, by obstructing these functions on other surfaces: as the application of cold, in any form, to the cutaneous or pulmonary surface, or to both at once; various mental emotions, as anxiety, fright, surprise, &c.; or even the slightest agitation of mind in some constitutions; cold acid beverages, or ices, taken when the body is overheated or perspiring; the suppression of chronic eruptions, or copious or accustomed perspirations or discharges; the disappearance of abscesses, drying up of old sores, and checked menstruation or lochial discharge.— (*b*) The *evacuations* are watery or serous, mixed with thin feculent matter, and exhibit every shade, from a dark brownish, or greenish brown, to a pale, greyish, or whitish colour; and they contain, in some cases, pieces of thick gelatinous mucus, or a thin, glairy, and stringy mucus; in others, whitish albuminous flocculi; and, in a few instances, large membranous or albuminous shreds or flakes, moulded on the internal surface the intestine, constituting the *D. Tubularis* of Dr. Good. The discharges in this variety are often preceded by sickness or vomiting; by severe griping pains in the abdomen; and are attended by a dry, harsh skin; increased temperature of the trunk; a flatulent state of the bowels; a small, frequent, constricted, but soft pulse; a furred or loaded tongue, particularly towards the root, with red edges and point; and scanty, high-coloured urine. The patient also often complains of an aching, dull pain in the abdomen, sometimes increased by heavy pressure. — (*c*) Inflammatory action may not exist in every case of this variety; or it may not supervene until after simple determination of blood to, or irritation of, the the mucous surface has continued for some time; and, even when present, it does not necessarily occasion the diarrhœa. This variety, occurring in *infants*, constitutes what is usually called the *watery gripes* (§ 15.), and sometimes gives rise to one or more intus-susceptions; or it passes into chronic diarrhœa, with disease of the mucous and mesenteric glands; or into slow remittent fever, marasmus, and fatal exhaustion.

10. *C. Diarrhœa from excited or inflammatory Action of the mucous Follicles* (*Catarrhus Intestinorum*, of various authors; *D. Catarrhalis*, of Boerhaave; *D. Mucosa*, of Cullen, Good, &c.; *Cœliaca Mucosa*, Sauvages). — (*a*) This form generally appears in the course of functional disorder of the digestive organs, particularly indigestion, hypochondriasis, costiveness, and colicky affections; which may be viewed as predisposing to it, by favouring the accumulation of mucous sordes in the follicles and on the internal surface of the bowels; and is excited by the causes already enumerated, especially those of the preceding variety (§ 9.). It occurs most frequently in old persons, or in those who have suffered from chronic disorders of the digestive organs; and in *children*, particularly during the period of first dentition.—(*b*) The *stools* often consist entirely of thin gelatinous mucus; frequently, also, of thick mucus, and a considerable quantity of watery or serous fluid; sometimes the mucus is mixed with this fluid and thin feculent matter, or is accompanied with small pellets of fæces; and occasionally it has the appearance of a semi-transparent mucilage, passing into a muco-puriform matter. The consistence of the motions varies much; and in some cases they are very offensive, but in others without any odour.

In many instances they have a greenish or yellowish green colour; in others, an orange or yellow tint: in a few cases, they are nearly colourless, or white, and thin, constituting the *D. Alba* of Hillary; the *Fluxus Cœliacus* of some writers; the *Album Alvi Profluvium* of Piso; the *D. Pituitosa* of Sauvages; the *D. Cœliaca* of Cullen; the *D. Chylosa*, or *Lactea*, of several authors. These appearances are chiefly attributable to the morbid action of the mucous follicles in some part of the digestive tube, most probably in the colon; to the presence or absence of the biliary and pancreatic secretions; and to the states of these secretions. This, as well as the preceding variety, may or may not be attended by febrile symptoms, may assume the acute character, and may pass into the chronic form, the mucous discharges in this latter case often presenting a light, whitish, or muco-puriform appearance.—(*c*) When mucous diarrhœa continues for some time, or becomes chronic, it occasions emaciation; a dry, harsh, or foul skin; and, in children, gives rise to marasmus, disease of the mesenteric glands, &c. When it becomes *chronic*, the stools sometimes assume a whitish, or mucilage-like, or greyish appearance, evincing the absence of bile; or they pass into a muco-puriform state, occasionally streaked with blood; or they contain long whitish shreds, or threads; and consist either altogether of these matters, particularly if the disease be seated low in the large intestines, or of an admixture of thin feculent matter with them, particularly when the upper portions of the colon and termination of the ilium are affected. In some cases of this form, occurring during difficult dentition, or after the use of calomel or mercurials, or upon the suppression of ptyalism, the stools have consisted of a thin, ropy mucus, of a translucent hue, and have seemed to be chiefly augmented pancreatic secretion. In *children* especially, when mucous diarrhœa has assumed the *chronic* form, the evacuations often present the *chylous* or milky appearance just noticed,—the *Chylous Diarrhœa* of Dewees and others. This state is attributed by them to the presence of chyme, or imperfectly elaborated chyle, which the lacteals refuse to absorb; and to the absence of bile: to which causes it is very probably partly owing, as well as partly to the morbid secretions of the mucous surface and follicles. Whatever appearance this variety may assume, it is frequently followed by the next.

11. *D. Diarrhœa from Ulceration of the mucous Follicles*—(*a*) occurs either consecutively of the two foregoing varieties, or in the course of several febrile or chronic diseases; in which cases, however, it is very often preceded by serous or mucous evacuations, or by both. But ulceration may take place without any such indication, and without the bowels being much, or even at all, relaxed. — (*b*) The stools are usually muco-puriform, streaked with blood; sometimes containing shreds or threads of albuminous matter; and mixed with thin, watery fæces, particularly when the disease is seated in the small intestines or cæcum. When the large intestines are chiefly affected, the muco-puriform discharges may contain little or no feculent matters; or these matters may form distinct portions of the stools, or may consist of detached pellets. In some instances, the stools have been very dark, grumous, watery, and fœtid; and, occasionally, merely thin, serous, or mucous, or both, varying in colour, and more or less feculent and offensive; and yet ulceration has nevertheless existed. In rarer cases, they have been quite black, grumous, and melanoid; or resembling ink, probably from the admixture of blood exuded in the small intestines, and changed by the action of the secretions — whether healthy or morbid. — (*c*) In this variety of diarrhœa, the emaciation becomes extreme, and the skin assumes a dry, harsh, foul, or lurid appearance. The pulse, in its latter stages, is quick, small, and weak. Aphthæ sometimes appear on the lips and tongue; and hectic fever, with exhaustion, prevails.

12. *E. Diarrhœa with the Discharge of unaltered Ingesta; Lientery* (Λειεντέρια, Gr.; *Lubricitas*, vel *Levitas Intestinorum*, Lat.; *D. Lienterica*, of Cullen; the *Lienteria* of Sauvages and others) — (*a*) occurs more frequently, in *children*, before the period of the second dentition, than at later epochs; and it is generally the consequence or sequela of inflammatory irritation of the digestive mucous surface, and disease of the mesenteric glands — of the advanced stages of these pathological states. It is most common during the first dentition, particularly when the canine and molar teeth are about to appear; and, in this class of patients, as well as in adults (in which latter it is comparatively rare), it either follows dysentery, or is a concomitant of the last stages, or chronic states, of one of the preceding varieties — commonly of the *serous* or *mucous* — than a primary form of the disease. It is *caused* by the same remote agents which induce these its primary conditions; and it evidently depends upon a similar state of increased peristaltic action, and deficient vital function, of the stomach and duodenum, to that which obtains in the intestines; the food being thereby propelled onwards before it has undergone the changes usually produced by these organs, and discharged from the bowels but little altered from the condition in which it passed into the stomach. — (*b*) The appetite is usually voracious in this variety, particularly in children, although the emaciation and debility may be extreme. The biliary secretion is also deficient or vitiated; and, in some cases, it appears nearly or altogether wanting in the stools, owing rather to the weak or imperfect action of the liver, than to obstruction. — (*c*) It usually terminates in stupor, and death from exhaustion; although recovery sometimes takes place when it is early and judiciously treated.

13. II. Of certain Relations and Manifestations of Diarrhœa. — i. The *Causes* of this disease have been noticed in the description of its different varieties.—(*a*) Diarrhœa is most frequent in *childhood*, particularly during dentition, and in persons of a weak constitution and lax fibre; and in those addicted to spirituous liquors. I have observed a tendency to it in some families — sometimes in all the children of a family, one of the parents being possessed of the same liability.—(*b*) It is *endemic* in some places, evidently owing either to their humid, close, and miasmal situation, or to an impure state of the water, especially in large cities or towns; or to the nature of the food in common use.—(*c*) The *epidemic* prevalence of diarrhœa

has been noticed by **Bartholinus** (*Hist. Anat.* cent. ii. his. 65.), **Sydenham** (*Opera*, p. 160. 209.), and **Leichner** (*De Diarrh. quadam Epid.* Erf. 1676.); and, in some summers and autumns, its frequency has been so great, within my own experience, especially in children, as to justify me in stating that it sometimes assumes this form.—(*d*) It has also occasionally put on a *periodic* character, particularly when it has arisen from endemic causes, and been connected with a masked or latent intermittent. It has appeared monthly, in females whose menstrual discharges have been suppressed, — and thus constituted a substituted evacuation.

14. ii. *Puerperal Diarrhœa* may occur either very soon, or a few days, after delivery. It is occasioned by a neglected state of the bowels previously — by the irritation of collected fæces, or by the irruption of morbid secretions into the intestines. When it proceeds from the former cause, the evacuations are feculent, lumpy, offensive, and attended by some degree of tenesmus; when from the latter, it is often accompanied with sickness, or vomiting, and sometimes with cramps of the lower extremities; the stools being fœtid, bilious, dark green, or greenish yellow, with whitish flakes floating in them. It may be connected with suppression of the lochia, or of the milk; but, in such cases, it is rather the cause than the effect of the suppression. It commonly originates in one of the states of disorder now mentioned, or in both. When, however, such a degree of irritation of the bowels is produced, as will be followed by excited vascular action, suppression of either the milk or lochia, or both, may follow, with more or less febrile commotion. Cases of this description usually do not supervene until a few days after parturition; and are attended by the phenomena of serous or inflammatory diarrhœa, with disordered biliary secretions, offensive dark stools, with albuminous whitish flakes or flocculi, quick pulse, and symptomatic disorder of various functions, favoured by the puerperal state. The more strongly marked cases of this form of disease pass into and constitute what has been termed *Intestinal Fever* by **Burns** and others. (See **Fevers** *of the Puerperal State*.) The slighter cases even not infrequently terminate in chronic inflammation of the intestinal mucous surface, with all the symptoms of mucous diarrhœa, or of ulceration of the follicles, or of dysentery.

15. iii. In *Infants* and *Children*, diarrhœa is remarkably frequent,— especially from the commencement of dentition, or the time of weaning, to the third year of age; and is, in respect both of its phenomena and of its contingent effects, a most important disease. These states of it which are identical with those generally observed in the adult, have already been noticed, particularly the *serous*, *mucous*, and *lienteric*. — *a*. The *first* of these, in the form of *watery gripes*, may appear previously to the period of dentition; and then it is connected with the state of the nurse's milk, or too early or over feeding, which induces acidity of the prima via; with either inflammatory excitement of, with augmented secretion from, the mucous surface, or increased and irregular action of the muscular coat, or both. In either case, the disease may be very *acute* — may run on to unequivocal inflammatory action, and may occasion introsusceptions, with scanty, dark, watery, or mucous and bloody stools, terminating in convulsions and death; or it may be prolonged into the *chronic* state, owing either to neglect, to the continuance of the causes, or to injudicious treatment. When it lapses into this state, the evacuations become very offensive, watery, of a dark green, brown, or curdly appearance; are preceded by severe griping; and are voided suddenly and violently, frequently with much flatus and straining. In these cases, there are also more or less febrile symptoms; and, in its advanced stage, often a raw or aphthous state of the mouth; the disease assuming the lienteric form, or occasioning rapid exhaustion. In such cases, morbid secretions, and knotty or curdly fæces, frequently are retained about the sigmoid flexure of the colon; and fatal cases generally present the termination of the ilium, the cæcum, and lower part of the colon, more or less changed in structure; or exhibit, along the greater part of the digestive canal, the appearances usually consequent upon inflammatory action of the mucous surface.

16. *β*. Diarrhœa is also very common in delicate children, at the *period of weaning*; and, in many cases, is connected also — although not necessarily — with the irritation of difficult dentition. It usually assumes a *chronic* form; and is most severe and most rapid in its progress in infants who have been much too early or abruptly weaned, and improperly fed at the time, or afterwards. This form of diarrhœa was described very minutely by Dr. **Cheyne**, under the term "*Atrophia Ablactatorium*," or "*Weaning-brash*;" and afterwards by **Cruveilhier**, **Andral**, and others. The evacuations are usually greenish, watery, or slimy; sometimes ash-coloured and lienteric; and attended by griping pains, often by retchings and vomiting, with symptomatic fever. The appearance of the stools, however, varies very remarkably; but they generally partake more of the serous, bilious, or lienteric characters, than of any others: thereby indicating, what, indeed, is displayed on dissection, namely, the inflammatory nature of the disease, and its extension along the alimentary canal, and even to the liver. It usually occurs during summer and autumn, particularly when the seasons are moist and hot; and is seldom of shorter *duration* than four or five weeks, or longer than three or four months. It is evidently a milder grade of the same pathological states which give rise to the disease I have described under the name of *Choleric Fever of Infants*: and, although it is connected in its advanced stages with inflammatory action, yet it is very probable that the inflammation is of an *asthenic* kind; and that it originates in irritation produced by acrid and morbid secretions, and by imperfectly digested and improper food, or by an unhealthy state of the nurse's milk. It is attended by great emaciation and debility, and frequently terminates in fatal intus-susceptions, convulsions, or coma from exhaustion, or serous effusion within the head, or from both.

17. *γ*. In rarer instances, a *peculiar form* of diarrhœa occurs after weaning, in which the stools are not so very frequent or abundant, but they are pulpy or semifluid, of a clayey colour, and very offensive; and accompanied with an abund-

ant secretion of pale, ammoniacal, albuminous, and fœtid urine, — both the stools and urine emitting a nearly similar smell. The abdomen is full and soft; the skin generally cool; the mouth, lips, tongue, and fauces are red; and the debility great: emaciation rapidly follows; and, in some cases, the bones yield from the absorption of the phosphates which are probably carried off by the urine; the disease partaking as much of the characters of diuresis, or *albuminous diabetes*, as of diarrhœa. A bilious form of diarrhœa may also occur as a symptom of incipient disease of the membranes of, or effusion into, the ventricles; or irritation about the origin of the nerves.

18. iv. The *Dark Races* of our species, particularly the *negro*, are much more liable to diarrhœa than the white; and in them it usually assumes a chronic state, and frequently the mucous form. It also very commonly presents *asthenic* characters, is often *complicated* with intestinal worms, and is prone to pass into dysentery, or to be followed by rapid depression of vital power.

19. III. Associations of Diarrhœa.—(*a*) This affection may attend the *commencement* of dangerous maladies, particularly fever, dysentery, pestilential cholera, hepatitis, meningitis, &c., owing to irritation of the mucous coat of the intestines, to the flow of morbid or acrid secretions into them, &c., the evacuations being feculent, bilious, mucous, or serous.—(*b*) Its occasional *association* with gout has been noticed by Sydenham, Baglivi, Musgrave (*De Arthrit. Anom.* cap. 4.), and Lorenz; and has given rise to the *D. Arthritica* of Sauvages. In *children*, it is very often complicated with bronchitis, especially during dentition. It may constitute a serious, or even dangerous, *complication* in low remittent or continued fevers, in scarlatina, small-pox, measles, hepatitis, &c.; and may proceed either from determination of vascular excitement to the abdominal viscera, particularly the intestines; or from inflammation, ulceration, &c. of the mucous coat in some part of the canal, especially after retrocession, or repulsion of the eruption in the exanthemata; the stools being serous, dark-coloured, with whitish flocculi or flakes, or mucous, and sometimes bilious. It is also often associated, in its chronic states, with mesenteric disease and worms.—(*c*) It may be *critical* in several febrile and inflammatory diseases; the discharges being bilious, homogeneous, &c. (See Crises, § 8.) — (*d*) It is also frequently *colliquative*, or the result of exhaustion of the constitutional powers from protracted disorganising disease — as pulmonary consumption, chronic abscesses, diseased joints, hectic fever, and morbid states of the blood, caused by the absorption into it of purulent or other matters generated in any part of the body. In such cases, it more directly depends upon disease affecting particularly the mucous follicles, the tone or vital cohesion of the mucous surface and vessels supplying it being diminished; and the evacuations being mucous or muco-puriform, or serous and grumous, or sero-puriform and partly feculent. Colliquative diarrhœa is also frequently dependent upon ulceration, apparently commencing in the follicles, and often without any evidence of antecedent inflammatory action, at least of a sthenic kind.

20. IV. Duration, Termination, and Appearances on Dissection. — *A.* Diarrhœa, particularly in its idiopathic state, is generally of short *duration*; but bilious and mucous diarrhœa may be much longer protracted. I have seen the former continue, in a warm climate, for several months; and, in this country, nearly as long, sometimes with short remissions. The *serous* and *mucous* varieties often assume an *acute* character, in respect both of intensity and duration; but they frequently also, particularly the latter, degenerate into the *chronic* form; either retaining their specific distinctions, or assuming those of ulceration or lientery. When the disease has even been cured, there generally remains during life a liability to its return, particularly when it has passed into the chronic state, and has possessed the *mucous* character. A slight diarrhœa may continue the greater part of life, and at last pass into dysentery.*

21. *B.* Diarrhœa may *terminate*—(*a*) in *dysentery*, from an increased affection of the large bowels, frequently connected with inflammatory action or ulceration of their mucous surface and follicles, and spasmodic action of the lower part of the colon: (*b*) or it may run into *enteritis*, or even *peritonitis*, particularly when it commences in the serous form, owing to the extension of inflammation from the internal to the more external coats of the intestines; or to the perforation of them by ulcers; and it may end in abdominal dropsy: (*c*) or it may give rise to *convulsions*, to intus-susceptions, particularly in children: and (*d*) it may assume the *chronic* form, varying in severity and duration, and occasioning mesenteric disease, emaciation, and exhaustion; and it may be prolonged even for years, with irregular remissions and intermissions.

22. *C.* The *appearances* on dissection can be ascertained only in severe or chronic cases, or in those who have died of its complicated states; or of some other disease on which diarrhœa had supervened, or with which it was associated. In some recent or slight cases, the *mucous coat of the intestines* has been found quite pale and bloodless; and the follicles, only, more developed than usual. In others, it has been somewhat softened, or merely injected; occasionally it has been congested and discoloured, the injection or congestion generally existing in patches or streaks, between which it has been quite pale. In more chronic and severe cases, it has likewise been pale, anæmic, and softened; in some, inflamed, congested, and of every shade, from a rose tint to a brownish or purplish colour — commonly in streaks or patches. In some instances, either without, or in addition to, these and other appearances about to be no-

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* Some years ago, I was consulted by a well-known and eminent person, past the middle age, of the sanguine temperament and plethoric habit of body, and a rigid water-drinker, who had always had diarrhœa — at least for twenty years. He was directed to be blooded; and the diarrhœa was moderated merely, without being checked, when it became unusually troublesome, as apoplexy was dreaded, and as he was otherwise in excellent health. Soon afterwards, he went to South America, where the diarrhœa passed into acute, and, afterwards, chronic dysentery, which reduced him, from a full and almost corpulent habit, to a state of extreme emaciation. In this state he met with a dangerous accident, from which he lost so much blood that he rallied with difficulty. He recovered, nevertheless: the dysentery was cured; and the diarrhœa, upon my seeing him again in London some years afterwards, had not returned.

ticed, the mucous and *submucous* tissues have been œdematous, thickened, and very much softened. Inspissated mucus, or even coagulable lymph, and more frequently a thin, brownish or greyish, or puriform mucus, have been found covering the diseased surface. In some cases of children, the intestines have become soft, white, almost diaphanous, and easily torn; and have contained a purulent, custard-like matter. Their calibre, in a few instances, has been greater than usual; but much more frequently diminished, or even much and irregularly contracted, particularly in the part chiefly affected. In some instances, small pustules containing purulent matter have been observed, apparently unconnected with the follicles; and, upon breaking, have left merely a slight, superficial, and reddish ulceration, or excoriated-like surface (Bright and myself). Both the small and large intestines have occasionally presented one or more introsusceptions — sometimes a number, especially in infants and children; and, in fatal cases, soon after weaning, softening, with or without inflammatory appearances, has often also existed in the *stomach* and liver. The intestines have been, in some instances, of a darker hue than natural, externally as well as internally; either in large portions, or throughout, and occasionally in thickly disseminated dots or points. The *mucous glands*, particularly in severe or chronic cases, and those belonging to the mucous and lienteric varieties, have been very generally found either prominent, enlarged, inflamed, or the seat of ulceration, or of a dark or blackish colour, by Brunner, Stark, Lieutaud, Bang, Abercrombie, Bright, Andral, Annesley, and myself. Fungoid ulcers in the situation of the follicles, often with prominent and inflamed bases, have likewise been observed by these writers. Brunner (*De Gland. Duodeni, &c.*) noticed their prominent and enlarged state in the duodenum; and Stark (*Klin. Bemerk. &c.* p. 7.) principally in the large bowels. I have often observed them enlarged, or otherwise diseased, in the former of these situations, in cases of the lientery and atrophy of children; but those of the cæcum, of the termination of the ilium, and of the colon, are more frequently affected in this class of patients. The *mesenteric glands* are often inflamed, or enlarged, or indurated, particularly in young subjects, and in chronic and lienteric cases. The *gall-bladder* sometimes contains greenish bile; and the *liver* is occasionally more vascular than natural. The parts most commonly or most severely diseased are the ilium, especially its lowest third, and the cæcum. The absence of any appreciable lesion in some cases, and the slight nature of those observed in others, militate against the doctrine of Broussais as to the universal dependence of diarrhœa on inflammation of the intestinal mucous surface. He, however, contends that the blood had retired, in such cases, from the inflamed capillaries into the veins, at the time of, or after, death; thereby leaving no traces of inflammation observable on dissection. This change may occur in vessels that are simply excited, or after erethism merely of the mucous coat (states most frequently attendant upon slight diarrhœa); but not when inflammation has actually existed. (See Digestive Canal — *Pathology of.*)

23. V. Diagnosis. — (*a*) Diarrhœa is distinguished from *dysentery* by the tormina and tenesmus; the scanty, mucous, and bloody evacuations; and the more early and marked febrile symptoms, of the latter. In it, the calls to stool are almost incessant and abortive, and the motions are nearly destitute of fæces, or sometimes contain scybalæ. In the former, the griping pains, even when most severe, never equal the tormina of dysentery; of which the distressing tenesmus, the quick pulse, the increased frequency of the calls to evacuation during the night, the presence of strangury, are also pathognomonic. — (*b*) Diarrhœa differs from *cholera*, in the much less severity of attack; by the absence of spasms of the extremities; by the entire absence, or occasional occurrence merely, of nausea or vomiting; and by the milder character and less rapid progress of the former. Bilious diarrhœa, however, is sometimes merely a slighter form of bilious cholera; the existence of spasms in the latter constituting the chief difference, excepting as to grade: and *pestilential* cholera very frequently commences in some one of the common forms of diarrhœa. — (*c*) Diarrhœa differs, in certain of its varieties — especially the fourth, fifth, &c. — but little from inflammation of the internal surface of the intestines, excepting as respects the activity or acuteness of the affection, and the extent to which the constitution sympathises with the local disease. But although certain states of diarrhœa are chiefly owing to inflammatory action, still this action is attended by increased exhalation and secretion from the mucous surface, whilst inflammation, either limited in extent, or of a low grade, may exist in this situation, and particularly in the follicles, without the alvine evacuations being either frequent or increased, and even in some instances they may be constipated. It is chiefly from the quickness of the pulse, and the evening accessions or exacerbations of fever; from the sensations of the patient on pressing and examining the abdomen; from the temperature and state of the skin, particularly in this situation; and from the whitish, furred, or reddish appearances of the tongue, and the state of the discharges; that the existence of inflammation of the mucous surface or follicles of the intestines, in diarrhœa, or independently of diarrhœa, can be inferred.

24. The Prognosis — (*a*) of *idiopathic* diarrhœa is generally favourable: it is usually slight, and soon subsides after the removal of the offending cause. There are, however, few disorders that will be more readily aggravated, or converted into a more serious disease, by injudicious treatment. — (*b*) The *symptomatic* varieties of the complaint are to be viewed entirely as respects the pathological states which occasion them. The *serous* and *mucous* forms, especially when they assume the *chronic* state, or occur in children after weaning, should always be considered as serious affections, and a cautious prognosis ought to be given. The varieties referred to ulceration, and to the appearance of undigested substances in the stools, are very dangerous diseases, requiring the most judicious medical treatment and regimen; and, even with these advantages, the larger proportion will terminate fatally. — (*c*) The *complicated* states of diarrhœa, unless those attending the commencement, or marking the crisis, of diseases, are all more or less serious or unfavourable, espe-

cially colliquative diarrhœa. The degree of danger they portend is particularly noticed in the articles on the maladies with which they are most commonly associated. In all the forms and states of this complaint, the causes, the effects of previous treatment, and the constitution, the habits, and existing state of the patient, ought to be carefully considered before we form an opinion of the ultimate issue.

25. VI. Treatment.—i. Of Idiopathic Diarrhœa.—*A.* The *Feculent form*, or *Diarrhœa of Irritation*, when recent, requires demulcents or diluents merely, in order to facilitate the discharge of acrid or accumulated matters. This having been accomplished, disorder soon ceases. But the irritating substances may be partly retained, and keep up a prolonged, or remitting, state of disease, with griping pains and scanty stools, which may be partly feculent, mucous, or serous—the latter predominating when the irritation is considerable. In this case, much discrimination is requisite in selecting the aperient which is obviously required; for, if it be insufficient, the disorder will be prolonged; if it be too active, either super-purgation or inflammation will be occasioned. In such cases, a moderate dose of fresh castor oil; or the compound infusion of senna with manna, tartrate of potash, and an aromatic, sometimes with tincture of hyoscyamus; or, when the stomach is not irritable, rhubarb with magnesia and a grain of ipecacuanha, in aqua pimentæ, &c., will generally have the desired effect. In some circumstances, five or six drops of the tinct. opii, in the aperient draught, will both moderate its operation, and render it more effectual. If hyper-catharsis be occasioned by the purgative, a full dose of laudanum, or from one to two drachms of the old paregoric elixir, with external warmth, &c., will soon calm the irritation. When the bowels have been previously constipated, and there is any tension, or hardness, or fulness of the abdomen; or when the stools are partly fæcal and partly mucous, or dark-coloured, serous, and muddy; a mild purgative, such as already advised, will be necessary. The practitioner should take into consideration the habits of the patient as to exercise and modes of living, and every argument for or against the existence of accumulated fæces in the bowels, and be thereby guided in his practice. When he observes sufficient indications to warrant the exhibition of a purgative, the effects produced by it, the persistence of the irritation, and the state of the abdomen and of the evacuations, will influence him as to the propriety of repeating it, or of prescribing other medicines. If the first purgative have not produced a satisfactory effect, if there be no tenesmus, and if the stools are not very mucous, it will generally be advisable to give a full dose of calomel and of James's powder at bed-time, and either of the purgative doses already noticed early in the morning. When this form of diarrhœa appears to have arisen from acidity in the *prima via*, particularly in *children*, with green, spinach-like, or knotty or scybalous evacuations, a full dose of calomel, or hydrarg. cum creta with magnesia, or magnesia only in anise-seed water, followed by castor oil, will generally be effectual.

26. *B. Diarrhœa from Relaxation*, or from the septic and irritating operation of the injurious ingesta, either solid or fluid, mentioned above (§ 6.), requires demulcents combined with aromatics, particularly the confect. aromatica, capsicum, and other hot spices. If the action produced by the offending substances on the bowels have been sufficient to have procured their complete discharge, this may be all that is necessary. But if we suspect, from the associated phenomena, that a part of them has been retained, the treatment now advised for the removal of fæcal matters should be adopted, with the addition of the aromatics and restoratives just mentioned, in quantity proportionate to the urgency of the case. In cases of diarrhœa arising from putrid matters, capsicum is almost a specific, especially when it is occasioned by fish: burnt brandy is also beneficial in these, after the offending matters have been expelled. When either of the foregoing varieties passes into the *chronic* state, the same treatment will be requisite that is recommended for the chronic mucous form of the disease (§ 30, 31.).

27. ii. Of Symptomatic Diarrhœa.—*A.* The *Bilious variety* should be treated with strict reference to the presence of griping pains, and the colour of the stools. In this disorder, calomel has been much too indiscriminately prescribed. In every case of it, the existence of pain or of heat about the region of the liver, about the the shoulder blades, &c., or of fulness in the epigastrium, should be ascertained; and, if these exist in any degree, the treatment should be commenced with blood-letting, or cupping, or leeches on the præcordia or hypochondria. An excited state of the substance of the liver may be present, without any increased frequency of pulse or heat of skin; therefore the absence of fever should not prevent the adoption of depletion, which may even be repeated. Next in importance to depletion, is the use of demulcents, lubricating infusions, or diluents with nitre and sub-carbonate of soda, and small doses of antimony, or of camphor, particularly if the papillæ of the tongue be erect, and the stools are not offensive, nor dark or greenish coloured. If they be either, or both, and if the tongue be foul, a full dose of blue pill, or hydrarg. cum creta, may be given, and followed by castor oil, or any other purgative already mentioned, or by the medicines of this kind in the Appendix (F. 96. 205. 430.). When the bile, from either its acridity or its quantity, occasions much irritation, the rectum becomes often excited to spastic constriction, thereby preventing the discharge of fæcal and more consistent matters, and occasioning tenesmus, or superinducing dysentery. In order to prevent this, or to remedy it at its commencement, the refrigerating demulcents just noticed may be associated, or alternated, with cooling laxatives, and the retention of the morbid secretions in the colon guarded against, and their irritating properties diminished by emollient enemata. The too early exhibition of astringents or opiates is often injurious in this variety; for, although they may afford relief for a few days, and the patient may think himself cured, yet he will soon afterwards complain of uneasiness in the abdomen and region of the liver, with fever, foul or furred tongue, and all the symptoms of hepatic disease, which may be soon followed by inflammation of the substance of the liver, or dysentery. When we suspect that the diarrhœa has been induced or kept up by irritation in the duodenum, the treatment above recommended is quite appro-

priate; and the refrigerants already prescribed, with demulcents and a mild and low diet, should be continued sufficiently long to take effect. Bilious diarrhœa may accompany *difficult dentition;* and in this case, lancing the gums, and the treatment advised in that article, should be adopted.

28. *B. Diarrhœa from Vascular Excitement,* or *Serous* diarrhœa, should be treated with reference to the cause which produced it. — (*a*) If it have arisen from the irritation of morbid matters, and if the symptoms indicate their partial retention, laxatives or mild purgatives are requisite; but it will not always be safe to exhibit them until general or local depletions, especially leeches applied to the anus, warm baths or fomentations, and demulcents with refrigerants, have been employed. Any of the *mild* purgatives recommended above, or F. 790., may be afterwards exhibited, and their action promoted by demulcent and aperient enemata. — (*b*) When, however, neither fæcal nor other injurious matters are retained, depletions should be accompanied with, and followed by, the internal exhibition of the nitrate of potash, with sub-carbonate of soda, and tincture of hyoscyamus (F. 838.), or tinct. opii comp. (F. 729.), or the paregoric elixir, in demulcent vehicles, (F. 728. 866.); and, if nausea be not present, with vinum ipecacuanhæ. — (*c*) When this form of affection arises from checked perspiration, diaphoretics, diluents, the warm bath, a warm bed, and mild, demulcent or farinaceous diet in small quantity, will generally remove the disorder in a very short time. If it be attended by any heat of skin, or acceleration of pulse, the liquor ammoniæ acetatis, nitrate of potass, and camphor julap (F. 865. 871.), will be of much service. — (*d*) If the motions be frothy, or emit a sour smell, the chalk mixture with ipecacuanha and opiate, or aromatic confection, will be requisite; and if griping pains with tenesmus be complained of, the pulv. ipecacuanhæ comp. with sub-carb. of soda, mucilage, oleum anisi, and aqua pimentæ, may be given; or the old paregoric elixir (F. 728.) in chalk mixture, and assisted by small emollient and anodyne clysters. — (*e*) These will generally soon remove the complaint; but when it has become more *chronic,* or is very severe at the outset, or is attended with tenesmus, or seems inclined to pass into dysentery, from eight to twelve leeches, in addition to the previous depletion, should be applied close to the anus, and repeated if necessary, the medicines now recommended (*d*) being also exhibited in a more decided manner.* In this form of diarrhœa especially, little or no *food* should be allowed, excepting the lighter farinaceous articles, as sago, arrow-root, rice-gruel, tapioca, &c. When the complaint has subsided, and the appetite become craving, or when much irritation of the lower bowels exists, chicken, veal, or mutton broth, may be taken; and the same articles, after having been strained, may also be exhibited in clysters.

29. *C. Diarrhœa from Disease of the Mucous Follicles — Mucous Diarrhœa.* — (*a*) Emetics have been recommended in diarrhœa by Hippocrates, Celsus (lib. iv. cap. 19.), Pichonet, Fontaine, Sydenham, Bang, and Vogel; but it is in this variety that they are most serviceable, particularly in its more recent states. In it, also, *purgatives* are required more than in any other. Ipecacuanha is the most appropriate emetic, and small doses of it will likewise be advantageously conjoined with the purgatives or other medicines prescribed. I have usually directed, if the disorder was not removed by two or three doses of the more common purgatives, equal quantities of the oleum ricini and ol. terebinthinæ to be taken on the surface of a suitable vehicle, each alternate morning; a dose of calomel or hydrarg. cum creta, sometimes with Dover's powder, having been given the preceding night, if tenesmus was not complained of; and although this practice has been pursued by me in some hundred instances in the Infirmary for Children, besides occasionally in adults and in private practice, I have never been disappointed in its effects. If, however, it does not very soon remove the disorder, we should suspect the existence of inflammatory action, and have recourse to local depletions, particularly from the anus, to warm baths, fomentations, rubefacient cataplasms or blisters on the abdomen, and a repetition of the alteratives and refrigerants already advised. After morbid or accumulated matters have been removed, and the mucous follicles excited by these medicines to a more healthy action, aromatics, cretaceous powders or mixtures, and the pulvis ipecacuanhæ compositus, or small doses of opium or the paregoric elixir, may be prescribed. Care should be taken not to exhibit astringents or opiates before morbid secretions have been discharged, nor to allow the bowels to become constipated, otherwise a chronic state of the disease or dysentery may supervene.

30. (*b*) The *chronic* form of this variety usually arises either from a neglected or injudiciously treated acute stage, or as a sequela of dysentery; it is also very common in children; and often occasions, as well as attends, obstructed mesenteric glands. There is no ailment, particularly when existing in children, that requires more discrimination than this. If, after an attentive enquiry into the history and previous treatment of the case, as well as into its existing state, we find the abdomen hot, the skin dry and harsh, the tongue red at its edges, or its papillæ erect, and the pulse excited but not weak, local depletions are required, and should be followed by the tepid or warm bath, or by fomentations,

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* This form of diarrhœa is very common in persons addicted to the use of spirituous liquors; and it is, in them, frequently attended by vomiting, and severe inflammatory symptoms referrible to the duodenum, and by chronic disease of the biliary apparatus. A case of this description, in a married female of good circumstances, was seen by me, in consultation with an able practitioner, whilst this sheet was in the press. She had, in addition to the above complication, long complained of difficult and very scanty menstruation; this evacuation being watery, and of a greenish colour. She had been blooded locally, and very judiciously treated. As the return of this discharge was expected, and taking into account the previous treatment, the following were prescribed; the borax chiefly on account of the scanty catamenia: —

No. 174. ℞ Hydrarg. cum Creta gr. iv.; Pilul. Saponis cum Opio gr. v.; Syrup. Simp. q. s. Fiant Pilulæ ij. omni nocte capiendæ.

No. 175. ℞ Sodæ Sub-boratis ℈j.; Aquæ Fœniculi dulcis ʒxj.; Spirit. Lavandul. Comp. ʒj. M. Fiat Haustus, quater in die sumendus.

The purging ceased; the motions became feculent, and of a healthier colour; the severe paroxysms of pain, and the tenderness complained of in the region of the duodenum, and ducts subsided; and the catamenia became, after a few doses of the borax, copious and more natural.

and by moderate doses of the purgatives last recommended. As soon as the stools are improved by these means, aromatics with opiates, or absorbents, or both (F. 623. 633.), may be prescribed; and warm clothing, with light farinaceous food, allowed. If these means be insufficient, a blister, or rubefacients, &c. applied over the abdomen, and the hydrargyrum cum creta, with the pulvis ipecacuanhæ comp. (F. 653.), and small doses of rhubarb, given night and morning, or even oftener, will be of much service. I have frequently prescribed, with the greatest benefit, in chronic cases both of this and the preceding variety, the sub-borate of soda, with honey, and the compound powder of tragacanth and capsicum.

31. (*c*) Chronic mucous diarrhœa, with *whitish*, greyish, or mucilage-like stools, arising from the absence of bile, the imperfect absorption of the chyle, and the morbid state of the mucous secretion, requires low diet, consisting entirely of farinaceous substances. At the same time, the hydrarg. cum creta ought to be exhibited twice or thrice daily, with the sub-carbonate of soda or potash, and minute doses of opium. A tonic or stomachic powder or mixture should also be prescribed, with the warm bath, and frictions of the surface upon coming out of it. If these means fail, there is probably disease of the mesenteric glands, — the liquor potassæ may be given in beef-tea, the mild mercurial continued every night, and the purgative draught already directed (§ 29.) also be tried. In some obstinate cases of this kind, I have resorted to the chlorates of the fixed alkalies or of lime, conjoined with the compound tragacanth powder, and aromatics (F. 283.), with great benefit. It will generally be necessary in this state of the disease to rouse the digestive and assimilative functions by *tonics*, and the action of the liver by mild mercurials; and to combine these remedies with antacids, or with demulcents and aromatics, or with balsams or the terebinthinates. The infusions of calumba, or cascarilla, or cinchona, or cusparia, with carbonate of ammonia, and confectio aromatica, may be first employed; and afterwards the balsams, or vegetable and mineral astringents. In more obstinate cases, the warm salt-water bath, or a tonic, stimulating, or gently rubefacient plaster to the abdomen or loins, or both, may be prescribed, and the trunk surrounded by a flannel roller; a light farinaceous diet being allowed. The treatment now described is requisite equally in *children* as in adults. This form of chronic diarrhœa is most common in the former; and when it is connected with dentition, requires constant attention to the state of the gums.

32. *D. Diarrhœa from Ulceration* requires very nearly the same treatment that was recommended for chronic mucous diarrhœa (§ 31.), of which it is generally only a modification or consequence. When the evacuations in this variety are fluid, or muddy and fœtid, and without tenesmus, the disease is most probably seated in the small intestines; and when arrested by opiates and astringents, uneasiness at the stomach, with nausea and sickness, are usually produced. Besides the means noticed in the preceding paragraph, the terebinthinates and balsams may be given, with small doses of rhubarb, magnesia, tragacanth, &c. The mistura cretæ, with tinct. camphoræ comp. and mucilage; the decoction of logwood, with laudanum; the hydrarg. cum creta, with pulv. ipecacuanhæ comp., and either an aromatic or an absorbent; the nitro-muriatic acid, with tinct. opii, in tonic infusions; a decoction of cusparia, with nitric acid and laudanum; the infusion of catechu, with aromatics; sulphur, with carbonate or subborate of soda and opium; camphor, with nitrate of potash, or chlorate of soda, and tragacanth; the chlorates, with demulcents or emollients; the nitrate of silver, with tonic extracts, &c.; the sulphates of copper, or of iron, or of zinc, or the nitrate of bismuth, either alone or with opium; lime-water; blisters and rubefacients; demulcent, emollient, and opiate clysters; tepid salt-water bathing, followed by frictions with rubefacient liniments (F. 296. 305.), and tonic plasters, with flannel rollers round the abdomen; are the means which are most to be depended upon, in this unfavourable state of the disease. Animal food generally increases the disorder, and farinaceous articles of diet should be in moderate quantity, or taken after short intervals.

33. *E. Diarrhœa with indigested Matters in the Stools.*—The treatment in this variety should be directed principally with the intention of promoting the functions of the stomach and duodenum. These may, particularly in children, and during the period of dentition, be disturbed by inflammatory irritation of the mucous surface, associated with increased action of the muscular coats (§ 12.); whenever, therefore, this condition is presumed, leeches should be applied over the epigastric region, and be followed by a sinapism, or a blister, with tissue paper interposed between it and the skin, or by a rubefacient cataplasm or liniment. As the biliary functions are usually torpid or otherwise morbid in this variety, and the mesenteric glands often diseased, hydrarg. cum creta, with sub-carbonate of potass, ought to be given at bed-time. The digestive functions will be most permanently promoted by the infusion of cinchona, or catechu, or cascarilla, or calumba, or of cusparia and rhubarb, with liquor potassæ, or sub-carbonate of ammonia, and small doses of opium (see F. 413. 623. 788. 870.); or by chalybeate preparations, particularly the ammonia-tartrite of iron, with laudanum, or extract of syrup of poppy, or tincture or extract of hop. The use of recent ox-gall, as recommended by Horn (*Archiv.* Mar. 1810. p. 335.), or F. 481., is appropriate in this and the two preceding varieties, and will be very beneficial when it can be exhibited. In addition to these, and other internal and external remedies already noticed, the tepid or salt-water bath or semicupium, will also be productive of much advantage, particularly when followed by frictions of the abdomen or spine with stimulating embrocations or liniments.

34. iii.—(*a*) *Diarrhœa in the Puerperal State* (§ 14.), when it arises from accumulations of fæcal matters and morbid secretions, requires the use of gentle laxatives and mild purgatives, assisted by emollient and aperient clysters, with strictly regulated diet. After the offending matters are evacuated, opiates should be exhibited. When bilious vomiting accompanies diarrhœa, or when the stools are bilious, demulcents, di-

luents, and mild laxatives are requisite, until the morbid secretions are evacuated; but if spasms with much irritability of stomach be present, opiates must be immediately exhibited, with magnesia, and nitrate of potash, which will generally remain upon the stomach; but if these be vomited, small opiate clysters or suppositories should be administered. As long, however, as the stools continue offensive, or otherwise morbid, mild laxatives, and an occasional dose of calomel or blue pill, should be prescribed. In other respects the treatment is to be conducted according to the principles already sketched. — (*b*) When, in addition to the accumulation of morbid secretions, slight or chronic inflammation of the mucous surface of the bowels, with serous dark-coloured and offensive evacuations supervene, an emetic of ipecacuanha, if given sufficiently early, will be of service. After its operation, or independently of it, three or four grains of calomel, or five or six of hydrarg. cum creta, with a little magnesia, may be exhibited, and in a few hours afterwards either a dose of fresh castor oil, or any other mild purgative. If griping be present, an emollient and opiate enema should be administered. If the lochia be suppressed, the sub-borate of soda, in doses of from ten grains to a scruple, may be given three or four times daily, in emollient decoctions or infusions (F. 209. 630. 867.), or the liquor ammoniæ acetatis, with spirit. ammon. aromat. and camphor mixture, may be prescribed; mild purgatives or laxatives being repeated occasionally, until the tongue becomes clean and the stools natural. If the disease be not relieved by these means, and if pain be felt in any part of the abdomen upon well-directed pressure, or if a sense of heat or the symptoms of serous diarrhœa be present, general or local bleeding, with the rest of the treatment recommended in that variety (§ 28.), should be put in practice. Having removed morbid matters, or inflammatory irritation, where either or both exist, demulcents, absorbents, gentle restoratives, and tonic or astringent infusions, with mild diet, may be prescribed.

35. iv. *In Infants and Children*, diarrhœa assumes the bilious, serous, mucous, and lienteric characters: the former two more frequently before weaning, and in an acute form, or at a more advanced age in connection with irritation in the brain; the latter more usually after weaning, and in the chronic states (§ 16.). — (*a*) In slight diarrhœa, with fluid feculent motions, small doses of rhubarb with magnesia (F. 623. 633.), a grain or two of hydrarg. cum creta at night, and the tepid bath, are all that is required; care being taken that the bowels shall not become costive. If the disorder be occasioned by improper ingesta, or overfeeding, or if it be attended by fever, an ipecacuanha emetic should precede the above means, which ought to be followed by a dose of castor oil; and a grain or two of calomel ought to be given at bed-time, as advised by Dr. CLARKE (*Mem. of Irish Acad.* vol. vi.). When the stools are slimy or serous, and ejected forcibly, with tenderness on pressure, leeches and fomentations should be applied to the abdomen, and small anodyne and emollient clysters thrown up. If the evacuations emit a sour smell, and if they be greenish, or curdled, or frothy, cretaceous substances and magnesia, or ammonia, with aromatics, and occasionally with opium or syrup of poppies, ought to be exhibited: after the more urgent irritation is subdued, mild purgatives will still be required, and should be repeated, whenever the evacuations are morbid. Great caution is necessary in exhibiting opiates to infants, either by the mouth, or in clysters, and they ought not to be given when the symptoms indicate the retention of morbid matters in the bowels. In order to evacuate these matters, the following may be prescribed: —

No. 176. ℞ Spirit. Ammon. Aromat. ʒjss.; Olei Ricini, Syrup. Rosæ, et Mannæ Opt., āā ℥ss.; Aquæ Pimentæ et Aq. Com. āā ℥j. Fiat Emulsio, de quâ sumatur Coch. unum minimum vel mediocre, pro re natâ. Vel,

No. 177. ℞ Potassæ Tartar. ʒ ij.; Infus. Sennæ Comp. et Aq. Fœniculi Dul. āā ℥j.; Syrup. Sennæ ℥ss.; Olei Anisi ♏ vj. Fiat Mist., cujus capiat Coch. unum mediocre vel amplum pro dosi.

No. 178. ℞ Hydrarg. cum Creta gr. xij.; Sodæ Sub-carbon. exsic. ʒss.; Camphoræ rasæ gr. iij.; Pulv. Ipecacuanhæ, Pulv. Opii, āā gr. j.; Pulv. Cinnamom. gr. xviij.; Sacchari Albi ʒ j.; Olei Anisi ♏ iv. Tere probe simul, et divide in Cartulas xij., quarum omni nocte, vel mane nocteque, capiatur una.

36. When the diarrhœa proceeds *from weaning*, either prematurely or at the proper time, the treatment now advised, or that recommended for the *mucous* variety (§ 30, 31.), should be employed. Dr. CHEYNE directs small and repeated doses of calomel; but, unless morbid matters are accumulated in the *primæ viæ*, — when it should be given in a full dose, and be followed either by castor oil, or the mild purgatives already prescribed, — the hydrarg. cum creta, with magnesia and Dover's powder, or F. 923., is preferable. When the stools are slimy or bloody, or squirted out forcibly, leeches should be applied to the abdomen, and these medicines be also given in small but frequent doses; fomentations, demulcent clysters containing olive and castor oil, the tepid bath, and warm clothing, being also prescribed. If it assume the *acute* character, or at the commencement of the attack, the treatment prescribed in the article on the CHOLERIC FEVER OF INFANTS (§ 11. 15.), of which it is merely a modification, is in every respect appropriate. When it passes into the *chronic* form, the means recommended with reference to chronic mucous diarrhœa, or the ammonia-tartrite of iron, with confectio aromatica and compound tragacanth powder, should be employed; the hydrarg. cum creta and Dover's powder being exhibited every night. The abdomen or spine ought also to be rubbed night and morning with either of the liniments (F. 296. 300. 311.), upon coming out of the tepid or warm bath, and be rolled in flannel. When the patient's strength is not much reduced, and if there be fever, and offensive evacuations, much benefit will result from a dose of calomel, with a grain of James's powder, at bed-time, and from one to two drachms of castor oil, with half a drachm of the spirits of turpentine, taken on the surface of fennel water the following morning. Clysters of beef-tea, or of strained mutton or veal broth, well salted, may also be thrown up; and the chlorates of the alkalies or of lime, or lime water; the sulphate of iron in small doses, with the sulphate of potash; the liquor potassæ, or the sub-carbon. of ammonia, with infusion of cinchona, or of catechu, or F. 183. 536. 363. &c., may be prescribed. With a light nutritious (chiefly farinaceous) diet, a sufficient quan-

tity of salt should be taken; and if the vital powers be much depressed, warm spiced port wine negus may be allowed in small quantities. In the variety attended by copious, pale, albuminous urine, &c. (§ 17.), strong jellies and soups, animal food, fresh eggs very lightly boiled, the chlorates, with small doses of rhubarb, vegetable and mineral tonics and astringents, the preparations of iron, warm salt-water baths, and frictions with stimulating liniments, are the most beneficial. If the bowels become constipated, the mildest laxatives should be prescribed. If the urine be much diminished in the more common form of the disease after weaning, the spirit. ætheris nitrici ought to be given; and if drowsiness or *coma* supervene, blisters may be applied behind the ears. These last symptoms are more frequently the consequence of exhaustion than of effusion, when they occur late in the disease: or if effusion take place, it is the result rather of the physical state of the brain, a serous fluid poured out from the vessels filling the vacuum that would otherwise have been left by the anæmic and atrophied encephalon, and requires tonic and restorative remedies. In such cases, more advantage will accrue from measures calculated to support the vital powers, to allay irritation in the prima via, and to determine the circulation to the external surface, than from those which depress the energies of life, although they may act beneficially in other respects. It is necessary to watch carefully the state of the gums throughout this serious and obstinate form of diarrhœa, and to lance them whenever they indicate the propriety of the operation. — (*d*) If the diarrhœa, either in infants or older children, be symptomatic of *cerebral congestion, irritation,* or *inflammation* (§ 35.), leeches behind the ears, calomel with James's powder, the semicupium, cold affusions on, and cold applications to, the head, with cooling diaphoretics, diuretics, and external derivatives, are the chief remedies.

37. v. *Diarrhœa in the Dark Races* requires a much more general and liberal use of aromatics, absorbents, and warm astringents, than are admissible in the white variety of our species. In them, capsicum and the other hot spices, with cretaceous powders and mixtures, the preparations of catechu, of kino, of iron, &c., are almost indispensable. When symptoms of retained fæcal matters are present, purgatives are requisite, but they should be of a warm and tonic kind, or be combined with substances of this description. Although diarrhœa is only occasionally *complicated with intestinal worms* in Europeans, and then chiefly in children, or in the inhabitants of low, moist, warm, imperfectly ventilated and unhealthy places, it is very often thus associated in the dark races, and at every age. This circumstance, therefore, should suggest the employment of anthelmintics, especially those which are tonic and astringent, as the decoction of the pomegranate root, or the pink-root, or the male fern, in preference to other medicines, particularly when these parasites are suspected to be present. In this class of subjects, whether diarrhœa be thus associated, or simple, a sufficient quantity of salt with aromatics should be allowed, and the patient's strength be kept up by suitable nourishment, and by vegetable and mineral tonics.

38. vi. *The Associations* of diarrhœa (§ 19.) require the greatest discrimination. — (*a*) When it accompanies the *invasion* of *fevers*, it generally proceeds from the irritation of retained excretions and acrid secretions in the prima via. These should be evacuated by an ipecacuanha emetic, and by diluents and demulcents, followed by a full dose of calomel, and this latter by a mild purgative and oleaginous enema. If signs of vital depression exist, warm diaphoretics with ammonia, and occasional doses of rhubarb with magnesia, and the warm bath, should be afterwards prescribed; but if febrile excitement accompany the diarrhœa, saline refrigerants, and the rest of the treatment recommended in the *serous* variety, will be necessary. (See Fevers.) — (*b*) When the disorder accompanies *gout*, or occurs in the gouty habit, it should not be checked. Mild purgatives may be first prescribed in conjunction with preparations of ammonia, or one of the fixed alkalies; and when morbid secretions and fæcal matters are evacuated, full doses of magnesia, or of potash or soda with the spirit. colchici ammoniatus, and afterwards mild tonics, will generally restore the digestive functions. — (*c*) When diarrhœa is complicated with *bronchitis* (§ 19.), as often occurs during dentition, local depletions, lancing the gums, and calomel or hydrarg. cum creta, followed by a mild purgative, and these by diaphoretics, demulcents, emollients, the tepid or warm bath or semicupium, and attention to diet and warm clothing, are the means to be chiefly depended upon. In many of such cases, ipecacuanha emetics, and in others, camphorated refrigerants, will be productive of great benefit: the former when the bronchi are much loaded, and the stools are mucous and offensive; the latter when there is much heat of skin, and serous or watery evacuations. — (*d*) Diarrhœa complicated with *scarlatina, measles,* or *small-pox,* must be treated with strict reference to the state of vital power, the appearance of the eruption, and the character of the evacuations. These important complications are particularly noticed in the articles on these diseases; but I may here remark, that a sudden arrest of the evacuations may be followed by effusion within the head, and *coma,* whilst their unrestrained continuance may occasion exhaustion, or fatal disorganisation of the intestinal mucous coat. The treatment should therefore be directed, in such cases, with the intentions of diminishing inflammatory action in this part by moderate local depletions, of equalising the circulation and secretions by external derivatives and relaxants, and by diaphoretics and diuretics, and of supporting the powers of life, whenever they become depressed, by diffusible and permanent stimulants. I may state as the result of experience, that, when this complication follows an imperfect developement, or retrocession, of the cutaneous eruption, even moderate depletions are not well borne, unless they be accompanied by warm diaphoretics and diffusible stimulants; and that, of the latter medicines (which are very generally appropriate), full doses of ammonia, or of camphor, or of both, in some instances combined with nitrate of potash, in others with alkaline carbonates or magnesia, in most with demulcents and emollient diluents, in several with laxatives, and in many

with aromatics, or tonics and antiseptics, have proved the most beneficial.— (*e*) When a diarrhœa that is not critical *accompanies or follows remittent, continued, or adynamic fevers*, the evacuations being watery, muddy, dark-coloured, or otherwise morbid, the hydrarg. cum creta, with ipecacuanha, camphor, and cretaceous substances; or the terebinthinates and the balsams, with vegetable or mineral astringents; also tonics and antiseptics, the nitric and muriatic acids, or both; or rhubarb with magnesia; the chlorates with demulcents; external derivatives with warm rubefacient and stimulating liniments, &c., are the chief remedies, and the most likely to prevent the extensive sloughy ulcerations that sometimes attend the diarrhœa that supervenes either during, or subsequently to, these diseases.

39. *Colliquative diarrhœa* is sometimes not easily controlled; and even when most readily repressed, the constitutional disturbance may be thereby increased. It is most benefited by small doses of the sulphates of copper and of zinc (F. 577. 587.), by the mineral astringents generally, and by the cretaceous and demulcent preparations, combined with camphor, aromatics, and opiates, or with tonic and astringent infusions and decoctions, which, at the same time that they alleviate the symptoms, also support the vital energies. But the adoption and combination of these, or the choice of other remedies already or about to be noticed, should depend mainly upon the nature of the primary disease, of which the diarrhœa is, in this state, merely an advanced symptom.

40. *Cautions, &c.*—The *critical* manifestation of diarrhœa should never be interfered with, unless it either proceed so far as to depress the vital energies, or be attended by signs of inflammatory disease of the mucous surface and follicles, in which case the treatment recommended for the varieties indicative of such disease and its consequences should be prescribed. When diarrhœa occurs in gouty or asthmatic persons, or in those of a plethoric habit of body, or who have a tendency to, or have suffered from, cerebral affections, or hepatic disorders; or in the leucophlegmatic and hydropic diathesis; it ought to be treated with much caution; and should be only at first moderated, if very severe, by mild purgatives or laxatives; by depletions, diaphoretics, and diuretics; by a regulated diet; and by warm clothing, according to the circumstances of the case, because the sudden arrest of the evacuations by opiates and astringents may be attended by some risk.

41. vii. NOTICES OF PARTICULAR REMEDIES RECOMMENDED BY AUTHORS, &c.—*A. Bleeding* has been advised by COTUGNUS (*De Venæsect. in Diarrh.* Rom. 1604.); by HORSTIUS (*Opp.* iii. p. 68.); by ZACUTUS LUSITANUS (*Med. Pr. Hist.* l. ii. p. 734.); in the bilious variety, and by SYDENHAM. It is obviously requisite in the inflammatory states of the disease, whether acute or chronic, and preferably by leeches applied to the abdomen, to the sacrum, or to the verge of the anus, particularly when tenesmus is present.

42. *B. Refrigerants* are always beneficial in the serous and mucous varieties, and when the complaint is attended by increased heat or excited circulation, and erect papillæ of the tongue; and they may be combined with demulcents and opiates (F. 36. 821. 838. 886.) according to the circumstances of the case. Of this class of medicines the *nitrate of potash* or *of soda*, *camphor* (F. 431.), the *muriate of ammonia* (F. 352. 431.), *borax* (F. 209. 630. 867.), variously combined, and the *tepid bath*, are the most appropriate. RECAMIER (*Annuaire Méd. Chirurg.* vol. i. p. 113.) recommends nitre with the *oxyde of bismuth*, and opiated aromatics. HUFELAND prefers the muriate of ammonia (STARCK, *Archiv.* b. i. st. 3. p. 93.) in the inflammatory states, and when it accompanies fevers; and ZADIO combines it with mucilaginous substances (*Journ. der Erfind.* st. xxi. p. 57.).

43. *C. Laxatives* and *mild purgatives* have already been sufficiently noticed. Those of an irritating nature are not unfrequent causes of the complaint, and ought never to be prescribed. Even castor, olive, or almond oil, if they be in the least acrid or rancid, will be productive of much mischief. I have seen enteritis supervene on diarrhœa from this cause. In the chronic states of the disease, *sulphur*, with cream of tartar and sub-borate of soda, in the form of electuary (F. 790.), and conjoined with aromatics, is often the best laxative that can be employed. It has been preferred by LANGE (*Miscell. Verit.* p. 29.), and it possesses the advantage of relaxing the skin.

44. *D. Diaphoretics* are of much benefit in all the febrile states of the disorder, particularly the serous variety, and are advantageously combined with refrigerants. They have been adopted by SYDENHAM, DIEMERBROECK (*Observat. et Curat.* No. 64.), LENTIN (*Beytrüge*, b. iv. p. 332.), OSIANDER (*Denkwürdigheiten*, b. ii. p. 179.), &c. The chief of this class are James's powder, ipecacuanha, camphor, carbonate and acetate of ammonia, spiritus ætheris nitrici (F. 394. 840.), &c. *Ipecacuanha*, particularly when associated with nitrate of potash, camphor, and opium, is one of the most certain and efficient remedies we can prescribe in all the acute forms of the disease; and it is also a very useful adjuvant of other medicines (see F. 39. 495. 642. 744. 924.). It has been very generally used, and particularly by LINNÆUS (*Amœn. Acad. Upsal.* vol. viii. p. 246.), FOTHERGILL (*Med. Observat. and Inquir.* vol. vi. art. 18.), BALDINGER (*N. Magazin.* b. xix. p. 404.), STARK, LOEFFLER (*Beyträge*, b. i.), and BROUSSAIS (*Loc. cit. in Bibli.*), either in the combinations now noticed, or in those constituting the old and new Dover's powder. It may also be given with the nitrate of soda, and opium; or with the *tormentil*, as formerly directed by me (*Lond. Med. Repos.* vol. xviii. p. 329.).

45. *E. Demulcents and emollients* are of service in all the varieties of diarrhœa: those of an oleaginous kind, in the form of an *emulsion*, when a laxative is required, as the castor, olive, or almond oil, with ammonia, or the fixed alkalies, &c.; and those of a mucilaginous description, when a constipating effect is desired, as the compound powder of tragacanth (F. 389.), or mucilage of acacia, and decoction of Iceland moss (LIND. HERBER, *in* HORN, *Archiv.* Nov. 1810, p. 289.); and they may be combined with refrigerants, or opiates, aromatics, absorbents, or astringents,—also with *sedatives*, as the hydrocyanic acid, the preparations of morphine, or of hyoscyamus, or of hop, or those of ipecacuanha, according to circumstances. (See the EMULSIONS, in the *Appendix*.) They are often of great ser-

vice when administered in the form of small *clysters*, conjoined with opium, as advised by Sydenham (*Opp*. p. 87.), Hildenbrand (Hufeland, *Journ. der Pr. Heilk*. b. xiii. st. 1. p. 148.), and Hufeland (in *Ibid*. b. xxvi. st. 3. p. 155.)

46. *F. Absorbents* are especially indicated when the complaint is connected with acidity in the prima via; and the cretaceous, magnesian, and ammoniacal substances, combined with opiates, aromatics and astringents (F. 37. 347. 354. 384. 442. 648.), are the most serviceable when relaxation of the mucous surface and debility exist; and the sub-carbonates of the fixed alkalies, associated with refrigerants (F. 838.), when inflammatory action is present in this surface.

47. *G. Aromatics* (F. 348. 363.) are particularly requisite in asthenic cases, and if the patient has been in the habit of using hot condiments and spices with his meals; or when the diarrhœa arises from unwholesome water, from stale animal food, and from endemic causes; in which circumstances, *charcoal*, in large doses, as recommended by Dr. Jackson, and some American physicians, may also be given. Aromatics are best combined with absorbents and vegetable tonics or astringents.

48. *H. Tonics*, particularly calumba (F. 51. 869.), cascarilla (F. 870.), and cinchona (F. 380, 381.), are often requisite, especially in conjunction with the alkaline and other absorbents, and with aromatics, opiates, &c.; and in the idiopathic, the asthenic, and chronic states of the disease. In such cases, and thus combined, *calumba* has been recommended by Percival (*Essays*, vol. ii. p. 3.), Stark (*Klin. und Anat. Bemerk*. p. 7.), Thomann (*Annalen. ad* 1800, &c.), Frank (*Acta Inst. Clin. Viln. Ann*. ii. p. 79.), Fischer (in Hufeland, *Journ. d. Pr. Heilk*. b. xvi. st. i. p. 123.), and Lichtenstein (*Ibid*. b. xix. st. i. p. 180.); *quassia*, by Lettsom (*Mem. of Med. Soc. of Lond*. vol. i. p. .); *cascarilla*, by Bang (*Act. Reg. Soc. Med. Haun*. vol. i. p. 241.) and others; the *willow bark* (F. 414.), by White (*On the Broad-leaved Willow Bark*. Bath, 1798.); and the *cinchona* with opium, by Picque (*Journ. de Méd*. t. xlii. p. 433.) and Schmidt (Horn, *Archiv*. b. v. p. 236.), chiefly when the complaint assumes a periodic form, or is connected with remittents or intermittents. *Nux vomica* and *strychnine* have also been prescribed in atonic diarrhœa: the extract of the former, by Theussink, Oswald (*Archiv. der Pr. Heilk. f. Schlesien*, b. ii. st. 4. art. i.), Horn (*Archiv*. Nov. 1810, p. 258.), and Rummel; the latter, by Recamier and Graves (see *Bibl*.), who gave the twelfth part of a grain of it twice or thrice a day, with complete success, in an obstinate case of white mucous diarrhœa. Dr. Rummel considers it particularly efficient in removing this very obstinate form of the complaint, when seated in the lower bowels.

49. *I. Astringents* are requisite in similar states of combination as tonics, and in the same forms of the disease. They are not admissible in the bilious variety, or where fæcal collections or acrid matters are retained, or in the inflammatory states of the complaint, until after depletions, refrigerants, and diaphoretics have been employed; but they are seldom of use whilst the temperature of the surface is increased, and the pulse accelerated, although M. Bally's experiments indicate the contrary.—*a*. Of the *vegetable substances* belonging to this class, the most serviceable are catechu, kino, the *pomegranate bark* or *root*, the *cusparia* or *angustura* bark, *logwood*, &c., and some mineral substances. The preparations of *catechu* with those of chalk and opiate confection, or F. 30. 183. 788., are very generally employed, as well as those of *kino* (F. 34. 536.). Some doubts exist as to whether catechu or kino is most serviceable. Dr. Pemberton preferred the latter; and M. Bally (*Gazette de Santé*, &c. 1829, and *Med. Gaz*. vol. v. p. 700.) found, from an extensive trial of it, that it generally arrested chronic diarrhœa, without fever, in four or five days, when taken to the extent of from twelve to twenty grains daily; and that, even in diarrhœa with fever, and tenderness of the abdomen on pressure, it was equally successful. The bark of the root of the *pomegranate*, as well as its flowers, and the exterior of the fruit, have been long employed in diarrhœa in Eastern countries. They were much prescribed by Mead, Strandberg, and Cullen. Mead gave them in the form of decoction with cinnamon and red roses. They are very beneficial when the diarrhœa is complicated with worms. The *cusparia* or *angustura bark* was much praised by Lettsom (*Mem. of Med. Soc. of Lond*. vol. vi. art. 15.) and Theussink; and is an excellent medicine, either in substance, tincture, or infusion (see F. 201. 413.). The *krameria*, or *rhatany root*, first employed in diarrhœa by the Spanish physicians, Dr. Ruiz (*Mém. de l'Acad. Roy. de Madrid*, 1796, p. 364.) and Dr. Hurtado (*Journ. de Méd*. &c. t. xxxvii. p. 216.), has since been used with advantage in this country (F. 734.). The *simarouba bark* was recommended by Jussieu, Capet, Frize (*Annalen*, i. p. 59.), and Werlhof (*Observat. de Febr*. sect. iii. § 6.), but chiefly in the diarrhœa attendant on fevers; and the *mahogany bark*, by Hughes (*Med. Facts and Observ*. vol. vi. art. 10.). These may be prescribed in the form of infusion with the *arnica*, the root of which has been much used by Theussink in this complaint. The *logwood* is an excellent astringent, and, in the form of decoction, a suitable vehicle for other remedies. The *bistort*, the *uva ursi* (F. 217. 396.), and *tormentil*, are also of much service, particularly when associated with ipecacuanha. The root of *comfrey*, the *consolida major*, is recommended by Hufeland (*Journ. der Pr. Heilk*. 1809.); and the *lythrum salicaria*, by Blom, Bang (*Op. cit*.), De Haen (*Rat. Med*. par. iii. par. 195., p. iv. p. 250.), and Herz (*Briefe*, st. i. art. i.). They are much employed in the north of Europe.

50. *b*. The *mineral astringents* are very beneficial in several of the forms of diarrhœa, particularly the chronic. *Lime* in various forms,—in cretaceous powders and mixtures, chiefly as absorbents; and in the state of *chlorate* (F. 283.), or recent *lime water*, as powerful astringents,—are very serviceable, especially when associated with demulcents, mucilages and aromatics. I have used the chlorate of lime on many occasions with advantage; and *lime water*, with boiled milk, or with the other medicines just referred to, is in very general use. *Alum*, also, variously combined, or in the form of *alum whey*, has been

praised by Adair (*Edin. Med. Comment.* vol. ix. p. 21.) and Harrison (*New Lond. Med. Journ.* vol. ii.). It may likewise be given with other astringents, or with aromatics and opiates. The *superacetate of lead* was prescribed by Dr. Archer (*N. Y. Med. Repos.* vol. iii. No. 3.), with opium; but Horn (*Archiv.* b. vi. p. 144.) states that he found it of no use. I have seen benefit derived from it in the diarrhœa attending the advanced stages of phthisis. The *sulphate of copper* has been tried successfully by Dr. Elliotson, in doses of from half a grain to two grains, given twice or thrice a day, with opium; and the *ammoniated copper* has been prescribed by Bianchi (Brera, *Comment. Medici. Dec.* i. vol. ii. art. 2.). The *sulphate and oxide of zinc* are also useful, especially when combined with rhubarb, or myrrh, or the balsams, or terebinthinates (F. 578. 587. 666. 875.). The *nitrate of silver*, triturated with a tonic or astringent extract, and in small doses, has been employed by me on various occasions with advantage, particularly in the mucous variety, and in very chronic cases. The mineral astringents are often the most efficacious in colliquative diarrhœa.

51. *K.* Besides the above, there are *other remedies* which may be noticed. These are, the *tussilago* (Percival, *Essays*, vol. ii. p. 224., and Friborg, in *Todes Biblioth.* b. i. p. 118.); large doses of *almond oil*, as an emollient and laxative (Vallisneri, *Opp.* iii. p. 278.); the infusion of the *diosma crenata* (F. 231. 396.); the *plantain* in demulcent broths; unripe *medlars* (Forestus, *Opp.* vol. iii. p. 47.); the root of the *geum urbanum* (De Meza, in *Acta Reg. Soc. Med. Haun.* vol. ii. No. 4. p. 28., and Ranoé, in *Ibid.* vol. iii. p. 369.); the *Peruvian*, *Canadian*, and other balsams (F. 369.); the *briony* (Arnaud, in *Journ. de Méd.* t. lxxvi. p. 257.); the *decoction of elm-bark* (Collingwood, in *Edin. Med. Comment.* vol. xvi. p. 58.); and *camphor* (Thomann, *Annalen ad* 1800, p. 355.); which latter I have already recommended, from a frequent experience of its good effects when judiciously prescribed. *Sarsaparilla* will also be found useful in chronic states of the complaint, and may be associated with the decoctions of elm-bark or of Iceland moss, or with lime water or liquor potassæ; small doses of hydrarg. cum creta, with Dover's powder, being exhibited at bed-time. Bang advises *salivation* in obstinate cases; and in rare instances it may be advisable to resort to it. Dr. A. Stout (*Phil. Med. Journ.* May, 1823.) states that he cured a case of diarrhœa from suspended menstruation by the *ergot of rye*, given in doses of six grains three times a day.

52. *L.* The administration of most of the medicines noticed in the course of this article, in the form of *clyster*, will prove of much benefit, whenever signs of disorder in the course of the colon can be traced, or when the complaint has been preceded by dysentery. In these, Horn (*Archiv.* b. vi. p. 139.) advises the infusion of valerian to be administered in this way. An infusion of ipecacuanha may likewise be thus prescribed. When the diarrhœa assumes a chronic form, *warm or tepid salt-water bathing*, or *artificial irritations* and *eruptions* induced on the abdomen, and kept up for some time, will be generally serviceable. When this practice cannot be adopted, either warm, tonic, and deobstruent plasters should be placed on the abdomen or loins, or a flannel belt or roller be worn around the lower part of the trunk. I have found a large plaster consisting of equal proportions of the emplast. picis comp., the emplast. ammoniaci cum hydrargyro, and the emplast. galban. comp., extremely useful, particularly when the complaint has been connected with hepatic disease. These means, in the most severe and obstinate cases, will be much promoted by slow and frequent or constant travelling, or sea voyaging.

53. *M.* The *diet* should be strictly regulated, not only in the course of the disease, but also during convalescence, and after recovery. Whilst the complaint continues, especially in the acute form, the food ought to be farinaceous, very mild, and in small quantity. In the chronic states, also, this injunction should be followed in many cases; the lighter kinds only of animal food, in small quantity, being allowed when the patient's strength requires it. Malt liquors, acid wines, and acid or over-ripe fruit, or pastry, particularly its crust, ought to be entirely relinquished. Good or old port wine, however, or old sherry, will frequently agree with the patient, and is often even requisite. In cases requiring astringents and tonics, not only may wine be allowed, but also a substantial, but light, diet of well-seasoned and simply dressed animal food. The diet, during convalescence and recovery, ought never to be continued on so restricted a scale as to lower the patient's vital energies, without making trial of the effects of that which is more nutritious.

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DIGESTIVE CANAL — its Lesions.

— Syn. *Digestive Tube*, *Alimentary Canal*, *Prima Via*, *Gastro-intestinal Canal or Tube*. *Canal Gastro-intestinal*, Fr.

Classif. — General Pathology; *Morbid Structures*.

1. The several morbid changes to which the *digestive canal below the diaphragm* is subject, will be noticed here, in a general and connected manner, its principal diseases being described individually in separate articles. The changes experienced by that part of the tube which is placed above the diaphragm, are detailed in the articles Fauces, Œsophagus, and Pharynx.

2. *Of certain appearances in the digestive tube, that cannot be imputed to disease of any part of it, but which have often been mistaken for disease.* — The internal surface of the stomach or intestines of a living animal, whose circulation is not disturbed, is of a red tint, somewhat deeper than that of the mucous membrane of the cheek of a healthy person. During the period of digestion the tint is much deeper, evidently owing to increased flux of blood; and its secretions and exhalations are much increased. The red tint of health, however, disappears after death; and the digestive surface generally becomes uniformly pale, or slightly rose-coloured in places, at the period when *post mortem* examinations are usually performed. There are, however, certain circumstances which modify its appearances upon dissection, totally independent of disease of any part of the digestive canal. Some of these circumstances have operated shortly before death; others during the last moments only; and several either soon, or a considerable time, after the extinction of life.

3. (*a*) The *causes* which operate before death, are, 1st. The performance of the digestive processes, the increased redness of the villous surface attending them generally continuing after the cessation of life. 2d. The free return of the venous blood from the gastro-intestinal tube, to the right cavities of the heart, causing, in the first degree, simple congestion of the venous trunks; in a higher degree, along or continuous with this congestion, an injection of the small vessels in streaks, stripes, patches, or points, with opacity of the injected parts; and, in the highest degree, a partial effusion of blood into the submucous cellular tissue, forming ecchymoses, or into the cavity of the part, colouring red the matters contained therein. It is evident, not only that the disease of remote or related organs will thus affect the colour and state of injection of the vessels of the digestive tube, according as it may impede or facilitate the return of blood from them but that the kind, the mode, and phenomena of dissolution will have the same effect. Thus, death by asphyxia generally presents a congested and deep-coloured tint of the digestive mucous surface. These facts, which seem to have been not unknown to Morgagni, to have been proved by experiment by Boerhaave, to have been observed in the cases of strangulation examined by Dr. Yelloly, and to have been demonstrated in cases of asphyxia, and by experiment, by the French pathologists, especially Billard, Andral, &c., are most important, and evidently indicate that disease has been incorrectly imputed to the digestive canal, when the appearances whence the inferences were drawn, arose either from lesions of other organs, or from the mode in which death was produced.

4. (*b*) The *causes* of redness and injection of the digestive mucous surface operating *after death*, are, 1st. The gravitation of the blood; and, 2d. Its transudation through the parietes of the vessels. The *first* of these begin to act immediately after death, and whilst the blood is still fluid, as shown by the researches and experiments of MM. Trousseau and Rigot. The injection and redness of the intestinal parietes produced by gravitation, or injection from *hypostasis*, generally acquires its highest degree at the end of some hours from the extinction of life, and ceases to increase as soon as the fallen temperature of the internal parts allows the blood to coagulate. Hence, the longer the blood continues fluid, and the more abundant it is in the vessels of the digestive canal, the more marked will be the injection of depending parts from hypostasis. The *second* of these *post mortem* causes of redness takes place at a remoter period — usually after twenty-four hours in summer, and after thirty-six or forty hours in winter; but the period varies with the nature of the disease, and the state of the blood at the time of dissolution. This change commences first with red spots in the course of the vessels, isolated, grouped together, or running into one another, giving rise to coloured streaks, and evidently proceeds from the exudation of the blood through the vessels containing it. At a later period, the redness is not limited to the course and situation of vessels; but the whole surface becomes more and more uniformly tinged, until it is equally red, approaching the appearance existing in the internal surface of the blood-vessels under similar circumstances. The following is a summary of the causes modifying the appearance of the gastro-intestinal canal; and which, in in some respects, and with some additions, is the same as given by M. Andral.

5. The digestive mucous membrane is seldom of the same colour in the healthy state. It may be—(*a*) perfectly *white* or *whitish*, although this state does not imply that functional disorder did not exist during life.—(*b*) It may present various tints or *degrees of colour*, without ceasing to be sound, depending, 1. on the performance of the digestive processes, shortly before or at the time of death; 2. on the congestion to which internal vascular parts are liable at the last agony or moments of life; 3. on mechanical obstacles to the return of blood in the veins existing a longer or shorter period before dissolution; 4. on the gravitation of the blood to depending parts; 5. on the exudation of blood through the parietes of the vessels; 6. on the exudation of this fluid

through the capsule of the spleen; 7. on the gases existing in the canal at the time of death; 8. on the developement of other gases at a remoter period, when putrefaction commences; 9. on the combination of the colouring matter of the bile present in the digestive tube, with parts of its mucous surface; and, 10. on the medicinal or other ingesta, which may change its colour so as to resemble the morbid state. Some of the colours produced by these causes cannot be confounded with that resulting from inflammation; others very nearly resemble it, especially those occasioned by the 1. 2. and 4. and certain varieties of 3. and 5. Those states of the digestive surface that most nearly resemble inflammation, may in respect of it be denominated *passive*. M. **Billard** has given the following *diagnosis* between *passive* and active or *inflammatory* redness of the villous or digestive mucous coat. —

Inflammatory.	*Passive.*
a. With or without manifest thickening of the membrane.	*a.* The same.
b. Indifferently in a depending or elevated part.	*b.* Almost always in a depending part.
c. Without general injection of the abdominal vessels, and without any obstacle to the course of the blood; sometimes consisting in only a slight local injection.	*c.* With general injection of the abdominal vessels, and with an obstacle to the course of the blood; rarely being an isolated local injection, but frequently occupying a fold of the intestine, or the whole intestine.
d. With considerable tenderness of the sub-mucous tissue, and a capability of raising the mucous coat in large patches.	*d.* A power of raising the mucous membrane in shreds only, which is the case in health.
e. With thickening and abundance of the intestinal mucus; and sometimes with sanguineous exhalation.	*e.* Without abundance or thickening of the intestinal mucus; but sometimes with sanguineous exudation.

6. This diagnosis refers merely to the differences between *redness* from inflammatory irritation and redness from passive congestion. The various *results* of inflammation of the mucous membrane are entirely left out of the question. This tissue seldom experiences any change in *density* within the period which usually elapses between death and the examination. Therefore, *softening* can very seldom be justly considered a *post mortem* change. In respect, however, of the stomach, the case has been supposed to be otherwise, and upon good grounds. The observations of J. **Hunter** and **Allan Burns** on the human subject; of **Carlisle**, **Cooper**, and **Wilson Philip**, on rabbits; of **Adams**, **Bretonneau**, and **Trousseau**, on dogs; and of **Spallanzani** on fishes; show that the solvent action of the juices of the stomach may be exerted upon itself, within twenty-four hours from death, so as not only to soften its villous coat, but to dissolve both it and the coats exterior to it, until the organ is perforated or destroyed in one or more places. The possibility of this occurrence is shown by the experiments of **Stevens**, **Lovell**, and others, demonstrating the solvent power of these juices; and that it actually takes place, is established by the experiments of Drs. **Camerer** and **Carswell**, as well as by the sound health of the subjects of it at the time of death, and the absence of inflammatory appearances around the destroyed part, or in the peritoneal coat. The healthy state of the other tissues composing the parietes of the digestive canal, and the natural capacity and position of its different parts, require no remark.

7. I. **Functional Disorders.**—The disposition, which has prevailed for many years, and which is still so manifest in medical literature and practice, to impute every morbid condition to inflammatory action, and changes of structure, has been displayed more in this branch of pathology than in any other. Since the appearance of the writings of **Marcus**, and especially since the promulgation of the doctrine of **Broussais**, all the states of disorder referrible, directly or sympathetically, to the digestive organs, have been considered by many to arise from inflammatory irritation and action, or their consequences, in various grades or states of activity; and even those who have not adopted the views of this very zealous writer, have too generally overlooked the primary and controlling influence of the vital endowment in the origin and removal, not only of the diseases of the alimentary canal, but of its related viscera, and, indeed, of those of all other organs. The pathologist who observes closely the action of the numerous agents which either merely change the conditions of life, as manifested in the sensitive and contractile systems, or which produce alterations of structure cognisable by the senses, and who notes the manner in which primary impressions affect related and even remote parts, must have often remarked, that some connection subsists between the nature of the agent, the particular system acted upon, and the effect produced; that the more obvious and palpable lesions are generally remote and often only contingent results; and that alterations apparently identical are often associated with, even when they are not the consequences of, very different states of sensibility and contractility, as well as of the other manifestations of vital power. It is necessary to our enquiries into the morbid states of a part, which, with reference to the formative and vegetative processes especially, is primarily and essentially vital, and which, from its intimate connection with the organic system of nerves, powerfully influences, whilst it is itself influenced by, the vital endowment or appropriate influence of this system, — of a part especially devoted to the preparation of the materials for the reparation of the structures, and the support and perpetuation of life,—to view its changes of function and of structure accordingly, and with strict reference to the foregoing considerations.

8. i. *Changes in the Desire for Food and Drink.* —If the alimentary canal be admitted to be, of all parts of the economy, that in which identity of lesion the least infers identity of symptoms, the same admission should be extended to the causes whence its lesions arise. *Morbid states of hunger and thirst* have, with other disorders of the digestive tube, been imputed either to inflammatory irritation or action, or to organic changes. That they proceed, in many cases, from those lesions, must be admitted; but that they uniformly or necessarily thus originate, cannot be maintained.—(*a*) *Anorexia*, or loss of appetite, although a very general attendant on all the organic changes observed in the stomach, is not uniformly present; for circumscribed lesions have been sometimes found in this viscus, without this symptom having been observed. And, on the other hand, it often exists entirely uncon-

nected with any change of texture. Both M. LOUIS and M. ANDRAL have found, in persons who had long evinced the greatest aversion from every kind of food, the stomach perfectly sound. Anorexia appears frequently, independently of the evidence of *post mortem* research, to depend upon a change in the state of the nervous power, as shown by the influence of moral emotions, and mental and physical fatigue in producing it. Its occurrence as a symptom of all acute or serious diseases of related, as well as of remote organs, and of idiopathic and exanthematous fevers, is well known.—(*b*) The frequent connection of *bulimia* with irritation and organic diseases of the stomach, and even of the bowels, is admitted; but it is also dependent upon a temporary activity in the nutritive processes, as in convalescence from acute diseases; and is then referrible to the condition of vital endowment, as manifested in the digestive and reparative functions.—(*c*) *Pica*, whilst it also often arises from chronic irritation of the stomach, is as frequently a symptom of disorder in the organic nervous system, and even of a morbid state of the blood, and it sometimes depends upon functional or organic change in some remote organ, as the uterus or ovaria. (See APPETITE, MORBID; and CHLOROSIS.) — (*d*) *Thirst* has also been imputed to irritation or inflammatory action; but, although it is certainly a symptom of this and other diseases of the stomach, and the rest of the digestive tube, it likewise arises from diminished exhalation and secretion in the pharynx and fauces; from the rapid discharge of the aqueous parts of the blood by the surfaces or kidneys; and from the superabundance of saline particles in the serum.

9. ii. *Disorders of the Functions of Chymifaction, Chylifaction, and Fæcation.* — That the numerous phenomena attendant upon indigestion may, and very often do, arise from various states of irritation or structural change in the digestive canal, particularly in its villous surface, is unquestionable; and M. BROUSSAIS, although he has pushed the doctrine extravagantly far, has drawn attention to important and too frequently neglected facts. I must, however, contend that disorders of the digestive processes frequently cannot be referred, after the most patient investigation, to such sources; but must be imputed to altered states of the vital or nervous power imparted to the viscera which perform these processes; and that those pathological states generally are more or less intimately associated with debility and altered sensibility, or even wholly consist of these states, affecting either the alimentary canal and related organs, or the œconomy throughout. (See DEBILITY, § 15.)

10. *A*. In respect of *chymifaction*, or digestion in the stomach, the above positions cannot be disputed. For disorders of this function often depend upon causes which observation has proved incapable of directly influencing the organisation, or of acting otherwise than upon the sensibility or the other manifestations of life displayed by this viscus, or even by organs affecting it sympathetically. The influence of moral emotions not only upon chymifaction, but also upon chylifaction and fæcation, is well known. Moreover, the stomach has often presented after death no lesion to account for the total deprivation of function long experienced during life; and even when organic changes have been observed, they have not always been such as usually arise from inflammatory irritation or action: for it should not be forgotten, that structural lesions may also proceed from *sub-action*, or from conditions of vital power, and of vascular action, diminished as to grade, and modified in kind from the healthy standard. Indigestion may therefore arise — (*a*) from depression or modification of the nervous influence; giving rise, 1st, to imperfect or disordered action of the muscular coats of the stomach; 2d, to a diminished or modified secretion of the gastric juices; (*b*) from a morbid state of the mucus secreted by the follicular glands of the stomach, either connected with, or independently of, irritation, (*Embarras Gastrique* of the French); (*c*) from inflammatory irritation and various organic changes; and, (*d*) sympathetically, from functional or structural disease of adjoining or remote organs.

11. *B*. The observations now offered apply equally to the function of *chylifaction*, which, whilst it is often disturbed by inflammatory irritation and organic changes, is as frequently disordered from modifications of the vital or the organic nervous influence supplying the duodenum, the small intestines, and their related organs, particularly the biliary and pancreatic apparatus. When this influence is depressed, exhausted, or in other respects modified, then imperfect and irregular action of the coats of the duodenum and small intestines; deficient, or insufficiently elaborated, or otherwise morbid secretions from their internal surface, and from the liver and pancreas; and alterations of sensibility, as well as of tonic contractility must be the result; whether organic change be superinduced or not; — such change most commonly being the remote consequences of neglected and long continued functional disorder, or of its repeated reproduction by the numerous agents which occasion it. As respects chylifaction, the result must be an imperfectly formed chyle, which undergoes the further process of assimilation either with difficulty or insufficiently, occasioning various disturbances or diseases, expressed chiefly in the secreting or depurative viscera, as well as in the body generally. Also, when the vital influence is insufficiently exerted on the organs of chylifaction, the materials on which they act, more readily assume those combinations to which their chemical affinities, assisted by warmth and moisture, dispose them. But when their vital energy is duly exerted, the secretions poured out by the glands and surfaces, and intimately mixed with the ingesta from the commencement of mastication, are so far imbued with that influence which pervades the œconomy, and converts other substances into those structures, with which it is itself so intimately associated, as to withstand purely chemical affinities, or to change them into such as are strictly vital. And as this controlling and self-perpetuating power is more and more weakened, so are the purely chemical forces more strongly exerted, until various new combinations, either of a gaseous or of an acid or acrid nature, are formed, whereby the digestive tube is inordinately distended, irritated, and, ultimately, permanently changed in structure, capacity, and even in position.

12. *C.* The processes of *fæcation*, although obviously and most severely disturbed by inflammatory irritation and organic changes, are also impeded or otherwise disordered without any such lesions. A deficient exertion of the vital endowment, through the medium of the organic nerves supplying them, or alteration of their sensibility, and the resulting modifications in the tonic and insensible contractility of their muscular coats, and in their exhaled and secreted fluids, are even more frequently the causes of disorders in the functions of defæcation than appreciable organic change; and even when this latter becomes developed, in this part of the canal as well as in others, it is still more frequently the consequence of neglected and continued functional disorder. (See CONSTIPATION.)

13. iii. *Morbid States of Sensibility of the Digestive Canal.*—These states consist chiefly of pain in various grades and modifications. Acute, lancinating, dull or heavy, gnawing, burning, pungent, remittent, periodic, &c.; and, whilst they are often attendant upon,—particularly burning or gnawing pain,—rather than occasioned by, organic lesions, especially of the external tunics of the canal, they are still more frequently unaccompanied by any appreciable change. Indeed, the numerous alterations of texture found in the gastro-intestinal mucous and sub-mucous tissues are seldom attended by severe pain. M. ANDRAL very justly remarks that the mucous coat may be acutely, or chronically diseased — may be inflamed, thickened, softened, or deeply ulcerated — without any uneasy sensation, or, at most, with griping pains on going to stool. The abdomen of persons, whose intestines are ulcerated during adynamic fevers, may be even pressed in all directions, without the sensibility being painfully excited, unless the ulcers extend in depth to the peritoneal surface. On the other hand, the alimentary canal is frequently the seat of the most severe, or even excruciating pain, without its texture being at all affected, as proved not only by *post mortem* examinations, but also by its causes, its sudden accession and departure, and by the juvantia and lædantia.

14. *A.* The *stomach* is the most prone of any part of the digestive canal to experience changes of sensibility, probably owing to the numerous agents, chiefly ingesta — solid and fluid — hot and cold — bland and relaxing — exciting or irritating — depressing or inflaming — indigestible or unwholesome — to which it is subjected during life; and often to all these, in hurtful variety and inordinate quantity, producing opposite impressions on, with extraordinary distension of, its coats. Add to the above, the various passions and emotions which disturb the nervous and circulating systems, and the reasons wherefore the stomach manifests not only the simpler states of indigestion, but also the severe and complicated forms characterised by altered sensibility, disordered action of the muscular coats, and morbid secretion — as cardialgia, flatulency, acid and acrid eructations, pyrosis, rumination, bulimia, gastrodynia, and cramp or spasm, will be apparent. These, although sometimes *associated* with organic change, rather than *occasioned* by it, are most commonly referrible merely to modifications of vital and nervous power and altered sensibility — pathological states, however, which will often superinduce organic changes when prolonged, or aggravated by injudicious treatment and diet.

15. *B.* The *small* and *large intestines* also experience very remarkable changes of sensibility, often without any manifest lesion of structure, but generally in connection with irregular action of the muscular tunics, diminished secretion and exhalation, and an increased production of flatus. The different forms of colic — the flatulent, hysteric, lead, Madrid, bilious, or the dry belly-ach, &c. — are the most marked examples of this state of functional disorder, which may, however, terminate in, or be complicated with, various alterations of texture, or of position and capacity.

16. iv. *Disorders of Secretion and Excretion.* — The secretions and excretions of the digestive tube are disordered in various ways, and often to a very considerable extent, without much general disturbance being the result. — *A.* When the nervous influence of the *stomach*, and occasionally also of the *duodenum*, is suddenly impressed or seriously disturbed, *nausea* and *vomiting*, with increase of the secretions of these viscera, are often, although not always, or even generally, produced. Such disorder may depend on the state of the stomach; on disease of the small intestines, especially of the duodenum; on obstructions in some part of the canal; on affections of distant organs, as the nervous centres, the kidneys, the uterus, &c.; on intense impressions made upon any part of the frame, or on severe affections of the whole system. Even when vomiting is occasioned by a morbid state of the stomach itself, it is as often the result of an altered condition of nervous influence, as of structural change; although in many cases both pathological states co-exist. This act may arise not only from irritating or injurious substances taken into the stomach, but also from similar matters absorbed or introduced into the circulating current, and from morbid secretions poured out from its own villous surface, or regurgitated into it from the duodenum. Ingesta of the most opposite kinds — whether highly stimulating and irritating, or depressing and septic, or simply relaxant — may occasion it; the stomach evincing in either case the disposition to eject whatever is injurious to the frame; the retching often continuing long after the noxious matter is thrown off, apparently in consequence of the morbid impression made by it upon the nerves supplying the organ, and through their channel upon the vital manifestations of the body. Vomiting from irritating or injurious matters in the circulation, arises most probably as much from the effect produced by them on the vital endowment, especially as manifested in the organic nervous system, as from their effect upon the stomach itself through the medium of the blood circulating in it. Indeed, MAJENDIE has shown, that attempts at vomiting will follow from this cause, even when the stomach has been removed from the body. In delicate persons, the sight even of certain substances, or the odour of others, particularly if they at any time had overloaded, or disagreed with, the stomach, will produce nausea and vomiting. The repeated retchings supervening with the collapse consequent upon excesses is probably favoured by the morbid and accumulated secretions generated

during the excitement and the nausea following it. In this case, the vomiting is attributable chiefly to the exhaustion of the nervous influence of the organ, and to the affection of the nervous centres; a moderate repetition of the stimulus, or of some analogous excitant, removing the disorder. *Sea-sickness* is, however, the most conclusive illustration of the frequent origin of vomiting in modifications of the nervous influence. These facts, as well the effects of irritation of the uvula or pharynx, and of inflammatory affections of the brain, and other remote viscera, warrant the conclusion that vomiting is chiefly a nervous affection; and that, although it is frequently attendant upon, it is often also entirely independent of, change of structure, either of the stomach, or even of any other part. (See VOMITING.)

17. *B.* Owing to the superabundance, or the irritating nature of the secretions formed by the intestinal villous surface, or to the quantity or quality of the biliary and pancreatic secretions, or to both pathological states conjoined, *diarrhœa, lientery*, or *dysentery*, may take place, independently of organic lesions and even when such lesions exist, it is generally to the co-existence with them of increased or morbid secretions proceeding from one or more of these sources, that these diseases are to be imputed. Even in *cholera*, in which the eruption of an increased quantity of morbid secretions into the duodenum occasions copious discharges from the stomach and bowels, with cramps, &c., we are not justified in concluding that any organic change is present beyond simple irritation, of a temporary kind, excited in the villous surface by the acrid state of the secretions passing along it.

18. II. LESIONS OF THE TISSUES COMPOSING THE DIGESTIVE CANAL. — The difficulty of distinguishing between the slighter lesions of structure, and changes occurring shortly before and after death, as well as states of the villous membrane connected with the conformation and diathesis of the individual, has already been pointed out. More frequently, however, no such difficulty exists, the change being of a kind that will not admit of a doubt as to its nature. But in judging of very many of these more palpable lesions, we shall fall into numerous errors, if their more prominent appearances merely be considered, without reference to their causes, and to the state of vascular action which occasioned them, and to the conditions of vital power with which the vascular action was associated. For various changes of a remarkable description, closely resembling each other, may arise from very different states of vascular action and of vital power — either from sthenic inflammation, or increased organic action of the tissue, or from sub-action or diminished organic action, or from perverted nutrition of the part. To ascertain the nature of the morbid process, therefore, which gives rise to very manifest lesions, from even the closest examination of these lesions themselves, is frequently a matter of difficulty, and often of impossibility, in the present state of our knowledge; and it is chiefly by connecting them, as far as we may be enabled, with their causes, and with the conditions of vital power and of vascular action, that we can approach to accurate views of their nature. This I have attempted to do more fully and appropriately in the article INFLAMMATION; and have only referred to these important and too much neglected pathological states, when the nature of the changes required that they should be briefly noticed.

19. It should be understood that the several lesions about to be noticed, may exist either separately, or variously associated the one with the other; in some cases, in the same part of the canal, and holding the relation of cause and effect; in others, in distinct or remote parts, and without any such connection. As it will, however, be impossible to describe the changes observed in this part, in their numerous states of association, they will be considered separately, but with reference to such of these states as are most common. I shall, conformably with this plan, notice—*first*, changes of vascularity; *second*, lesions of the tissues composing the canal; *third*, lesions of internal secretion, comprising adventitious productions; and, *fourth*, changes of capacity and position.

20. i. *Changes of Vascularity, or Lesions of Circulation.*—*A. Anæmia*, or diminished vascularity of the digestive canal is sometimes observed; extreme paleness, existing either throughout, or in parts only. It is usually attended by more or less attenuation of the gastro-intestinal parietes; and is most frequently met with in subjects that have died from the exhaustion of chronic diseases, or after severe fevers. In these cases, ulcers are often found co-existent with it, that are as pale and bloodless as the surrounding tissue. This association of anæmia with asthenic ulceration is not infrequent in children who have suffered from chronic diarrhœa and lientery, with or without mesenteric disease, and who have died comatose. Anæmia of the digestive canal is also observed in cases of fatal hæmorrhage from other organs.

21. *B. Increased vascularity*, not arising from the causes stated above (§ 3, 4.), but from excited organic action, is of extremely frequent occurrence. As it is generally confined to the villous membrane, the canal externally will often exhibit no appearance of it, or will even be unusually pale; for sometimes, when this membrane is intensely red, the subjacent cellular tissue even, and the rest of the tunics, are quite devoid of colour. It is owing to this circumstance chiefly, that the existence of increased vascular action in cases of bowel complaints has been, until recently, so much overlooked amongst pathologists. This connection of inflammatory injection of the villous coat with disorders of the digestive tube had not, however, entirely escaped the observation of GLISSON, BAGLIVI, MORGAGNI, L. BANG, and C. SMYTH, and was afterwards placed in its true light by PINEL, BAILLIE, MARCUS, HILDENBRAND, ABERCROMBIE, LATHAM, ANDRAL, GENDRIN, BILLARD, and others (see *Refer.*); whilst BROUSSAIS and his followers made it the basis of a pathological doctrine, and stretched it beyond its legitimate limits.

22. Increased vascularity may be seated chiefly or separately in the *villous membrane itself*, or in its *villi*, or in the *follicles* either disseminated through or aggregated in it, or it may affect two or all of these anatomical elements

simultaneously. — (*a*) When the *membrane* itself is injected or inflamed, the appearances are diversified; but at first the light can still be partially seen through the coats, the vessels being disposed in a finely arborescent form. Somewhat later, the opacity is complete; the *redness* being at the commencement in spots, stars, patches, streaks, or bands; and of a rose or florid colour; but afterwards more deep, and dark or purplish; and terminating either insensibly or abruptly. — (*b*) When the *villi* are inflamed, the internal surface presents a number of red points, which are often closely crowded together, rendering the membrane opaque. Upon a close inspection, these points are found to consist of the villi; their injection occasioning the change of colour, which is either limited to their summits, or is extended from thence to their bases. In some instances, the injection is altogether confined to the villi; in others, the membrane itself is also more or less affected. In many cases, the villi are of a brownish or even blackish colour, particularly in persons that have had chronic diarrhœa. Active injection of the villous membrane may thus exist in an acute or chronic state, without any further change, for periods of very variable duration. In some cases, it will terminate in softening or ulceration in a few days; and in others, signs of irritation may exist for a very long time, and still simple injection without change of structure will only be found. — (*c*) When the *follicles* are the seat of increased vascularity, the injection is in the form of a small circle or *areola*, consisting of interlaced capillary vessels, with slight elevation of the membrane of the part, owing to the injection of these vessels and the tumefaction of the follicle. Often a smaller red circle is placed within the preceding, and situated, as M. Andral supposes, in the margin of its orifice. Sometimes the situations of the follicles present both these inflamed circles quite distinct; at other times they both increase, and at last meet each other. In some cases, instead of these reddish circles, brownish or blackish circles, similarly disposed and elevated, are met with. In other instances, where this disposition of the injected vessels is observed, there is neither tumefaction within the circle, nor depression in the central red point, to indicate the existence of a follicle. Inflammation of the follicles of Brunner and Peyer has recently attracted great attention owing to the writings of Bretonneau, Trousseau, and others on the subject (see the *Bib. and Refer.*).

23. Increased vascularity of the digestive canal is seated either (*a*) in the arterial and other capillaries, (*b*) in both the capillaries and venous trunks, or (*c*) in the larger vessels only. The *first* of these is an undoubted evidence either of irritation or of incipient inflammatory action, if no further lesion exist. The *second* may belong either to these pathological states, or to congestion, of a morbid kind existing during life, or of a mechanical nature occurring after death. The *third* may be the indication of pre-existing inflammation, partially subdued, or of increased determination of the circulation to the part. It is of importance to recollect, when judging respecting the nature of increased vascularity observed in the digestive tube, that, when it arises from augmented organic action, it commences in the capillaries and extends to the larger vessels, — the former only being found injected after death, in many instances; whereas, when it proceeds from passive congestion, it begins in the large veins and extends to the capillaries—the former only sometimes continuing injected after dissolution. When the vascularity is active, it commences generally with a capillary or reticular injection, which increases until an uniform red tint takes place, and every transparent interval disappears, owing to the crowded state of the injected capillaries. As the vascularity declines, it again assumes the reticular form, and at last only some large vessels are observed in an injected state.

24. Can the colouring of the part be an index of a *primary chronic*, or of a *consecutively chronic*, state of inflammation, or of an *acute* inflammation which has supervened on the chronic? An approximation only to the truth can be made in answering these questions. M. Andral supposes that the brown, grey, and slate colours especially belong to chronic irritation. But substances taken into the stomach, and proving quickly fatal by the extensive and intense irritation they occasion, or by their noxious impression on the nerves of organic life, or by both modes of action, usually impart a brown, dark, or purplish colour to the injected villous surface. The inflammation also of this surface, in adynamic fevers, is often of a very dark ochry or brown colour; and the asthenic forms of inflammatory action, as well as many of those in which the blood is contaminated or otherwise morbid, frequently present similar hues. Also a red colour may attend chronic as well as acute inflammatory action, although much less frequently. The above lesions of circulation are generally followed, after a longer or shorter time, according to the state of vital power, the condition of the circulating fluid, and intensity of action, by a change, to a greater or less extent, in the vital cohesion, and tonicity of the tissues composing the parieties of the canal, giving rise to the alterations of texture about to be described.

25. ii. *Lesions of the Tissues composing the Parietes of the Canal.* — *A. Atrophy* may affect only one, or all the coats of the gastro-intestinal parietes. — (*a*) Atrophy of the *villous membrane* presents several grades: in a less degree, or at its commencement the *villi* are greatly diminished, or nearly or altogether effaced. In a more advanced grade, not only have the villi disappeared, but the membrane itself is remarkably attenuated. In some cases, the villi are obliterated in places, and not in others. In the situation of cicatrised ulcers they are always absent. Atrophy of the villous membrane is met with chiefly in chronic cases, similar to those in which anæmia has been stated to occur; and it is obviously in some cases a *post mortem* change. It is often a consequence of anæmia; but it may accompany ulceration, vascular injection, or other lesions of the digestive canal. — (*b*) The *muscular coat* may also be atrophied, so that its fibres become much less apparent, the fasciculi wasted and separated by wider intervals, occupied by cellular tissue, from which they can hardly be distinguished. Atrophy of the muscular coat most frequently co-exists with atrophy of the other tunics, but it may also occur when they are hypertrophied,

especially when the sub-mucous cellular tissue is much thickened.—(c) All the coats of the digestive canal may be co-existently atrophied, the parietes of the canal being then remarkably attenuated, and appearing to consist merely of a sero-cellular tissue, which is transparent and colourless, and apparently without villi, follicles, or blood-vessels (Andral, Louis, Billard, &c.). This change is only met with in any considerable degree in parts of the tube; most frequently in the splenic portion of the stomach, and lowest third of the ilium.

26. B. *Hypertrophy*, or thickening, of the parietes of the alimentary canal may be confined to a single tissue, or may simultaneously exist in all the coats of which they are composed. This change, when far advanced, or seated in the sub-mucous tissue, and particularly when associated with ulceration, has been often mistaken, until recently, by British pathologists for scirrhus, and by Continental writers for true cancer. Although thus generally misconstrued, it appears to have been better understood by Rudolphi (*Bemerkungen*, th. i. p. 35.) and Thilenius (*Med. u. Chir. Bemerk.* i. p. 202.).

27. (*a*) *Hypertrophy of the villous or mucous membrane* consists of an increase of its density as well as of its thickness, and is thereby distinguished from the slight tumefaction produced by inflammatory injection of its capillaries, and from tumefaction and softening, with more or less discolouration, occasioned by acute inflammation, or intensely irritating ingesta.—*a.* When really hypertrophied, the villous coat may be removed in large shreds, which are harder as well as thicker than natural. When thus altered, it rarely retains its natural colour, but commonly presents either various shades of redness, or a slate-coloured, or a brownish, or blackish tint. This lesion is most common in the stomach; next in the rectum, cæcum, and colon; and least so in the small intestines. It may exist throughout either of these viscera, or in parts or points merely. When the membrane is thickened in the whole or greater part of the viscus, it may be either smooth, or unequal; in the latter case it usually presents a number of elevations separated by depressions, giving it a mammillated or papillary appearance. When the hypertrophy is only in isolated spots or points, it may proceed so far as to produce various elevations, patches, projections, tumours, and polypous growths, with or without narrow pedicles, and which have often been mistaken for fungous or malignant formations; but which, when prominent, are more appropriately termed vegetations or *excrescences*. They have been described by Bartholinus, Van der Wiel (cent. i. obs. 56.), De Haen (*Rat. Med.* vi. cap. 4.), Bauer, Schaarschmid (*Méd. u. Chir. Nachrichten*, b. v. obs. 10.), Sandifort (*Observ. Anat. Pathol.* l. i., *et Mus. Anat.* i. p. 255.), Portal (*Anat. Méd.* t. v. p. 243.), Baillie (*Ser. of Eng. &c.* fasc. iv. pl. 6.), Stark (*Archiv.* b. i. st. iv. n. 3.), Rebière (*Journ. de Méd.* t. lxiv. p. 619.), Andral, and others. These *excrescences* may either be of the usual consistence and colour of the mucous coat, or they may be harder or softer. They may also present every shade of colour; and be either nearly bloodless, or remarkably vascular. In some cases, their capillary vessels are so numerous or interlaced as to impart to them an erectile appearance; in others, their veins are large and engorged so as to resemble the morbid productions described hereafter (§ 48—51.). They have bases of various extent; in some cases large, in others very narrow, or slender pedicles; their summits being either pointed or rounded, or broad, resembling a mushroom. They are found in every part of the gastro-intestinal surface; in the cardiac and pyloric orifices, or any part of the stomach; in the cæcum, in the commencement of the rectum, in the colon, and least frequently in the duodenum and small intestines. About the anal orifice, however, and inferior part of the rectum, they are very common, and are there often produced by the syphilitic virus. Their number varies from one to twenty or more. M. Rullier preserved a stomach which was studded with about eighty, each of the size of a filbert. They may exist simultaneously in different portions of the digestive canal, as in the stomach and cæcum.

28. *β*. These excrescences should not be confounded with hypertrophy occurring in some of the *villi* with which the membrane is provided. When much enlarged, the villi project further, and are of a whiter colour, than the rest of the surface; and form small cylindrical vegetations, which may be readily distinguished from excrescences of the mucous coat itself.

29. *γ*. The villi, however, are much less frequently hypertrophied than the *follicles*. When the digestive canal of adults is studded with very apparent or projecting follicles, we may consider these bodies as diseased, although they may not be really hypertrophied. When they participate in the increased vascularity of the inflamed mucous coat, they become tumid from this circumstance, or from the morbid secretions collected in them, but not truly enlarged. When the aggregated follicles are tumified, elevated patches are thereby formed, giving rise to the *Dothinenteritis* of M. Bretonneau. However, as M. Andral has remarked, when thus tumified from increased organic action, their nutrition is often thereby augmented, and they then continue enlarged, or even increase in size, after the morbid vascularity has disappeared, and are then truly hypertrophied. When thus changed, they consist chiefly of small, conical, hard, whitish bodies, with central orifices. This lesion is met with often in persons whose digestive functions had not been disordered, as well as in those who had experienced either acute, chronic, or recurring diarrhœa. But hypertrophy of the follicles may also arise without any signs of antecedent increase of vascularity either in them, or in the villous membrane itself. When this has been the case, the only disorder has been either constant, or recurring diarrhœa; but as often no ailment has been complained of. Enlarged follicles may have their orifices of the natural size, or widened so as to be mistaken for a small ulcer, or narrowed and even obliterated. When this latter occurs, the follicle becomes distended by its secretion, in some cases, to such an extent as to form large globular tumours. The parietes of the hypertrophied follicle may also be transformed into a fibrous, or fibro-cartilaginous, or even a cartilaginous tissue, thereby augmenting their thickness,—a change justly

imputed by M. GENDRIN to chronic inflammation. Hypertrophy of the follicles is most common in the inferior part of the ilium, in the cæcum, in the rectum and colon, and in the duodenum, but is rarely met with in the stomach. It is most frequently a consequence of *diarrhœa*, *dysentery*, and *gastric fevers* (which see); and may be mistaken for tufts of enlarged white villi, and for small white bodies, consisting of the rudiments of *valvulæ conniventes*. It is very common after the bowel complaints of children, amongst whom, however, the follicles are always more manifest than in adults.

30. (*b*) *Hypertrophy of the sub-villous tissues* may be more or less general throughout one of the principal divisions of the digestive canal, or it may be circumscribed. It is not unusual to find, after chronic diarrhœa or dysentery, the *sub-mucous cellular tissue* much more apparent than usual, or even two or three lines in thickness, in the colon or rectum, or both. It is then denser than natural, sometimes with more or less regularly arranged fibres, or plates, of a pale or pearly white colour, and without any evident blood-vessels. It is often of a homogeneous semi-cartilaginous-like texture; but when thus generally *enlarged* and *indurated*, the hypertrophy is never so great as when it is circumscribed. When it forms, in some part of the canal, a tumour, elevating the mucous surface by its thickness, it constitutes the change to which the term *scirrhus* has been very generally applied, and differs from the diffused hypertrophy only in being circumscribed, and many times thicker. That the tumour occasioned by the circumscribed hypertrophy, whether existing in the cardia or pylorus, is not the result of the production of a new tissue, but arises from enlargement and *induration* — owing to excessive irritation — chiefly of the sub-mucous tissue, is manifest in the early states of the lesion. This may continue to be the only change; but often ulterior alterations take place, and a new structure is developed; the part becomes vascular, is sometimes divided into lobes, and morbid secretions are poured into its substance, whereby it acquires the appearance of areolæ and cells containing these secretions; the fibriles of the cellular tissue between them becoming at the same time more and more hardened and hypertrophied. Frequently the hypertrophy is not confined to the sub-mucous tissue, but is extended to the tissue connecting the muscular and peritoneal coats; hardened, white fibres running between and separating the fasciculi of the interposed muscular coat, and thereby connecting both layers of hypertrophied cellular substance. M. ANDRAL considers these fibres to consist of the cellular tissue placed between the muscular fibres, also in a state of hypertrophy; the latter structure gradually disappearing before the progressive increase and induration of the former. At last, all appearance of muscle is lost, and a mass either of simply hypertrophied and indurated cellular tissue, or of this substance further and consecutively altered, chiefly by the deposition into it of morbid secretions, is placed between the peritoneal and mucous coats.

31. This lesion is generally the consequence of inflammatory irritation long kept up or frequently reproduced in the mucous membrane, which may be sound, no change of it having existed, or that which formerly existed having ceased. More frequently, however, it is either injected, indurated, softened, ulcerated, or entirely eroded in the hypertrophied part. Hypertrophy of the sub-mucous tissue is most frequent in the stomach and large intestines, particularly the rectum, where it may be either diffused or circumscribed; and the least so in the small intestines, in which it is commonly circumscribed. It is rarely met with in infants. MM. BILLARD and ANDRAL have, however, observed it in them; and I have seen it in the colon of children a few years of age, who had long been affected with chronic diarrhœa. It seldom is seen in the stomach before thirty; but it is common in this viscus between the ages of thirty-five and sixty-five, especially near the pylorus and cardia.

32. (*c*) *The muscular coat* is sometimes hypertrophied, either alone, or along with the sub-mucous tissue. In the former case, the pyloric orifice of the stomach is its chief seat (CRUVEILHIER, R. PRUS, LOUIS, BOUILLAUD, ANDRAL, &c.), and is much increased in thickness from this circumstance. In hypertrophy of the sub-mucous tissue, the muscular coat, instead of disappearing before the increasing bulk and induration of the cellular tissue that surrounds and penetrates it, as most frequently occurs, and as above described, is sometimes also hypertrophied. In this case, when a section is made of the diseased part, the hypertrophied muscular coat may be traced, in the form of a bluish semitransparent layer, placed between two other layers of a whitish colour, consisting of the sub-mucous and sub-peritoneal cellular tissue also in a state of hypertrophy. This central or muscular layer is traversed by lines of the same colour as the layers on each side of it; the enlargement and induration thus extending to the muscular coat, and through its fibres, by means of their interposed cellular tissue, to that connecting it with the peritoneum. This lesion is most frequent in the stomach, particularly near the pylorus, and constitutes, as well as the preceding states (§ 27.) — often with various alterations of secretion superadded — what is usually called *scirrhus*. (See STOMACH — *Diseases of*.)

33. C. *Hypertrophy of the nerves and vessels*. — (*a*) The *nerves* supplying the gastro-intestinal canal are very rarely enlarged. M. ANDRAL has never observed any such change in them. M. R. PRUS, however, found, in a case of circumscribed hypertrophy of the sub-mucous tissue and muscular coat (*scirrhus*) of a part of the body of the stomach, the right œsophagæan branch of the pneumo-gastric nerve increased to twice its bulk, from the cardia to its disappearance in the tumour. It should be recollected, that the state of the nerves is seldom enquired after in *post mortem* inspections, and that to ascertain the condition of the ganglial nerves requires the most minute research, which can seldom be devoted under such circumstances. — (*b*) The *blood-vessels* of the gastro-intestinal tube are very often large and dilated; but this is not hypertrophy. Their parietes are very rarely thickened. M. ANDRAL found, in two cases of chronic disease of the stomach, the parietes of the veins thus changed, constituting true hypertrophy. FORESTUS (*Ob-*

serv. l. xviii.; *Schol. ad Observ.* 18.) and Voigtel (*Handb. der Pathol. Anat.* ii. p. 95.) have noticed a *varicose* state of the *veins* of the stomach; a lesion which M. Andral has not met in his numerous dissections.—(*c*) The *lymphatic* vessels, and especially the *glands* of the digestive canal, are very frequently hypertrophied, if the increase of volume so often found in the lacteal or *mesenteric glands* after irritation of the intestinal mucous surface be considered as true hypertrophy. But, in many instances, the enlargement is merely the consequence of vascular injection, and serous or sero-puriform infiltration of their tissue, without any increase of nutrition — the very element of hypertrophy. But after these pathological states have subsided, an evident increase of the bulk and density of these glands remains, whether the primary irritation continues, or has long previously disappeared. When these glands are enlarged, dense, and not very vascular, we may attribute the change to increase of nutrition, according to the state of our knowledge of what constitutes it. But when evident signs of inflammation — as increased vascular injection, redness, and tumefaction — are observed, the change must be chiefly imputed to increased organic action of the blood-vessels; although this condition does not preclude the co-existence of hypertrophy; with which, indeed, increased vascular action, in some grade or other, is very frequently, and even necessarily, associated, and of which it is generally the cause. However, in many cases of what may be called hypertrophy, or, otherwise, enlargement of the lacteal or absorbent glands, instead of being more vascular, they are pale, and even more bloodless and colourless than natural, particularly after chronic diarrhœa, lientery, and marasmus. The glands through which the lymphatics of the stomach pass are not so frequently enlarged as those of the mesentery. Often, however, those along the curvatures of the stomach and around the pylorus are much increased in size.

34. D. *Softening of the digestive canal* is one of the most common changes observed; and it may be limited to one of the coats, or extended to two or all of them. In this latter case the parietes of the canal may be torn with the greatest ease. — (*a*) Softening of the *villous coat* is most frequently met with: it occurs in every degree, and either throughout or in parts of this membrane only, the consistence of the other coats being undiminished. This lesion is most common in the stomach, where it has been most minutely studied. In its first stage or grade, it can hardly be removed in shreds, as it may be in the healthy state; and it is readily converted, by scraping, into a kind of pulp. As the softening increases, the slightest touch reduces it a to a mucous-like pulp; and at still further advanced periods, it is either no longer uniformly spread over the gastric surface, or it is entirely deficient in parts or throughout, leaving the sub-villous tissue quite bare. This lesion may exist in the whole of the stomach, or in parts of it only, — most frequently in the splenic portion. It is often attended by marked dilatation of the veins running between the coats, evincing the antecedent existence of increased vascular action in cases where other appearances of it may have vanished. In some cases of children, the softening exists only in a number of small round patches of a red colour; and in others, it is in lines, streaks, or irregular bands. It is probable that the small softened spots which have been also noticed by M. Lestier may become ulcers from the extension of the lesion to the subjacent tissues. The *colour* of the softened villous coat may be greyish or natural, or white with a bluish tinge, or a dead milky white, or red, brown, brick red, and more rarely purple. Softening, with some one or more of these shades of colour in different parts of the canal, is met with as a consequence of various acute and chronic maladies seated either in the digestive organs, or in remote viscera, especially chronic diseases of the lungs. White softening in the lower part of the small intestine and colon is one of the most common lesions observed after chronic diarrhœa.

35. (*b*) Softening of *all the coats* of the digestive canal may take place to a remarkable extent, particularly in the stomach and bowel complaints of children, and in the gastric and adynamic fevers of adults. It has been described by Jaeger, Zeller, F. Rhades, Fleischmann, Laisné, Cruveilhier, Haviland, Wiesemann, Gairdner, and other writers referred to in the *Bibliography*. In some cases, the parietes of the stomach may be torn with the utmost ease, all the tunics and interposed cellular tissue having become friable and semi-dissolved; resembling, in extreme cases, a kind of jelly, without any trace of organisation, and hence denominated by M. Cruveilhier "*gelatiniform softening*." In some of these cases, the gastro-intestinal parietes are modified only in respect of consistence, and have the outward appearance of being sound, until more closely examined. With this loss of vital cohesion, the colour of the part may be either natural, or remarkably pale, or red, and without reference to the acuteness or chronicity of the disease. The splenic portion of the stomach is most liable to general softening of the coats; but it also occurs in the small intestines, and the cæcum and colon. M. Andral states, that he met with reddish softening of the coats of the stomach in a child who had taken sulphuret of potash before death. I believe that this substance, as well as the caustic alkalies, will readily occasion this change, if exhibited in too large doses, or continued too long. As to softening of the gastro-intestinal parietes ever being a *post mortem* change, this pathologist remarks, that it may be established as a general principle, that any softening observed on opening the body at the usual period after death should not be considered as the result of putrefaction. But it may be, when observed in the stomach, the result of the action of the gastric juices, as shown by J. Hunter and others referred to. It is, moreover, extremely probable that the acrid and morbid secretions of the diseased gastro-intestinal mucous surface may so far act upon any part of it as to soften and to erode it during the latter hours of existence, and the time that elapsed after dissolution. These inferences have received support from experiment and pathological observations (§ 6.). Dr. Camerer, of Stuttgard, made, in 1818, a number of examinations with a view to the solution of this question; and found that, in all the animals

which had been killed while in good health, the great extremity of the stomach was softened, and if a sufficient time had elapsed, its parietes were dissolved or even perforated; no signs of putrefaction being observed. Whilst, on the contrary, in a dog already evincing putrefaction, no trace of softening existed in the stomach. This physician also found that the fluid collected in the stomach of two children who had died of gelatiniform softening of this viscus, introduced into the stomach of a man just dead, produced, at the end of twelve hours, solution of the coats of the part with which it had come in contact; that a portion of the same fluid had no effect upon the stomach of a living rabbit; but as soon as the animal was dead, or when the pneumogastric and trisplanchnic nerves were divided on each side, this fluid had an immediate action on the coats of the stomach. Hence it must be concluded that softening of this viscus is not unfrequently a *post mortem* change. It ought to be remarked, that softening of any part of the digestive canal has been too generally imputed to inflammatory irritation, owing to the frequency of its occurrence in febrile and inflammatory diseases, and from the action of acrid poisons. But the extreme cases of it that I have had an opportunity of observing, have been the *choleric fever* and *diarrhœa* of infants occurring after weaning, and in children who have died from aqueous effusion on the brain. In most of these it was unattended by vascular injection; the softened parts themselves, and those surrounding them, being either softened merely, or also attenuated or even eroded and perforated, and quite pale, excepting in the course of a few large vessels. I have likewise observed it, but in a different and more general form, in the adynamic and deliquescent states of remittent and continued fevers*, and in two cases of puerperal disease; the softened parts being more or less discoloured, and sometimes ulcerated, but not perforated. From the condition of vital manifestation in the cases in which I have remarked this change, it may be inferred that it results chiefly from a loss of the organic nervous power, and of the vital cohesion of the tissues previously to death, but is increased by this event, and by the action of the morbid fluids and secretions upon them.

36. F. *Ulceration of the gastro-intestinal parietes* is a frequent and important lesion, and has long attracted much attention in practice. It seems to have been first noticed by AVICENNA (*Canon.* l. iii. fen. 16. tr. 1. cap. 2.), who often makes mention of excoriations and ulceration as a cause of vomiting and diarrhœa; and it has been described by BONET (*Sepulch.* l. iii. sect. xi. obs. 2, 3, *et passim.*), GMELIN, FRIEND, HALLER, FIELD, PENADA, BAILLIE, FRANK, PROST, ANDRAL, and others (see *Bibliog. and Refer.*). It is met with in the parts of the canal in the following order in respect of frequency: — The inferior third of the ilium, the cæcum, the colon, the rectum, the upper two thirds of the ilium, the stomach, the jejunum, and the duodenum. In either of these situations it is a consequence — (*a*) Of softening of the villous coat, without any evident injection, the ulcer being formed in the centre of the softened part; — (*b*) Of small inflamed spots of the villous membrane, which is quite sound in the intervals between them; — (*c*) Of a general injection or inflammation of this membrane, the intervals being more or less red; — (*d*) Of the sloughing of circumscribed parts of the villous, and sometimes of the sub-villous, and even of the muscular tissues; — (*e*) Of a change in the mucous follicles, either the isolated, or PEYER's glands, or of both, — generally preceded by obstruction and enlargement of them. These glands first form conical knobs, and are either few or numerous, greyish or reddish, and with or without areolæ (§ 22. *c.*). Subsequently, a slight depression appears on their summits, owing to enlargement of their orifices, or to an incipient ulcer; this depression gradually becoming more considerable; the tumid glands thus resembling, particularly in their inflamed state, and when they contain a small quantity of puriform matter, the dimpled pustules of small-pox. They were formerly considered identical with these pustules, particularly when found, as is occasionally the case, in that disease; and they have been described as such by FERNEL (*De Abd. Rer. Causis*, l. ii. cap. 12.), BAILLOU (*Epid. et Ephem.* l. ii. p. 207.), HORSTIUS (*Instit. Med. Disp.* 3.), A. PARÉ (l. xiv. cap. i.), PEYER (*Observ. Anat.* ii.), MEAD (*De Variol. &c.* Lond. 1747, p. 323.), BARTHOLIN (cap. iii. obs. 29.), P. FABRICIUS (*Observ. circa Const. Epidem. Ann.* 1750, § 18.). Pustular ulcers have been particularly noticed in chronic dysentery, by Sir J. PRINGLE, Sir G. BAKER (*Epid. Dysent. of* 1762.), Sir G. BLANE, and Dr. D. MONRO; the last of whom describes the black colour of their bottoms in that disease. These pustular or pimple-like excrescences are often destroyed from the apices to the bases, leaving circular and deep ulcers in their places, that sometimes extend or run into one another when the aggregated follicles are affected, and thereby produce large, irregular, ulcerated patches. Ulceration originating in the follicles may proceed either from inflammatory action, or from obstruction of their outlets, and their consequent distension and irritation by their natural secretion, which had become acrid from the retention, or by the accumulation of a morbid or tuberculous-like matter, which imparts to them the appearance of white granules; this change being succeeded by ulceration, often without any apparent increase of vascularity. — (*f*) Ulceration may also arise from disease of the sub-villous tissue, instead of commencing in the villous coat itself, as in all the preceding states. In this case the sub-villous tissue is the seat of various morbid secretions — as of tuberculous matter — which irritate the villous coat, inflame it, and at last ulcerate it; or which, by interrupting the connection of a portion of this coat with the parts beneath, cause it to sphacelate, leaving an ulcer-like excavation in its place.

37. *Ulceration* of the digestive tube *is* — or rather is an attendant upon — either an *acute*, or a *chronic* disease, — more commonly the latter. It is very rarely acute in the stomach, but is more frequently so in the small and large intestines. The *number* of ulcers is various — from one to some hundreds. They are generally only few, or even single, when they occur in the sto

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* I should state, in support of my own originality as to this change in fevers, that it was noticed in a paper read by me to the London Medical Society in 1819, and published in the Quarterly Journal of Foreign Medicine for Jan. 1821.

mach; and very numerous, crowded together, and confluent, in the ilium and large intestines; in which latter, however, they are sometimes met with singly, or few in number, and isolated. Their *form* is usually round or oval; but they are also sometimes linear and irregular. They are most frequently *seated* on one side of the canal, but they may occupy its circumference. Their *margins* are either white, pale, red, or of deep brown; the portion of villous membrane forming them, being either of natural thickness and consistence; or softer, harder, thinner, or thicker. In some cases the surrounding sub-villous tissue is thickened and indurated. Their *bottoms* consist of different tissues, according to the depths to which they may have penetrated. In some instances they are so slight as to appear like *abrasions* or *excoriations*; and in these the mucous coat still remains at their bottoms, the villi only having been destroyed. More commonly, however, the villous coat is penetrated; the sub-villous tissue, which is usually either grey, red, brown, or blackish, soft and fungous, or hard and scirrhous, forming the bottom of the ulcer. In other cases, neither the surrounding villous membrane, nor the cellular tissue below it, is further altered than as regards the solution of continuity, and sometimes diminution of consistency, the bottoms and margins of the ulcers being white, pale, without inflammatory appearances, and occasionally remarkably softened. These alterations are common in the stomach and bowels of children who have suffered diseases of these organs, or of the brain, after weaning; and in adults who have died of pulmonary maladies, or of bowel complaints after fevers. Dr. J. Gairdner considers that they are not true ulcers, but erosions of portions of the coats which were previously diseased, by the juices of the organs after death. I have seen many of these cases, chiefly in children, and believe that the principal part of the change must have taken place previously to dissolution, which had most probably rendered the surrounding tissues less vascular, and further diminished their already weak cohesion, long before the period at which these changes usually supervene (§ 35.).

38. As the ulcers deepen, the sub-mucous and the muscular tissues are successively penetrated, and in some cases without any appearance of vascularity in either the bottoms or the margins of the ulcers, or in the intervals between them; these latter cases generally occur in the diseases already alluded to, and in cases of great asthenic or vital depression, sometimes associated with anæmia or a cachectic habit of body; the ulcers assuming a truly phagedenic character. When the peritoneal coat is reached, it is either thickened, by a developement of the cellular tissue connecting it with the muscular coat; or it is inflamed, the vascular injection being evident, and sometimes attended by an effusion of lymph, on its free surface, giving rise to partial adhesions between it and the opposite parts. In other cases, particularly in the asthenic ulcers now noticed, the peritoneum at their bottoms is thin, transparent, and pale; no coagulable lymph being thrown out upon its free surface, owing to the weak and cachectic state of the frame. A single small ulcer may penetrate deeply, and perforate the intestine; whilst a similar result may not arise, although the ulcerations are both numerous and large.

39. The coats in the *intervals* between the ulcers, as well as the parts immediately surrounding them, may be of natural colour, consistence, and thickness; or more or less either softened, injected, tumefied, thickened, or hypertrophied, and variously coloured. The intervening *villous surface* is often of healthy colour, but softened, and studded with enlarged follicles; and although it is more frequently slightly injected, yet, in some cases, the opposite condition already noticed obtains. The *sub-villous tissue* is often more or less thickened and indurated where the ulcer penetrates the villous coat, the ulcer appearing in the centre of a thickened or hypertrophied mass. The *cicatrisation* of ulcers has been observed by Baldinger (*N. Magazin*, b. ii. p. 347.), Male, Abercrombie, Andral, Trolliet, Billard (see *Bibl. and Refer.*), and others. A large cicatrised ulcer was found in the stomach of M. Béclard, who had long experienced disorder of this organ. Andral refers to several cases, in two of which the mucous membrane was evidently reproduced. The changes that take place on the peritoneal surface, when it becomes the bottom of the ulcer, as well as when it is perforated, have a marked reference to the state of vital power; under usual circumstances, and in a sthenic state of the system, the adhesions already noticed take place; but in an asthenic habit of body, coagulable lymph is not produced, or not in such a state as to form adhesions; and often merely an aqueous or turbid fluid is exhaled; sometimes long before the ulcers have penetrated far through the parietes of the canal. Thus ascites may supervene in any of the stages of ulceration, as observed by Prost (*Méd. Eclair. par l'Ouver. des Corps.* t. ii. p. 52.) and others.

40. G. *Perforations of the digestive canal* have recently attracted much attention; but they had not passed disregarded in former times. Among the numerous writers of the 16th, 17th, and 18th centuries, who have noticed this lesion, a very great proportion, having observed it associated with intestinal worms, imputed the perforations to them, — an inference not confirmed by more accurate modern research; the worms having merely passed through the openings they found ready made. Instances, however, of this lesion unassociated with the entozoa have been recorded by Morgagni (Epist. xxxi. art. 2.); Monro, Vetter (*Aphorismen, &c.* b. i. p. 193.), Bang, Hunter, Gerard, Portal, Breschet, Laennec (*Journ. de Méd. Cont.* vol. iv. p. 557.), Percy (*Ibid.* vol. iii. p. 510.), Leroux (*Ibid.* vol. xv. p. 239.), Penada, Jaeger (*Hufeland u. Himly. Journ. d. Pr. Heilk.* May, 1811.), Gistren (*Ibid.* July, 1811.), Marcus (*Ephemeriden der Heilk.* b. i. heft ii.), Cloquet (*Nouv. Journ. de Méd.* t. i.), Louis (*Archives Génér. &c.* t. i. p. 17.), Legallois (*Ibid.* vol. vi. p. 68.), Chaussier, Rullier, Ebermaier, Gairdner, Abercrombie, Armstrong, &c. (see *Refer.* in *Bibliog.*). This lesion may arise in various ways: (*a*) It may be partly or altogether a *post mortem* change, and attended by softening and thinning of the surrounding tissues; (*b*) or it may be caused by an eroding ulceration of the tunics, without injection, but with softening and thinning of the margins; (*c*) or by a circumscribed

slough involving all the gastro-intestinal tunics; (*d*) or by an ulcer that has penetrated all the coats; (*e*) or by rupture of a previously softened or otherwise diseased portion of the parietes.

41. (*a*) Perforation from the action of the *gastric juice* is always in the depending part of the stomach; its size is large and irregular, its margins are fringed and thin; and the surrounding tissues are pulpy or gelatinous and transparent, having a semi-dissolved appearance, and a pale, whitish, yellowish colour, sometimes streaked with brown or black lines from the action of the acid juices on the blood remaining in the capillaries. — (*b*) Eroding ulcerations of the stomach, such as have been described above (§ 35—37.), and which are with difficulty distinguished from the *post mortem* effects of the gastric juice, may end in perforations, having pale, thin, and soft edges, especially in children. Dr. **Coste** records two instances of such perforations in the stomachs of adults, caused by the oxymur. of mercury and spirits, long and largely employed. — (*c*) A portion of the canal very rarely *sloughs* so as to involve all the coats, and to give rise to perforation when the slough is thrown off, excepting in cases of poisoning by acids, and of strangulated hernia. — (*d*) *Ulceration* is the common cause of perforation, and is most frequently, in such cases, seated in the solitary or aggregated glands of **Brunner** and **Peyer**. — α. It may occur suddenly, and peritonitis supervene, the patient having previously appeared in good health. Such instances are recorded by **Male**, **Rogers**, C. **Smith**, **Crampton**, **Travers**, **Laennec**, **Andral**, and **Bourienne** (*Journ. de Méd.* t. xxxvi. p. 464.), as having occurred in the stomach; and by **Neumann** and **Hufeland** (*Journ. der Pract. Heilk.* b. ix. p. 170.), the perforation having taken place in the duodenum and jejunum. — β. Perforation is more frequent in the course of, or during convalescence from, the gastric and enteric form of continued fever, particularly in the epidemic or rather endemic forms of it, similar to those described by M. **Bretonneau** under the name of *Dothinenterites*, and previously by **Roederer** and **Wagler** by that of mucous fevers. But it may occur in all fevers of an adynamic form, the surrounding portions of intestine being of a dark or dirty brown, or ochry colour, softened, and often ulcerated in numerous places, or studded with minute ulcers of the aggregated glands. This change has been well described by **Bright**, **Chambers** and **Hewett**. (See **Fevers** — *Diseased Appearances in*.) — γ. It is also met with after chronic complaints of the stomach or bowels, which are sometimes attended by much pain or retchings, as in the cases recorded by J. **Moore**, M. **Workman**, **Elliotson**, and **Heim** (**Horn's** *Archiv.* Jan. 1822.), but more frequently by little acute suffering, until after perforation, followed by peritonitis, has taken place. — δ. It may also supervene during chronic disease of the lungs, owing either to simple ulceration of the glands, or to softening of tubercular matter deposited between the gastro-intestinal coats, and consequent ulceration, as in the case recorded by M. **Legallois** (see *Refer.*); perforation from this latter cause sometimes occurring independently of pulmonary disease, particularly in children. — (*e*) Perforation from *rupture of an ulcerated*, cancerous, thinned, softened, or otherwise diseased part of the canal, is most frequently observed in the stomach, and in the colon or cæcum; and is sometimes favoured by stricture, thickening, &c. of the portion below it; the rupture usually arising from the over-distension of the diseased part of the canal, from external violence or pressure, and from straining at stool or vomiting. Most of the cases of rupture of the stomach and bowels recorded have been consequent upon some one of the changes already described, as may be seen in the cases recorded by **Morgagni** (Epist. liv. art. 15.), **Andry** (*Hist. de la Soc. Roy. de Méd.* 1776, p. 257.), **Lieutaud**, **Acrel** (*N. Schwed. Abh.* b. ix. n. 3.), **Portal**, **Richter** (*Chir. Biblio.* b. xii. p. 403.), **Soemmerring** (*Notes, &c.*), **Sandifort** (*Observ. Anat. Path.* l. iv.), **Zeviani** (*Mem. di Matem. e Fisica della Soc. Ital. Veron.* t. v. 1790.), **Hufeland** (*Journ. d. Pr. Heilk.* b. v. p. 819.), **Bouillaud** (*Arch. Gén. de Méd.* vol. i. p. 534.), **Marjolin** (in *Ibid.* vol. ii.), **Annesley**, **Crampton**, **Elliotson**, **Lisle**, F. **Davis** (in the duodenum), **Abercrombie**, W. **Cooke**, and others. — (*f*) *Ruptures* of the stomach and duodenum, without, as well as with, vomitings, but without any organic change or violence sufficient to account for the occurrence, have been observed by **Dupuy**, **Lallemand**, **Chevalier**, and B. **Brown**; but, probably, softening or atrophy, or thinning of the coats also existed, although not mentioned. Perforations of the digestive canal are most frequent in the stomach, especially in the splenic portion. In other parts of this canal they seldom supervene, except at the bottom of ulcers; whilst in the stomach they are more commonly produced by the other causes above enumerated. They may, however, exist simultaneously in different parts of the intestinal tube; and may occur at every age. **Cruveilhier**, **Wiesemann**, **Gairdner**, and **Billard** have observed them in young children. I have seen them as early as two and three months in infants deprived of their nurse's milk; but they are rarely met with until after weaning.

42. When perforation has taken place, various consequences ensue, according to its situation, and the disease and circumstances in which it has occurred. — (*a*) The contents of the viscus generally escape through the opening into the peritoneal cavity, and produce *acute peritonitis*, soon terminating fatally. But this is not a constant result; for the perforation may give rise to *chronic peritonitis*, under which the patient may continue to linger for several months. I have seen this in two instances — one in an adult, and another in a child. M. **Andral** notices a case in which *lumbrici* escaped into the peritoneal cavity through the opening, and occasioned merely an obscure lingering irritation. — (*b*) The perforation may communicate with the cellular tissue outside of the peritoneum, as when the cæcum and rectum are penetrated, and give rise to abscesses and fistulæ. I have referred to cases of this description, one of which occurred in my own practice, in the article on the **Cæcum**. — (*c*) In other cases, the gastro-intestinal contents do not pass into the abdominal cavity, owing to the circumstance of the peritoneum having, previously to its perforation, become inflamed, so as to throw out coagulable lymph

on its surface, which excites inflammatory irritation in that part of it directly opposite, and thereby forms adhesions between them, and shuts the opening. When this occurs, other consequences ensue. — *a*. The adhesion may take place to some part of the peritoneum reflected over the abdominal parietes, and the ulceration, by penetrating it, may also occasion abscess or fistula between the peritoneum and the walls of the abdomen. OSIANDER (*Denkwürdigkeiten*, b. i. p. 99.) has recorded a case of this description; and NEBEL, LIEUTAUD, VETTER, GODOT, JACQUINELLE, and B. GOOCH, instance others, in which the inflammation and matter thus formed advanced externally and opened in the left hypochondrium, a fistulous communication being thus established between the stomach or any other part of the digestive tube and the external surface. In this way *artificial anus*, or *fistula in ano*, commonly arises, when some part of the *intestinal* canal is perforated. — *β*. Owing to adhesion having taken place between the surface of some viscus and the penetrated peritoneal coat of the canal, the former either stops up the opening, preventing the escape of the gastro-intestinal contents into the abdominal cavity, or becomes itself penetrated by the ulcerative process extended thither. MECKEL (*Epist. ad* HALLER. *Scrip*. vol. iii.) found the opening in the stomach closed by the omentum accreted over it. ZEVIANI, CHAUSSIER (*Bull. de l'Ecole de Méd. de Paris*, 1808, p. 41.), and LEROUX (*Journ. de Méd. Cont*. vol. xv. p. 239.), observed it covered by the spleen, into which the ulceration had partially penetrated. KEPPELHOUT (*Sect. Cadav. Path. L. B.* 1805, p. 19.) met with a similar connection with the liver. M. ANDRAL saw an ulcer in the ascending colon, the bottom of which was formed by the substance of the kidney; and M. RAYER, a perforation of the duodenum stopped by the liver. Perforations of the stomach may be closed not only by the liver and spleen, but also by the diaphragm and transverse colon, and even may be likewise carried through either of them. M. ANDRAL records cases in which the perforation passed through the stomach and diaphragm into the thorax, and also into the substance of the lungs, the serous surfaces of each having previously adhered; and a communication had thereby been established between the cavity of the stomach, and either that of the pleura, or that of the bronchi. When the viscus which becomes accreted to the surface of the perforated portion of the canal has itself a cavity, then a communication generally takes place between them; thus CAMPER (*Mém. sur le Prix, &c.* t. v. n. 9.) met with an opening into the bladder. Indeed, communications thus formed with either the bladder, uterus, or vagina, are not very rare. A case occurred to M. CHOMEL (M. ANDRAL's *Anat. Path.* vol. ii. p. 136.), in which the duodenum communicated with the colon, through the gall-bladder, which adhered to both; and cases are not very uncommon, in which perforations and accretions of the serous surfaces of several parts of the digestive canal take place, and openings are thereby directly formed between them. I have seen communications thus existing in the same case between opposite parts of the small intestines in two places, and of the small and large intestines in three places. In another instance there existed no less than four or five such communications, each of which was of course a double perforation. These changes have been observed by me in four cases in children; and in all, the perforations were associated with chronic peritonitis. Dr. G. GREGORY (*Trans. of Med.-Chirurg. Soc.* vol. xi. p. 258.), has recorded a similar lesion; and an instance, in which it occurred in an aged person, is given in the third volume of the *Bulletins* of the Faculty of Medicine of Paris. Dr. ABERCROMBIE found an ulcerated passage existing between the stomach and colon, fæculent vomiting having preceded death; Mr. A. BELLOT detected several perforations, forming openings between the small and large intestines, and into the abdominal parietes of an adult female; and M. C. BROUSSAIS observed carcinomatous ulceration and perforation of the stomach, opening into the *vena porta*.

43. In all these, excepting the second perforation, by which a communication is established between contiguous portions of the canal, as in the cases now alluded to, the opening takes place from *within outwards*. But the perforation may be produced in an *opposite direction*, as where abscesses of the liver burst into the stomach or colon. M. CAYOL (*Journ. de Méd. by* CORVISART, *&c.* vol. xiv.) mentions a case in which an abscess in the kidney burst into the ascending colon. Abscesses, perforating, and opening into, the rectum, that had formed, in one case between it and the uterus, and in another between it and the sacrum, during convalescence from fever, have occurred in the practice of the author.

44. iii. MORBID SECRETIONS IN THE DIGESTIVE TUBE.—These may form on the free surface of the villous coat, or in the substance of the parietes of the canal. — *A. The secretions and fluids found on the internal surface of the villous coat* are — 1st, the natural secretions altered from the healthy state; and, 2d, those which are altogether adventitious and foreign to this situation. — (*a*) *The mucous secretion and the aqueous and gaseous exhalations* may be increased in quantity, and otherwise modified. — *a*. The *mucus* covering the villous surface is often greatly increased in quantity, and modified in consistency, either throughout the tube, or in portions of it only; this membrane itself being commonly of a bright red, and more or less injected; or of its natural colour, or sometimes even paler than usual. — *β*. The *aqueous exhalation* is also occasionally increased on the villous coat, and the vessels more or less congested, particularly the veins. The existence of increased aqueous exhalation, connected most probably with determination of the circulating fluid, is evidently the chief pathological state in cholera and serous diarrhœa. But vascular congestion is not always found upon dissection in those cases, especially if the person have died of some other disease, of which serous diarrhœa was a contingent symptom. In these the parietes of the intestines are generally attenuated and pale, and contain more or less of a serous, yellowish, or colourless fluid. — *γ*. The *gaseous fluids*, of which the digestive canal usually contains more or less in health, are often greatly increased, and are sometimes a very important symptom, although not constantly or generally con-

nected with any one pathological state. Increased exhalation of the intestinal gases is, however, a very frequent, although not a constant, result of inflammatory irritation of the villous membrane, or of disease of Payer's glands; but it may also proceed from extreme debility, manifested especially in the organic nervous system, and by the bloodless state of the digestive canal found after death. Hysteria, hypochondriasis, asthma, flatulent and lead colic, rabidity, and other affections, are characterised by great accumulations of air in the intestines, without any sign of vascular irritation of the villous surface. These gaseous collections are generally greatest in the large intestines; but they also take place in the stomach and small intestines, particularly in the latter, as observed in the last stages of typhoid fevers, and of various other acute diseases. The meteorismus of fever has been imputed by Broussais to disease, especially ulceration of the intestines; but, although the connection is frequent, it is by no means general, and, even when observed, both pathological states are merely associated effects of the same anterior change, viz. diminished vital power, expressed particularly in the organic nervous system and viscera influenced by it. The formation of air in the digestive canal has been chiefly attributed, in the article on Colic, to exhalation from the villous surface. It may also arise partly from the chemical reaction of the diversified and heterogeneous substances taken into the stomach, as they are acted upon by the secretions and are propelled along the canal, and a portion is commonly swallowed with the ingesta.

45. (*b*) *The fluids and secretions foreign to the digestive canal in health*, but which are sometimes found in it, are, blood, pus, coagulable lymph, melanotic matter, tubercular matter, concrete or fluid fatty matter, a thick albuminous substance, calculous concretions, and worms. — *α. Blood* is occasionally found in the stomach and intestines, both in a fluid and coagulated state, and in very variable quantity. The causes of its effusion on the free surface of the villous coat are — 1st, Atony of the extreme vessels, and diminished vital cohesion of the coat;—2d, A mechanical obstacle to the return of the blood, particularly in the vena porta;—3d, Inflammation or irritation of the villous membrane in various states of intensity and morbid association, supervening either spontaneously, or caused by irritating ingesta; — 4th, A morbid or dissolved state of the blood itself, most frequently, however, associated with the 1st state, as in scurvy, the black vomit of yellow fever, and purpura hæmorrhagica; — 5th, The erosion of the coats of a blood-vessel in the seat of an ulcer; — 6th, Disease of the coats of a blood-vessel, independently of any lesion of the villous coat; — and 7th, from having been swallowed, as in cases of excessive hæmoptysis, hæmorrhage from the fauces, &c. When the sanguineous effusion proceeds from the *third* source, it may be either very slight, the mucus covering the villous surface being merely tinged with it, or very considerable, according to the various concomitant circumstances under which it may take place. Its *fifth* and *sixth* sources are the most rare, but not so rare as M. Andral supposes, the sixth being entirely overlooked by him. M. Prost, Dr. Abercrombie, and others, have detailed instances of the former; and a case of the latter, from atheromatous deposit in the coats of an arterial vessel disposing it to rupture, very recently occurred in my own practice. (See Hæmorrhage — *from the Digestive Canal.*)

46. *β. Puriform matter* is but rarely met with on the villous surface, instead of the mucus usually secreted by it, in any appreciable quantity. It is much more commonly found in the follicles, either in an inflamed state of this coat, or independently of any marked injection of its vessels. When the follicles contain this fluid, they generally present the appearances already described (§ 22. *c.*, 36. *e.*), especially the conoidal and pustular state, the puriform matter escaping on incising them.—*γ.* Dr. Monro describes a *brown fluid* like cocoa, which he has seen in some instances voided in large quantity during life from the stomach. In a fatal case, this viscus was very large, and half filled with this fluid, its coats and adjoining viscera being sound. — *δ. Coagulable lymph*, in various grades of density, and in the form of false membranes, is also sometimes found on the gastro-intestinal villous surface; but not so often as in the mouth, pharynx, and œsophagus. I have observed it most frequently in the form of whitish flocculent or thin membranous-like patches and shreds, covering the inflamed or partially injected surface, in fatal cases of scarlet fever, with gastro-intestinal symptoms. In sub-acute inflammatory affections of the digestive organs, either with or without diarrhœa or dysentery, as in the cases described by Baillie, Powell, Good, Annesley, Lelut, Billard, &c., the false membrane is occasionally so complete as to form a tube of various dimensions, which, when evacuated with the stools, has been mistaken for a sphacelated portion of intestine, or for its mucous coat. Dr. Godman found it covering the whole villous surface of the stomach; and Mr. Howship remarked a similar production in a child that had accidentally swallowed boiling water. M. Andral thinks that it may sometimes proceed from a morbid secretion of the mucous follicles; but, as in the other situations in which it is seen, it evidently arises from inflammatory action of the villous or mucous coat itself, the exhalant vessels of which, in the inflamed state, throw out coagulable lymph instead of their usual watery or serous exhalation; these vessels also sometimes secreting puriform matter, in a modified form of disease. — *ε.* The gastro-intestinal mucous coat sometimes exudes a *black matter*, the *melanosis* of modern writers. This substance exists either in a fluid form, on the free surface of the membrane, or combined with its tissue, or in both forms in the same or different parts of the canal. When merely deposited on the free surface of this coat, it can generally be washed off; the matter composing it staining linen. But when it is infiltrated or combined with this tunic, it cannot be removed by ablution, and it does not stain linen. It is most apparent at the bottom of the lacunæ in the duodenum, or in the summits of the villi, or in the margins of the orifices of Peyer's glands, or in the bottoms of small ulcers.—*ζ. Tuberculous matter* is sometimes found in the follicles, the intestines being studded with a number of small white bodies, seldom exceed-

ing the bulk of a pea. The substance they contain is concrete, whitish, and friable. M. Andral remarks that these tumours are merely the follicles altered in their nutrition and secretion; the affection being a genuine *acne* of the mucous membrane. — η. *Fatty matter* is very rarely met with in the intestinal canal; but several cases are recorded in which it has been passed in a fluid and concrete state during the advanced stages of chronic diseases. — ϑ. *A thick albuminous matter* is generally found covering the villous surface of the small and large intestines of those who die early in the *Pestilential Cholera*. (See art. Pestilence.) Of Calculous Concretions and Worms in the digestive canal, a detailed account is given in their respective articles.

47. *B. Morbid productions in the tissues composing the parietes of the digestive canal.* — *a. Blood* is sometimes effused in the sub-mucous cellular tissue to an extent varying from a line to some inches, often without any change in the mucous membrane, and generally from the same causes as have produced its effusion within the canal (§ 45.) — *b. Serous infiltration*, or *œdema*, of the cellular tissue connecting the different tunics and muscular fasciculi with each other, is sometimes observed in various degrees, the thickness of the parietes being thereby proportionately increased. The fluid occasionally raises up the villous surface in the form of blisters or small vesicles. *Œdema* is most frequent in the large intestines, the villous membrane being remarkably pale, or more or less injected and variously coloured, or softer than natural, or even more consistent, or ulcerated, either independently of disease of its follicles, or in the seat of Peyer's glands, and with enlargement of them. The cellular tissue itself, the seat of serous infiltration, may be unaltered or softened, or hypertrophied, thickened, and indurated. In the latter case, it is, in some places, dry, and grates under the scalpel, without yielding any fluid; and in others, there are considerable deposits of serum, or of a gelatinous fluid of various consistency, constituting one of the more frequent states of what is usually called *scirrhus*, as met with in the pylorus or cardia of the stomach, or in the rectum. Œdema, in the different forms now enumerated, is often the chief lesion observed after chronic diarrhœa and dysentery, and prolonged affections of the stomach. The exhalation of serum may also occur within serous envelopes or *cysts*, developed between the villous and muscular coats, and varying from the size of a pea to that of an egg. — *c. Gaseous exhalations* may take place between the coats of the digestive tube, soon after death, from incipient decomposition; but a case observed by M. J. Cloquet (*Bullet. de la Faculté de Méd.* vol. vii. p. 267.) shows that it may also supervene during life. — *d.* The *secretion of fat* has been observed in one instance by M. Andral in the sub-mucous cellular tissue, the coats of the small intestine, in which it formed a small tumour, being quite sound. — *e. Purulent matter* is seldom found in the substance of the gastro-intestinal tissues, and then only in small quantity in the sub-mucous and connecting cellular substance—forming either one or more collections, which are generally encysted, but also infiltrated in this tissue. These small abscesses should not be confounded with the pustular-like tumours, containing pus, formed by inflamed follicles. They do not appear to give rise to any peculiar symptom. — *f. Tubercular matter* is secreted more frequently than pus in the gastro-intestinal parietes, particularly in the lower part of the small intestine, and generally in the cellular tissue connecting the coats. It forms small whitish tumours, owing to the colour and form of the deposition being perceptible through the elevated villous or peritoneal membrane, varying from the size of a millet seed to that of a pea. They may be very few or numerous — usually the latter in persons who have had tubercles in the lungs, particularly at the margins and bottoms of ulcers. They may exist long without giving rise to any symptom referrible to the digestive organs, until the mucous membrane becomes affected, when diarrhœa—generally chronic and intermittent—is the usual result. The membrane over and around these tubercles may be unaltered, or injected and inflamed, variously coloured, softened, ulcerated, &c. The softening and breaking down of the tubercular matter, and the attendant ulceration, may also terminate in perforation, as in the case published by M. Legallois. — *g. Melanoid matter* is occasionally deposited in the cellular tissue connecting the coats, either in a diffused or disseminated state, or in isolated spots, forming small projecting tumours. — *h. Osseous matter* is very rarely deposited in any part of the gastro-intestinal canal. De Haen (*Rat. Med.* vol. iv. cap. i.), however, met with it in the stomach; and Short (*Edin. Med. Essays*, vol. iv. p. 353.), in the colon and rectum.

48. iv. Complicated Productions generally the advanced Stages of Morbid Nutrition and Secretion conjoined. — The morbid formations now to be mentioned, are chiefly the advanced stages of two or more of the morbid changes already described; and, as might be inferred *à priori*, so nearly approximate to each other in their external characters, as well as in their anatomical and chemical elements, as often to render it a matter of difficulty to distinguish between them, unless in an arbitrary manner. From this gradual approximation of the appearances of organic lesions to one another has arisen the difficulty of describing and arranging them; and from attempts at both having been made without being aware of this circumstance, or adverting to it sufficiently, or from endeavouring to establish, in respect of morbid changes, that which has been successfully performed in regard of the living productions of nature, and of which the former does not, but the latter does admit, — from describing as unvarying species what is merely constantly changing varieties, — has arisen much confusion and misconception.

49. *A.* Local or partial hypertrophy of the villous membrane, forming the excrescences already noticed (§ 27.), seems to be an early stage of several changes, which have been variously denominated, according to the appearances they have presented, and which have evidently arisen from alterations of their nutrition, and interstitial secretion, probably occasioned, as well as modified, by local irritation, constitutional vice, temperament, diathesis, age, and vital endowment. — (*a*) The *simplest* of these productions seem to be the *polypous* or *fleshy* mass, which may assume either a

pyriform, oval, or spheroidal form; with a broad or narrow base, and an opaque, dark red or purplish colour, and various grades of consistency, and of vascularity chiefly as respects its venous circulation. It has been found in the stomach by Morgagni, Monro, Granville, and others; and in the intestines by Rhodius, Portal, Monro, &c.; and has been seen as large as the closed hand. After repeated irritation, it may either throw out much blood, or may experience a sloughing or destructive form of ulceration. — (*b*) Other modifications of polypous tumours present a lobulated, irregular, or fissured surface, with a more decidedly *fungous* appearance and spongy structure than the foregoing, particularly in the old and debilitated. They are commonly dark-coloured, abound more with varicose-like veins, are less homogeneous internally, are more cellular, spongy, and vascular, and contain a dark serous or sanious fluid in their areolæ or minute cavities. They also bleed more frequently and profusely than the preceding, and discharge a fœtid and sanious matter; and, when they ulcerate, assume the form of a soft fungous mass. They have been mistaken for *fungus hæmatodes*, but, although they very closely resemble the hæmatoid form of it, they differ from it in occurring primarily in the digestive canal, and not simultaneously in other parts, in being more spongy than it, and in containing little or no albuminous or brain-like substance. — (*c*) A third modification of these polypous productions has been described by Dr. Monro under the name of *milt-like tumour*. It approaches in appearance that variety of *fungus hæmatodes* which has been denominated *encephaloid*, from its brain-like structure. The milt-like formation resembles in colour and consistence the milt of some fishes, extends to a large size, and is very slow in its growth. It is externally of a pale red colour, with an irregular surface, emits an offensive fœtor, and is covered by a fine membrane, in which a number of injected vessels are ramified. It has a homogeneous structure, consisting chiefly of a whitish albuminous secretion deposited in the texture, or under the epithelium, of the villous membrane; and is imperfectly organised. It is partly miscible with water, and is somewhat hardened by spirits; the surface to which it is attached, and the adjoining parts, being discoloured, vascular, abounding with large engorged veins, and, when it is removed, presenting a villous, honey-comb appearance, besmeared with drops of blood from the torn vessels. The neighbouring lymphatic glands generally participate in the disease, and are filled with a similar matter. This structure differs from the true *fungus hæmatodes* in being found only on the digestive mucous surfaces; the latter, in every situation. It is also not so firm and elastic, nor so dark-coloured and purplish, nor of so unequal a consistence in different parts, as that disease. Moreover, it is not liable to fungous ulceration, as the latter is; and while it occurs only in advanced life, the true hæmatoid or encephaloid disease is most common in early and middle age. It is met with most frequently in the stomach, and several cases of it are detailed in Dr. Monro's instructive work.

60. *B.* The various states in which simple *scirrhus* or *scirrho-carcinoma* presents itself in the digestive canal have been here ascribed chiefly to hypertrophy of the *sub-villous cellular tissue*; and to the modifications of nutrition and secretion superinduced in it by long continued irritation, morbid diathesis, advancing age, and depressed vital power. In the simple states of scirrhus, the hypertrophy of the tissues to which it has been chiefly attributed (§ 30.) may be distinctly traced; the thickening and induration of the sub-villous cellular tissue amounting in many instances to a fibro-cartilaginous change. But in further advanced stages, or in states of the disease which are different from the commencement, a more complex lesion evidently obtains; two or more, and ultimately even all, the anatomical elements of the part being involved in this change. *Scirrho-cancer* is most frequent in the pyloric extremity of the stomach, the cardia, the rectum, the sigmoid flexure of the colon; but it may occur in other parts of the stomach and small or large bowels; and has been described by Morgagni, Baillie, Pinel, Howship, Monro, Chardel, Armstrong, Paletta, Louis, Bayle, R. Prus, Cruveilhier, and Craigie. It appears commonly to commence in the sub-villous tissue; the mucous follicles, the villous tissue itself, the muscular coat, the blood-vessels, the lymphatics, the nerves, and lastly the serous coat, evincing sensible evidence of change. But, although the former of these are the first to manifest altered structure, there is every reason to infer that the morbid condition originates in the organic nerves of the part, their functions only being at first affected; and that lesions of circulation, secretion, and nutrition, more or less gradually result, and ultimately the organic changes which are found implicating the above anatomical elements. — (*a*) The *scirrhous* and *simpler state* of this change consists of a greyish white structure, sometimes inclining to yellow, interposed between the internal surface and the serous coat of the part, frequently with lighter coloured and denser fibres — in some cases approaching to the fibro-cartilaginous texture — running through it, and generally in a transverse direction to the axis of the canal. This change may be confined to the connecting cellular tissue (§ 30.), or be coeval with a similar change in, or progressively implicate, the mucous follicles, and the villous or muscular coats. Along with the circumscribed thickening and induration of the part, a contraction of its canal generally takes place; the villous coat or the mucous follicles of the more prominent places become ulcerated; and, either consecutively or simultaneously, the interior of the morbid structure is partially softened and disorganised. Subsequently to this, a phagedenic, and, in some cases, a fungous form of ulceration rapidly proceeds; death, however, frequently anticipates this change. In rare instances, this structure is much more soft, lardaceous or pasty, and indented by erosions; and is chiefly met with in the rectum. I have, however, seen it once in the pylorus. — (*b*) In another variety, the scirrho-cancerous structure consists of circumscribed and irregular or nodulated masses; and, in the opinion of Monro and Craigie, commences in the mucous follicles. Its internal structure varies, but generally consists of a hard fibrous-like structure or bands traversing a soft or pulpy substance, fre-

quently containing a gelatinous or ichorous fluid in minute cavities. (See Cancer.) At a more advanced stage it becomes softer, often in separate parts, and at last ulcerates, leaving cavities with hardened, scirrhous, and ulcerating sides. It is most frequently found obstructing the orifices of the stomach. — (*c*) Scirrho-cancer of the digestive canal is not always limited, but sometimes extends to the adjoining parts; and it may attack distinct portions, or even other viscera, either simultaneously or consecutively. Generally the peritoneal coat is the last to be affected, and, when implicated, it resembles coarse parchment. The rugæ of the internal surface are generally thickened and indurated, or eroded and ulcerated in the centre, or studded with small hard tubercles. There are often fungous growths in the advanced stages, proceeding from the ulcerated surface, which has ragged, unequal, and retorted edges; the disease being then in an open or carcinomatous state. In some instances the adhesion precedes the ulcerative process; and thus life continues, though all the coats are destroyed, and the malady is extended to the adjoining parts. When adhesion has not taken place, the ulceration communicates with the cavity of the peritoneum. If the malady be situated so as to interrupt the passage through the canal, the parts above it generally become very much enlarged, at first thickened, but afterwards thinned, and ultimately either ulcerated, perforated, or ruptured. The thickness and hardness of the diseased part vary much. When it is seated in the cardia or the pylorus, it may extend to the diaphragm or duodenum respectively, and so on as to other parts. The lymphatic glands in the vicinity are usually enlarged and scirrhous. The progress of the malady is generally very slow; but in other cases it is more rapid.

51. C. *Medullary Sarcoma — Hæmatoid, or encephaloid disease* — may originate in any of the elementary tissues of the digestive canal. It also presents modifications, according as the encephaloid, or medullary, or the vascular structure predominates. But it differs from the fungous and scirrho-cancerous maladies, in its more obvious connection from the commencement in constitutional vice, in the greater rapidity of its progress, in its belonging to early age, and in its simultaneous or consecutive occurrence in different and unconnected parts. Its colour varies remarkably: it being generally much lighter when the medullary or albuminous substance is greatest, and passing through every shade to a violet or purple, as it becomes more vascular, and consists more of convoluted and injected capillaries; and varicose-like and congested veins. It generally consists at first of a soft elastic and distinct tumour, without fluctuation, but occasionally of unequal firmness in different parts. In its progress it bursts, and a soft dark or purplish fungus, which bleeds profusely, rises from its centre, and rapidly increases. When divided, separate portions of it exhibit different colours and consistence, — some being as soft as brain, others as hard as the boiled white of egg, and others like cartilage, — and cavities of various sizes and forms, containing a bloody fluid. It experiences a fungous ulceration, and, as it extends, implicates or converts into its own form the tissues surrounding it. It occurs more frequently in the stomach than in other parts of the canal; and when it obstructs the orifices of this viscus, occasions the further changes noticed with reference to the preceding lesion. (See Hæmato-encephaloid Disease.)

52. v. Changes of Capacity and Situation. — *A. Increased capacity* of the alimentary canal is usually partial only — in one of its compartments; and is often associated with, and, indeed, occasioned by, narrowing or constriction of a part immediately below it. General increase of capacity has, however, been observed in some cases of bulimia. The stomach and large bowels are most frequently thus altered; either of which may become so much enlarged as to occupy the greater part of the abdomen. Cases of this description have been observed by Plater, Morgagni, Hasenoehrl, Hamberger, Frank, Anderson, Stoerck, Sandifort, myself, and others; and are usually attended by thickening, induration and constriction, or scirrho-carcinoma of the pylorus, when the stomach is dilated; and of the rectum, when the colon is thus changed. M. Andral found the duodenum as large as the stomach in a case where the commencement of the ilium was contracted. When a portion of the canal becomes constricted or obliterated, either from simple thickening, induration and ulceration, or from scirrhus or carcinomatous disease, the part above may be not only dilated and sacculated, but also attenuated or even ulcerated, or it may ultimately burst from the consequent fæculent and flatulent distension. Cases of this description have been recorded by Girdlestone, Burrell, Annesley, and others. Instances of great dilatation of a part of the canal, without contraction of a part below it, are rare. M. Andral, however, found the stomach excessively dilated in two cases, without any obstruction of the pylorus.

53. *B. Diminished capacity* also is generally a partial change, and seldom observed throughout the canal, excepting in a slight degree, after long fasting or death from starvation, or after an excessive or prolonged use of acids and astringents. The stomach has been found as narrow as an intestine after poisoning by acids, and sometimes after irritating substances; and the intestines contracted throughout from the same cause, and the protracted use of acids and powerful astringents. In cases of artificial anus, the portions of intestine below it, no longer receiving the matters transmitted along the canal, contract remarkably, their cavity being filled with mucus. Obliteration of the cavity of some part of the digestive tube may take place either partially or completely — 1st, from *intrinsic causes*; and, 2d, from *extrinsic causes*, or changes external to it, but which alter or destroy the permeability of its canal. The *intrinsic causes* are — (*a*) hypertrophy, with induration of one or more of the tissues forming its parietes; (*b*) excrescences or polypous growth on its internal surface; (*c*) concretions, either calculous or fæcal, or a ball of worms; (*d*) constriction of the muscular coat in a circumscribed part. In this last form of constriction, which is not infrequently observed in fatal cases of dysentery, and of which several delineations are given by Mr. Annesley in the work referred to, the adjoining portions of intestine are commonly distended by air; the internal surface of the constricted part being generally either injected, or ulcerated, or

otherwise altered in structure. The contraction observed about the middle of the stomach, unconnected with any change of the tissues, by WEPFER, MORGAGNI, DE HAEN, E. HOME, MONRO, NACQUART, and others, has been ascribed to spasmodic constriction; whilst some conceive that it exists very generally during congestion. SOEMMERRING imputes it to the pressure of the stays, as it has been noticed chiefly in females. The four specimens figured by MECKEL all occurred in this sex (*Tab. Anat. Path.* fasc. iii. tab. 20.). The most common intrinsic cause of permanent contraction or diminished capacity of a considerable part of the digestive canal is that first assigned, — hypertrophy, with induration, of some one or more of its coats, either with or without ulceration. Numerous cases illustrating this are on record. Dr. DRAKE found the stomach diminished to one third of its capacity, its coats being thickened threefold throughout; and instances of thickening, induration, ulceration, and contraction of large tracts of the intestinal canal — most frequently of the large bowels — have been recorded by HILL, GREENHOW, BURRELL, HOLMES, CARTER, BOUILLAUD, HOWSHIP, MONRO, and many of the writers referred to. Besides these, other instances of the various forms of instrinsic constriction, or contraction from organic change, occurring in the stomach, and in the small as well as the large intestines, are adduced by BARTHOLIN, BONET, WALTHER, HALLER, PORTAL, MICHAËLIS, MOLLINELLI, LOESECKE, MOLLISON, and several others, in places referred to in the Bibliography.

54. *C.* Intimately connected with muscular or spasmodic constriction of some part of the canal is the occurrence of *introsusception*; the contracted portion passing within the adjoining dilated part. A large proportion of introsusceptions takes place at the moment of dissolution, particularly in children, as justly remarked by CAMPER, MONRO, J. DAVIES, and others; at least, no symptom referrible to it had occurred during life. The usual results of this change both of capacity and position are strangulation of the retained portion of intestine, and obstruction or obliteration of the canal; with the symptoms of COLIC AND ILEUS (§ 39, 40.), and internal strangulation In all introsusceptions, the villous coat is innermost; next, the two serous surfaces are in contact; and more externally still, the two villous surfaces are also in contact. This arrangement, as M. DANCE (*In Repert. d'Anat. et Path.* &c. t. i. p. 441.) has shown, should be recollected, as it explains how, in consequence of the constriction and inflammation of the introsuscepted portion, its serous surfaces, which are in close contact, adhere; and, owing to its consequent strangulation and sphacelation, the whole of it is sometimes detached and passed by stool, without any of the intestinal contents escaping into the peritoneum. Instances of this kind have occurred, and several are recorded in the works referred to. Introsusceptions are most frequent in the small intestines, several sometimes occurring in the same case. They may also take place in this situation to a small extent without any bad effect. A large portion — even the greater part of the small intestines — is in some instances invaginated in the cæcum and colon; and, in rarer instances, the cæcum itself, either with or without portions of the ilium and colon, may be introsuscepted into the sigmoid flexure of the last (HEVINUS, MONRO, ANDRAL, DANCE, and myself).

55. The extent to which the intestinal canal may be thus invaginated is extremely various — from a few lines to many feet. The introsuscepted portion may even protrude more or less through the anus. Instances of this kind are recorded by the writers now mentioned, and by many others. When the invaginated part sphacelates, sloughs are thrown off, leaving perforations, through which the intestinal contents may pass into the peritoneum. But when, owing to the circumstance just explained, this part is separated, perfect adhesion of the parietes of the intestine at the point of separation taking place, the canal suffers no interruption of its continuity. In this case, the invaginated part is passed by stool. HEVINUS met with an instance in which twenty-three inches of the colon, and another in which twenty-eight inches of the ilium, were evacuated. CRUVEILHIER and ANDRAL saw twenty and thirty inches of small intestine, with a portion of mesentery, thus passed. Cases in which an opportunity occurred of examining the intestinal canal at a remote period from the separation of the invaginated part, are recorded by HEVINUS and DUMERIL. In that by M. DUMERIL, six inches of the jejunum and ilium had been detached. Upon examination after death, the two extremities of the intestines were perfectly united, their edges having been bevelled and exactly fitted to each other. They had contracted adhesions to the peritoneum at their junction, but the canal was not sensibly diminished even at the cicatrix.

56. *D.* The *extrinsic causes* of obliteration or strangulation of the digestive canal are numerous, and have been referred by M. ANDRAL to an irregular disposition, either of the peritoneum or of the intestinal canal itself. — 1st, *Those depending upon the peritoneum* are — *α.* Perforation of the mesentery; — *β.* Perforation of the omentum; — *γ.* Strips of the omentum adhering to the abdominal parietes, and entangling a coil of intestine; — *δ.* Fræna extending like arches from a portion of intestine to some other organ, as from the uterus or ligamenta lata of the rectum (ESQUIROL) — or from a portion of intestine to the abdominal parietes — or from the omentum to a part of the abdomen — or from one of the abdominal viscera to another; — *ε.* The mesentery or omentum, involving a coil of intestine, when folded or rolled together. — 2d. The *causes of strangulation seated in the tube itself* are — *α.* The compression of one portion of intestine by another, as a portion of the transverse colon situated between the vertebral column and the duodenum (M. GENDRIN, in *Arch. de Med.* b. viii. p. 494.); — *β.* The escape of an introsuscepted portion of intestine through a perforation or rupture in the containing part, the introsuscepted portion being strangulated by the margin of the perforation. (M. M. SOLON, in *Bullet. de la Soc. Méd. d'Emulation,* 1822.); — *γ.* Twisting of the appendix of the cæcum around a portion of the ilium, commonly owing to the unusual length of this part; — *δ.* Adhesions of the extremity of the appendix, so as to form an arch or ring, in which a portion of intestine may become entangled; — *ε.* The twisting of a diverticulum around either the part from which it is produced, or a coil of intestine; — *ζ.* Adhesions of the extremity of a diverticulum,

which may compress a portion of intestine over which it passes, or that portion to which it is attached. All these causes may, however, exist without giving rise to *internal strangulation*. But they more frequently produce it either slowly or suddenly. In the former instance, symptoms indicating a greater or less obstacle to the passage of the intestinal contents are generally complained of for weeks, months, or even years, before the signs of strangulation appear. In the latter case, no premonitory symptoms are observed.

57. *E.* The *situation of parts of the digestive canal* may be *changed* in several ways, which are referrible to two principal *classes*:—1st, Alterations of situation in respect of different parts of the tube, and of the related viscera,—or *internal displacements*;—2d. Protrusions through some part of the abdominal parietes,—or *external displacements*. (*a*) Internal displacements arise from—α. obstruction; β. alterations of its calibre; and, γ. the impulsion or dragging of adjoining parts. The *stomach* is not infrequently partially displaced from some one of these causes, especially its pyloric extremity, and generally in consequence of scirrhous thickening and induration, or tumours developed in it or its vicinity. I have seen the scirrhous pylorus form a tumour below the umbilicus,—a circumstance which might have led to an incorrect diagnosis, if it had not been known occasionally to occur. This viscus may also be displaced by the dragging of the omentum in a large hernia, the pyloric extremity descending equally low from this cause, as in a case recorded by Dr. R. Lowis. The situation of the small intestines, *cæcum* and *colon*, is also frequently changed from the causes now stated. Alterations of this description in the two latter of these have been noticed in their respective articles. The *second* or *external class of displacements* belong to the province of the surgeon, the medical relations of the subject falling more appropriately under the articles Dyspnœa, in which diaphragmatic hernia is noticed, and Peritoneum, where the diseases of the serous coat of the digestive tube are considered.

58. vi. Congenital Lesions of Dimension and Situation.—The gastro-intestinal canal has never been found wholly wanting, even in monstrous productions. Of the different parts which constitute it, that proved to be the first formed is never deficient. This is the extension of the vesicula umbilicalis into the intestinal canal, which, however, may be arrested in its formation before one or other extremity of the tube has been produced, thereby occasioning deficiency of a portion of either, or the imperforation of their outlets. With the various congenital faults of configuration, dimension, and situation, it is unnecessary to occupy my limits. A few only of the most important may be noticed.

59. *A.* The *dimensions* of the digestive canal may be lessened or increased, either throughout, or in parts only.—(*a*) The stomach has been found so *small* as not to exceed the diameter of the small intestine. The convolutions of the small intestines have been observed less numerous or nearly wanting, and the length of the canal from the cardiac orifice to the anus hardly equalling that of the individual. The *cæcum* has sometimes been so small as not to form a *cul-de-sac*, or it has been, as well as the appendix, altogether deficient, the ilium opening directly into the colon.—(*b*) *Increased* dimensions of some part of the digestive canal are more common than the preceding. In infants and children, the stomach has been found of a remarkable size; and in some, the duodenum has been as large as the stomach. The cæcum, or its appendix, has also been very large. Brugnoni and Meckel (*Tab. Anat. Pathol.* fasc. iii. p. 23.) have adduced instances of two colons springing from a single cæcum, and reuniting at the rectum, in the case of the former; but terminating in *cul-de-sacs*, floating freely in the abdomen, in that of the latter. One part of the canal has been found greatly increased in size, whilst the other is diminished. M. Cabrol found the stomach of a person so large as to fill the greater part of the abdominal cavity, and the small and great intestines together little longer than three feet.—(*c*) Appendices or *diverticula* are sometimes attached, like the fingers of a glove, to the side of the canal. M. Andral states them to be most frequent on the jejunum and ilium, and Meckel on the lowest third of the ilium; but they have been found on the duodenum and on the rectum (Morgagni).—Their cavities are continuous with that of the intestine, and they terminate in a *cul-de-sac*, which either floats loosely in the peritoneal cavity, or adheres to some adjoining part. Their length varies from a few lines to three or four inches. They may either fall short of, equal, or surpass, the diameter of the intestine whence they spring; and they form every angle with it. They vary in number from one, which is most common, to five or six in the same portion of intestine. Their terminations are rounded or pointed, and they sometimes present a series of dilatations and contractions. Meckel saw one inserted into the navel, forming a kind of umbilico-intestinal canal. From this and other circumstances—particularly their being commonly found single, and on the lowest third of the ilium—he infers that *true* diverticula are the remains of the original intestine formed by the vesicula umbilicalis; and contends that, when they occur in any other situation, or when more than one exists in the same case, they are *false*, and consist merely of hernia of the villous through the muscular coat, or of some other change (*Ueber die Divertikel*, in Reil's *Archiv.* &c. b. ix. h. 3., *et Tab. Anat. Path.* fasc. iii. pl. 21.) They seem to dispose the adjoining portion of intestine to organic change, as well as to alterations of capacity, as in the cases recorded by Dr. Francis and others.

60. *B. The situation of the* digestive tube, or of parts of it, is variously changed, either by original conformation, or by accident or disease. The congenital abnormal positions of the viscera are so numerous, and of so little importance in a practical point of view, that I shall not touch on them. The reader will find them described in the works of Meckel and Andral referred to in this article. *Imperforations* of the canal come not within the scope of the work.

61. As the same alterations of structure occur in all the parts constituting the digestive canal, although in different degrees of frequency, I have described them in a connected manner, in order to prevent the repetition that could not be avoided if they had been comprised in the articles on the Intestines, Stomach, &c. But in these, and some other articles, I have detailed the *symptoms*

of those alterations, and the *treatment* they require, because the same lesions, seated in different parts of the canal, are attended by different phenomena, and claim modified means of cure; reference being made to the changes here described. Therefore, the diseases of the digestive canal should be also studied in the following articles, which contain most of what is known respecting them:—Cæcum, Colic and Ileus, Colon, Concretions, Constipation, Diarrhœa, Duodenum, Dysentery, Fauces, Fevers, Indigestion, Intestines, Œsophagus, Peritoneum, Pharynx, Rectum, Stomach, Worms, &c.

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DISEASE—the Causation and Doctrine of.—Classif. General Pathology; *Ætiology and Pathogeny.*

1. I. Preliminary Remarks.—It is of great importance to the tyro in medicine to acquire general principles, derived from a careful and comprehensive investigation of disease, that may guide him in the practical course he has to pursue. Nor is it of less moment to the experienced to find inferences and doctrines calculated to serve as the basis of therapeutical indications deduced for him even from those phenomena which have become familiar from frequent observation, or have appeared trivial when viewed in an imperfect or false light. It is by an intimate acquaintance with morbid actions, in respect of their origin, of their conditions at the time of observation, and of their tendencies, and by a knowledge of principles derived therefrom, that we are chiefly enabled to direct our course through those numerous difficulties which beset us in the practical discharge of our duties, when we are insufficiently aided by published authorities, or imperfectly guided by the results of personal observation. Even the most experienced will often find examples of disease in some one or other of the numerous combinations or successions it is constantly assuming, of which memory will not furnish sufficient examples, by the results of which he may be guided; and will frequently have to recur to those principles, both doctrinal and practical, which he had learnt from his predecessors, or had acquired for himself by analysing and recombining the numerous manifestations of morbid action which have been presented to his view. In endeavouring to supply what is not to be obtained in our medical literature—to satisfy a want which I know has been very generally felt—I have only to regret that my limits will preclude those details, which many might require, and will confine me chiefly to succinct statements, where vivid illustrations might be necessary, and therefore looked for. But some advantage will be derived from exhibiting an outline of the subject, in a methodic manner, filled up in its more essential parts with such touches and shades as may be necessary to truth of representation, and treated in separate articles where it assumes a practical interest. The origin of disease, and the numerous circumstances, which, existing either *intrinsically* or *extrinsically* in respect of the frame, modify disease in its progress, are amongst the most important topics to which the mind of the scientific practitioner can be directed; inasmuch as upon a due recognition of these, in their individual or joint operation, will depend the justness of our indications of cure, the appropriate employment of remedies, and consequently the success of our practice, and our own eminence.

2. i. *The intimate Relation of the Subject to the Doctrine of Life.*—In all speculations respecting the causes, the nature, and the removal of diseased actions, the body ought to be considered in relation—1st, to its organisation and mechanism; and, 2d, to the influence by which that mechanism is actuated: we should view it as presenting an assemblage of numerous and beautifully contrived parts, all displaying a wonderful and harmonious combination of phenomena,—the most perfect and the highest presented to us in the physical world. Some of the finest illustrations of mechanical adaptation and power, and of those principles of action to which the researches of the natural philosopher have been directed, are manifested in the human body. But these manifestations are subject to a finer and yet a more powerful principle than any which govern the operations of inanimate matter. The whole organised creation, especially the higher animals, and man in particular, display functions which inanimate substances cannot produce; and

although physical actions are observed in their most admirable conditions in the animal body, they are entirely subject to higher functions, to which the term vital, from their nature and object, has been applied. It is one of the chief characteristics of *life* that it is allied to matter, delicately and peculiarly combined, and differently constituted from inanimate matter, which is kept in a state of cohesion by means of the attraction subsisting between its particles, and which state its chemical affinities dispose it to preserve. Life allied with matter produces combinations entirely different from those, which the chemical affinities of the elementary particles dispose them to assume, and preserves these combinations in opposition to their physical tendencies as long as it continues thus associated. *Life*, then, as I have already contended, is a *superior power*; and this superiority is instantly shown by the readiness with which the elementary particles of that matter with which it is so intimately connected enter into different combinations and forms as soon as this principle is withdrawn. One, therefore, of the chief, although apparently one of the lowest and most generally diffused manifestations of life, is to preserve the textures, or the matter with which it is associated, in a state suitable to the performance of the various functions of the animal. But it also executes higher offices. By a series of beautiful processes, it changes substances foreign to the constitution of the animal to which it is allied, and at last assimilates them into the organised structures which it animates. Thus nutrition and growth are produced, and the decay of the organised body is prevented.

3. Life, in its intimate alliance with the structures of the body, gives rise to various manifestations, according to the peculiar organisation of each; these structures being the instruments of its influence, and the organs by which vital operations are performed. Thus the muscular fibre, endowed with life, displays contractile properties; the nervous fibriles manifest sensibility; the liver and kidneys perform their secreting functions; and so on as respects the various parts composing a perfect animal. The *healthy functions* of life form the study of the physiologist, whilst the description of the *organs* performing them belongs to the anatomist. It is with the *derangements* of both *functions and organs*, that the pathologist and practitioner are chiefly concerned. The knowledge of structure and healthy function is, however, the basis on which both the one and the other raise a superstructure of great public benefit. The duly instructed pathologist is enabled to comprehend the beautiful combination of physical principles evinced by the human body; and to understand how they are directed by, and made subservient to, life, whether in perpetuating its healthy duration, or in guarding it against agents threatening any of the functions and organs which it endows, or in removing derangements when actually produced. It is from an enlightened recognition of the operation of external agents on vital functions, of the relation subsisting between causes and their effects, and of the succession of morbid phenomena consequent on primary changes, either vital or organic, that the scientific practitioner is enabled to devise suitable plans and appropriate means of restoration to the healthy state. But, when contemplating the functions of the living body, whether in health or in disease, he should not restrict his considerations either to the physical, or to the vital, phenomena which any particular organ or structure presents. He should recollect that the physical phenomena are under the direction of the vital power; and that this power, although influenced by mechanical or physical operations, is equally energetic in controlling these operations, as they are, in their turn, of controlling it. The pathologist must be aware that the study of the living frame in health, and more especially in disease, is the investigation of the numerous manifestations of life through the various organs and structures with which it is wonderfully and inexplicably associated. Of *life* itself we know nothing but through those manifestations, and thus it is through them only we can enquire respecting its conditions. Although we cannot demonstrate the intimate nature of vitality, and cannot show the peculiar ties which bind it to organisation, we can prove, by an accurate enquiry into the numerous phenomena exhibited by living bodies, and by the manner in which external agents modify these phenomena, as well as by the derangements evinced by particular organs and structures, that the connection is intimate, and that causes operating upon the one generally affect the other. This powerful influence of life over the functions of the organs with which animals are endowed, and the manner in which causes modify the conditions of this principle, whether acting immediately upon it, or through the medium of the organisation with which it is allied, are amongst the most important topics which interest the medical practitioner.

4. The *conditions* of life, as manifested in the functions either of a single organ, or of the frame generally, are liable to change, from *intrinsic* and *extrinsic* causes; and the resulting alterations modify the structures with which this principle is so intimately and mysteriously related. On the other hand, the states of the animal organs and textures are readily affected by agents acting directly upon their organisation; and these states of structure modify its vital manifestations, and, through them, the vital endowment of the body generally. From this mutual dependence — this reciprocative influence — it will appear that, as life can only be contemplated through the medium of an organised body, so the derangements of such a body cannot be accurately investigated, and the conditions of life — its manifestations in appropriate systems and organs — be left out of consideration.

5. ii. *Health and Disease defined.* — Whilst the energy of the vital endowment is uninjured, and its manifestations in the various systems are in due harmony throughout, and with the state of the structures with which it is associated, all the operations of the body are duly and steadily performed. This is the condition which may be termed *health*. But as soon as the energies of the vital principle become depressed, excited, exhausted, or otherwise altered, either throughout the body, or in any of the systems or organs by which it is manifested, and when change from the natural condition is primarily produced in any of the structures with which it is associated, *disease* supervenes. This aberration from

the natural condition of the vital energies endowing the whole, or parts of the frame, or alteration of the textures which these energies actuate, is produced by causes acting sometimes singly, occasionally in combination, and frequently in succession. To point out the nature and modes of operation of those causes upon the living body, as far as their natures and effects are known, is the object here proposed.

6. A knowledge of the causes inducing those changes; the nature of the changes produced, as respects either the vital manifestations, or the structural alterations; the signs or phenomena by which morbid conditions of vital function or of structure are recognised; are the chief topics which interest the pathologist; whilst the means of removing those disorders, of averting death, and of alleviating the sufferings which they occasion, when cure is beyond the reach of our science, are the ends which he proposes to himself as the reward of his investigations. In order that all that is advanced respecting the various kinds and states of disease may be more clearly understood, I propose to give, in this, and some articles that will be referred to, a sketch of pathological principles; so that, by pursuing the plan pointed out in the preface, the knowledge which the tyro or the inexperienced reader will have acquired from this part of his systematic course of study, will become serviceable to him in the acquisition of that which should be afterwards brought before him. By considering what is simplest and most elementary, and proceeding onwards to what is more complicated and difficult, the mind will be gradually enabled to understand the abstract subjects which will come before it; the knowledge successively acquired introducing it to an acquaintance with what will follow. Before treating of the principal states or alterations from the healthy condition of the frame, which constitute the disease, I shall point out, *first*, the causes which act upon the living body most frequently in an injurious manner; *secondly*, the morbid conditions themselves which these causes induce; and, *thirdly*, enquire (in a distinct article) into the symptoms by which the nature of these conditions are recognised. Hence, *disease* will appear as a series of changes resulting from causes, between which and their effects there is a most intimate, although not always an obvious, relation.

7. II. Causation of Disease, or Ætiology; from αἰτια, cause, and λογος, a discourse.

Causes act primarily on the vital endowment. — I have already stated, that although the various textures and organs of the body display the finest combinations of mechanism, and the most beautiful principles of action presented by the physical world, yet they are entirely under the dominion of life, by which only they are actuated, and on which they entirely depend for the functions they present. It is not upon the textures or organs themselves that the causes of disease generally make their first impression; and even when they are brought in immediate relation to a particular organ or structure of the body, we have no evidence to furnish that they derange these parts by primarily affecting the machinery of which they are composed; but, on the contrary, from the gradual manner in which derangement is produced, from the nature and effects of the disorder which follows, and numerous other considerations, it may be inferred that they make their first impression upon the vital endowment of the organ, disordering the functions which it performs under the dominion of life; and the functional disorder either leads on to the production of further disease, or indirectly to a return to the healthy condition. No doubt, some causes affect at once the organisation of the part, such as many chemical, physical, and mechanical agents; but the majority modifies the vital manifestations of the frame, either in one organ or structure, or in several simultaneously; and by impeding or modifying, deranging or altogether changing these manifestations, thereby induces effects, which become themselves causes of further disease, until life itself is terminated, or a healthy condition of function re-established. Of the justness of this inference satisfactory evidence will be furnished in the sequel. (See § 63., *et seq.*)

8. The causes of disease have been variously arranged and named by pathologists. For the better understanding the subject, and writers on disease, the different arrangements and distinctions which this subject has received may be briefly alluded to. *Causes* have been denominated *external* or *extrinsic*, and *internal* or *intrinsic*, according as they operate upon the body from without or within. They have also been called *principal* and *accessory* or *concurrent;* disease proceeding chiefly from the former with the assistance of the latter. They have also been named *positive* and *negative*, from the manner in which they act upon the body; and by some they have been divided into *physical*, *chemical*, and *physiological*, according to their nature. The division, however, which has been most generally adopted is into *remote* and *proximate* or immediate, according to their relation to the disease occasioned by them: the remote being the first in the chain of causation, the proximate or immediate those early changes which they effect in the œconomy, and which constitute the primary condition of the disease, or, in other words, the pathological states arising directly from the operation of the remote agents. The REMOTE causes have been divided into *predisposing* and *exciting* or occasional causes; the predisposing being those which influence the conditions of the living functions so as to favour the operation of those occasional or exciting causes whence disease more directly springs. To these two classes I would add a third, viz. *determining* or *consecutive* causes, which, being posterior to the others in point of time, determine or call into action the exciting causes, or rather come in aid of, and follow up, the impression made by the latter; and which, without such aid, might have been insufficient to produce actual disease, or would have induced it only in a slight degree.

9. It must be obvious that all causes, as well as the effects they produce, must have an intimate relation to the condition of the living frame; and that those which may be quite inefficient on one person will be powerfully active on another; or which are without effect on an individual at one season, will be very influential at another, owing to the state of vital energy at the time, to the concurrence of other causes, or to exposure soon afterwards to such as will de-

termine, or otherwise aid, those which preceded it, and which, although the principal or exciting causes, were insufficient, until thus reinforced, fully to produce the disease. Owing, also, to the condition of the frame, no effect will sometimes follow one, two, or even three exciting causes; and until a greater number are brought into operation, no mischief will often result. The effects produced by various animal and vegetable exhalations on different individuals, or upon the same person at distinct periods, under different states of mind and predisposition; and by the action of numerous concurrent, accessory, and determining causes; fully illustrate this position. It is chiefly owing to a want of knowledge of the doctrine of causation, that so much error and difference of opinion prevail respecting infectious and non-infectious diseases. On the other hand, persons may be so very easily affected, that causes of the slightest nature, and such as are determining or accessory in the majority of cases, are *principal* in respect of them; and influences which are usually *predisposing* are often, in such persons, the exciting causes of disease. Also those which are *remote* in their operation on some constitutions, are *direct* or *immediate* in respect of others. Examples of this are found in the diseases of the lungs, liver, stomach, and bowels. In considering the agents which affect either the functions, or the organisation, I shall first notice those which generally *predispose* the system to disease; next those which *excite* disease in a direct or immediate manner; afterwards such as are specific, or produce determinate results; the effects of their operation on the living frame being obvious, and often admitting of being foreseen; and lastly those circumstances which sometimes determine, reinforce, or call into action, exciting or specific agents.

10. i. Of the predisposing Causes of Disease.—These may be classed—1st, into such as are proper or peculiar to individuals, and the circumstances in which they are placed; 2d, into such as are not proper or peculiar to individuals, but which may affect various persons, and even numbers of persons, but individually and occasionally; and, 3d, into such as are general, and affect more or less all who are exposed to them. — *A. Those which are peculiar to the individual*, and to the circumstance in which he is placed, and which may be called the individual predisposing causes, are—1st, original conformation and hereditary predisposition, age, sex; temperaments, original and acquired; habit and constitution; trades, professions, and circumstances of life, &c.; and, 2d, the various external and internal agents, and circumstances modifying the state of the functions,—as previous functional disorder, and convalescence from disease; and the pregnant and puerperal states.

11. *a. Original conformation and hereditary predisposition.*— It is generally observed, that the constitutions, temperaments, and diathesis of the offspring closely resemble the parent; and that whatever disposition to disorder, whether of function or of structure, the latter may have possessed, is liable to evince itself in the former. From this circumstance having been very generally remarked in respect of certain maladies, they have been termed *hereditary*. But it must not be supposed that children are actually born with the diseases of their parents. This is but seldom remarked; although, in rare instances, I have observed the commencement of tubercles in the lungs of a new-born infant by a consumptive mother; and small-pox and syphilis are sometimes communicated to the fœtus *in utero*, occasioning in some instances its premature birth, and even its death, either previously to or about the natural termination of utero-gestation. Hydrocephalus, cataract, and various imperfections of the organ of hearing, and, indeed, of other organs of sense, are not infrequently congenital, or examples of disease from *original conformation*; but, in such cases, it is rare that the parent is similarly affected at the time, although the hereditary predisposition, as about to be explained, exists nevertheless; and, as respects the first of these, a tendency merely to the disease could have existed at an early age in the parents. It should be kept in recollection, therefore, that the fœtus *in utero* may be affected by several cachectic, inflammatory, or even febrile diseases, *communicated* by the parents, or supervening *accidentally*: but, of those which are thus communicated, even the majority are not, properly speaking, hereditary; and those which are accidental do not depend upon the constitution of the parents, or the ailments experienced by the mother during the period of gestation. *Congenital diseases* are consequently divisible into— 1st, Those which occur in the fœtus, without any participation on the part of the parents,— as imperfect developement of organs, inflammations, effusions of fluid in various parts, &c.; 2d, Diseases in which the fœtus participates with the mother, owing to their contaminating influence, or their extension throughout her organisation,— as syphilis, small-pox, fevers, &c.; 3dly, Those that affect the fœtus from a constitutional liability in one or both parents,— as hydrocephalus, cataract, tubercles, &c.

12. Most commonly, however, the child is born free from disease; but, inheriting the constitution and diathesis of the parent, has that condition of function and organisation which renders it more susceptible of impressions produced by the exciting causes of certain maladies. Examples of this may be contemplated daily in respect of diseases of the lungs and brain; the constitution and functions of these viscera disposing them or rendering them more prone to experience those derangements by which the parent or parents had been affected. In some instances this predisposition may be more strongly marked in the child than in the parent; and in other cases the predisposition may be extremely slight, and only brought to light by the operation of the more energetic agents.

13. The predisposition of the offspring generally evinces itself more strongly at certain ages than at others, according to the kind of morbid constitution or predisposition which it may inherit, the causes to which it is exposed, and the nature of the malady which results. Thus, the disposition to *hydrocephalus*, *convulsions*, *idiotcy*, *rickets*, *scrofula*, *cataract*, &c., is most apparent soon after birth, and at early epochs of life; to *epilepsy*, *hæmorrhage*, and pulmonary *consumption*, about the age of puberty, or previously, or soon after; to *gout*, *asthma*, and *angina pectoris*, in adult and mature age; to *insanity*, *apoplexy*, and

paralysis, during the mature or advanced stages of life; and to various nervous disorders, at more irregular periods. But these diseases do not necessarily supervene, although one or both parents have been affected by them; and several usually appear in alternate generations. Some occur more uniformly than others. When the predisposition to them is derived from only one parent, they very frequently never make their appearance, unless as the effect of very active exciting agents. But even when the predisposition is derived from both parents, and when it may be considered as being thereby heightened, exciting causes are generally required to develope the disorder.

14. *b. Age.* — Each of the different epochs of existence is more liable to certain diseases than to others. During the *earlier periods*, there is generally a predisposition to particular disorders, even when no hereditary taint exists. This is partly owing — (*a*) to the changes going on in the frame; (*b*) to the state of vital manifestation; and (*c*), to irritations in the alimentary canal. Amongst the changes proceeding in the frame, that either readily suffer derangement or lead to it, the most important are the processes of ossification and developement of the contents of the cranium. These processes are more or less under the dominion of the vital influence; and they are more or less disturbed as this influence is affected, in respect either of the system generally, or of particular organs. Hence, rickets, hydrocephalus, inflammations of the brain or its membranes, readily occur. The quantity of blood sent to the brain in early life is another predisposing cause of cerebral affections; and the readiness with which the functions and even the circulation of the brain are disturbed by impressions from without or by irritations from within, becomes, especially when assisted by other causes, a frequent source of disease. (See AGE, § 10.; and DENTITION.)

15. After the first dentition, and during *growth*, the powers of life are energetic, as shown by the reaction of the vital functions upon the depressing causes of disease; and are eminently conservative, particularly in resisting hurtful agents. The predisposition is chiefly to inflammatory ailments and acute attacks of fever, especially in those who breathe a wholesome air and are sufficiently nourished. But the susceptibility to impressions, both moral and physical, is energetic; and irritations, from whatever cause, are generally followed by augmented vascular action, with which the whole frame, owing to the susceptibility of the nervous systems, promptly sympathises. Hence febrile attacks, eruptive fevers, inflammations, cerebral affections, disorders of the air passages, of the alimentary canal, and lymphatic glands, usually appear. At this period, also, all specific causes readily take effect, particularly of those diseases which are incidental to childhood; their full operation, however, destroying the susceptibility to be again affected by them. About the time of *puberty* and *adolescence* various complaints first show themselves, especially some that are inflammatory, and to which there is an hereditary tendency, — as pulmonary consumption, hæmorrhage from the lungs, epistaxis, plethora; and as soon as the body has ceased to grow in height, or the vessels to extend themselves in the direction of their axis, these disorders are still more readily produced by exciting causes. In *manhood* and *mature age*, the susceptibility to impressions gradually diminishes, and generally continues to decrease as age advances. During the former of these periods, hypochondriasis, melancholy, insanity, hæmorrhoidal affections, asthma, rheumatisms, and the majority of organic diseases, with the exception of such as are scrofulous, commonly make their appearance. Towards the *decline of life*, gout, softening of the brain, apoplexy, paralysis, scirrhus, cancer, changes in the coats of the blood-vessels, diseases of the organs of sense, affections of the urinary passages, &c. usually supervene. (See AGE, and CLIMACTERIC DECAY.)

16. *c. Sex.* — There are a great many diseases to which both *sexes* are equally liable. Fevers, inflammations, organic diseases, and many others, attack both. But it has been observed, during the prevalence of epidemics, and in unhealthy countries, that the female sex suffers much less than the male. This, no doubt, arises from the more regular habits of females, and their less exposure to the determining or concurring causes: something may also, perhaps, be attributed to their periodical discharges, which tend to diminish plethora and to purify the circulating fluid — circumstances calculated to impart a partial exemption from several diseases, particularly those which are epidemic and endemic, although they may dispose to others. But the conformation and temperament of females, the sympathy existing between their generative organs and the state of the circulation in the brain, the marked susceptibility of their nervous system, and great mobility of their muscular organs, dispose them — especially those in cities and populous towns — to diseases usually denominated nervous. The natural vicissitudes, also, of female life are accompanied with a tendency to particular maladies, especially the periods at which the menstrual discharge commences and ceases; at the former of which, nervous and cachectic complaints — at the latter, diseases of the organs of generation, or of those closely allied to them in function or situation — very frequently appear; — chorea, chlorosis, irregular convulsions, hysteric or painful affections, difficult, suppressed, or irregular catamenia, occurring about the former epoch; and chronic inflammations, scirrhus, cancer, and other organic lesions of the womb, disease of the breast, and disorders of the colon or rectum, about the latter period.

17. *d. Temperament and diathesis.* — The *sanguine* and *irritable* temperaments dispose to plethora, inflammations, hæmorrhages, pneumonia, and to inflammatory fevers. The *bilious* temperament most readily experiences biliary derangements, bilious fevers, affections of the stomach and bowels, hypochondriasis, mental disorder, chronic cutaneous eruptions, and various organic derangements of the abdominal viscera. Persons of the *lymphatic* or *phlegmatic* temperaments are predisposed to catarrhal attacks, slow fevers, chronic discharges, dropsies, scrofulous and scorbutic affections, diseases of the joints and glands, and to tuberculous and other chronic diseases. In persons thus constituted, the powers of life are languid, the preservative influence and vital resistance feeble, and reaction

upon noxious causes or agents seldom developed or energetic. The *nervous* temperament disposes chiefly to convulsive diseases, especially to hysteria in the female sex; to mania and insanity, or other derangements of the mental manifestations, as hypochondriasis, melancholia, &c.; to nervous and typhoid fevers, &c. This temperament often modifies the progress of various acute diseases, and imposes upon them a nervous character. When the temperaments are *mixed*, an accordant predisposition may often be remarked; as, in the *sanguineo-bilious*, a disposition to bilious inflammatory fevers, to hepatitis, to inflammations of the alimentary canal, of the brain, and of the serous surfaces, &c., is often manifested.

18. *e.* Of *constitution* and *habit* of body, it may be remarked, that a robust constitution generally successfully opposes the impressions of many exciting causes; but when once a morbid impression is produced, disease assumes a more active or acute character, and is attended with higher vascular action, the powers of life and reaction being great. On the other hand, weak constitutions, and those of a scrofulous taint, are more disposed to disorder, more readily affected by its causes upon the first impression; and disease in them assumes a more chronic and low form. When persons thus constituted have become habituated to the impression of certain morbid agents, they frequently cease to be affected by them in the usual manner; as observed in respect of marsh or terrestrial emanations, which seldom give rise to regular attacks of fever in such subjects, but induce organic disease, and sinking of the powers of life.

19. *f. Habits* of life and *profession* are amongst the most influential predisposing causes of disease. Whatever profession or occupation requires an active exertion of the powers of the mind, and continuation of that exertion to the neglect of sufficient relaxation and exercise, occasions determination of blood to the head, and favours the production of inflammation of the brain or of its membranes, especially if such persons live fully or luxuriously; and, if fever attack them, the head, the liver, and stomach become severely and dangerously affected; and, unless the disease be actively treated at its commencement, death may supervene in consequence of serous effusion from the membranes, or of softening of the texture of the brain, rupture of its vessels, or of organic change in the liver or digestive canal. Those who take *active exercise* in the open air are generally more disposed to inflammatory attacks of an acute character, to pneumonia, and to rheumatism, than to other complaints; although in them the predisposition to disease is much less than in other persons. Those who indulge the *appetites* beyond what the economy requires, — especially the desire for food, and for vinous and spirituous liquors, — are liable to disorders of the stomach, liver, and intestinal canal; and, if attacked by fevers, these organs generally are the most seriously affected: such indulgences also dispose to plethora, apoplexy, paralysis, gout, dropsy; and in many cases directly excite those maladies. Inordinate *sexual intercourse* is also a frequent predisposing cause of many diseases, and often immediately induces disorder. Pulmonary disease, affections of the heart, epilepsy, mania, and the other disordered manifestations of mind, frequently take place in consequence of the predisposition to them generated in the system by the excessive indulgence of this appetite. It also leads to other maladies, by lowering the vital energies of the frame, and thereby rendering them more assailable by the common exciting causes of disease.

20. *g.* The *circumstances* of life in which persons are placed have a marked influence in favouring or counteracting the operation of exciting causes. It has been determined, by exact observations and calculations, that those who enjoy easy or comfortable circumstances are much less subject to disease than the poor, the insufficiently clothed, and ill-fed. This arises not only from the former class being less exposed to its exciting causes, but also from the good effects of sufficient nourishment in supporting the energies of life, and thereby warding off the impressions of injurious agents and influences. Much, also, is owing to personal and domestic cleanliness, to proper clothing, and to living in airy apartments in healthy localities. Yet, while full living thus wards off many diseases, especially those arising from debility, as low or adynamic fevers, scorbutic disorders, scrofula, dysentery, and various others, it disposes to gout, dyspeptic and nervous affections, particularly to apoplexy and paralysis. (See Arts and Employments.)

21. *h. Debility, previous disorder, and convalescence from other diseases*, often favour the operation of exciting causes; particularly when the powers of life are much depressed or exhausted. In respect of the predisposition occasioned by already *existing* disorder, some doubt may be entertained by those who may have adopted the hastily formed and incorrect dogma that two disorders cannot co-exist in the economy. This may be true in respect of certain febrile diseases, especially those of a specific or exanthematous kind: but in nearly all beside, so very numerous are the exceptions, that the principle becomes quite untenable; and, in many cases, even an opposite doctrine may be enforced, particularly in respect of bilious and nervous disorders. Thus, when the functions of the stomach are weakened, or those of the liver obstructed, various affections of different organs related to these, either in function or anatomical connection, are apt to supervene, more especially febrile diseases, disorders of the bowels, brain, and lungs. The exhaustion of the powers of life partially continuing during *convalescence*, also disposes the frame to the invasion of the exciting causes. On this account, convalescence ought always to be watched by the ordinary medical attendant, who, if not allowed to continue his aid for this purpose, should state his reasons for proffering it; and, if it should be declined, the patient will then have himself only to blame. (See Debility, &c.)

22. *i.* Amongst the other individual predisposing causes of disease, I may mention the *pregnant and puerperal states*, that favour, in a very marked manner, the occurrence of several maladies, which, owing to this connection, have been denominated puerperal, &c. Although these diseases arise chiefly from the predisposition created by the conditions of the female organs and constitution during these states, yet a great difference exists between them as to their necessary depend-

ence upon these conditions; for, whilst these states predispose to the invasion of exciting causes developing disease in all instances, the maladies that result may be either such as are peculiar to them, as adynamic puerperal fever, &c.; or such as are not necessarily dependent upon, although remarkably favoured by, them, as inflammations of the uterus and peritoneum, uterine hæmorrhage, convulsions, mania, &c. During the puerperal state, also, the predisposition to fevers, inflammations, consumption, various nervous affections, rheumatism, &c., although less strong than to the preceding, yet is greater at this period than at any other.

23. *B.* Amongst those predisposing causes *which are not peculiar to the individual, but which affect persons individually and occasionally*, certain states of the mind deserve the first place. — (*a*) When the mental energies are depressed by grief, anxiety, disappointment, fear, &c., the powers of life are less able to oppose the debilitating causes of disease which invade them from without, and of which nature all the exciting causes of fevers, particularly those which are specific or contagious and miasmal, generally partake in a most marked manner. On the other hand, when the mind is elevated by success, by hope, by confidence, and the other exciting passions, the depressing causes make little or no impression upon the constitution; and individuals thus circumstanced almost always escape from diseases which readily invade the fearful, the dejected, and the disappointed. There is, perhaps, no circumstance which more certainly disposes the system to the operation of the exciting causes of fever, than the fear of being attacked by it; whilst nothing fortifies the constitution more surely than a full confidence that the causes of disease will not take effect.

24. (*b*) Next in importance to mental depressions, is whatever *lowers* the vital energies, or exhausts and debilitates the body. Under this head, low diet, fatigue, previous illness, excessive secretions and discharges, want of sleep, and venereal excesses, may be classed. (See art. DEBILITY.)

25. (*c*) *Dress*, even, has a very evident influence in creating a predisposition to disease. Too little clothing, particularly in females, favours the occurrence of difficult and suppressed menstruation, pulmonary diseases, and disorders of the bowels. It was remarked, during the French revolution, when it was the fashion to dress classically,— which was almost a state of semi-nudity, and more appropriate to the warmer climates of Athens and Rome than to those of the north of France and this country, — that pulmonary diseases, rheumatism, suppressed menstruation, bowel complaints, catarrhs; and amongst the children, who were exposed with naked busts and thin clothing, croup and other diseases of the air-passages and lungs; were uncommonly prevalent. On the other hand, *too warm clothing* is a source of disease, sometimes even of the same diseases which originate in exposure to cold; and often renders the frame more susceptible of impressions of cold, especially of cold air taken into the lungs. The remarks now offered may be applied to overheated sitting and sleeping *apartments*, and to warm soft beds and bed-clothing. These relax and weaken the frame, dispose to disorders of the kidneys, urinary and sexual organs, and render the system much more susceptible of injurious impressions from without. A predisposition is thus produced, not only to catarrhs, inflammations, affections of the lungs, and rheumatism, but to irregularity in the menstrual discharge. It has been remarked, that the females in Holland, who generally use very warm clothing, warm apartments, and warm beds, are very subject to excessive menstruation and fluor albus. Females, also, become disposed to various diseases, particularly those affecting the pulmonary organs and heart, from wearing very tight-laced and unyielding corsets. Indeed, those dressed in this manner can scarcely call the intercostal muscles into action, and can breathe only by means of the diaphragm. The mechanism of respiration being thus impeded, the requisite changes are not fully produced upon the circulating fluid; and congestion supervenes in the lungs, right side of the heart, and parts situated below the seat of pressure. This cause is especially injurious to females during growth and pregnancy; for the chest should be fully and freely expanded, especially at these periods, in order that the circulation through the lungs and heart may be unimpeded; and that the blood should experience those changes without interruption, that are required for the developement of the body and of the fœtus. The functions, not only of the lungs and heart, but of the liver, stomach, and bowels, are materially interrupted, and even these organs themselves are removed from their natural positions in respect of each other, by this cause. This is more remarkably the case as regards the colon, which, by the squeezing together of the hypochondria and lateral regions of the abdomen, is thrown into unnatural duplicatures; the passage of the fæcal matters along it being thereby impeded, and habitual costiveness, with all its consequences, produced.

26. (*d*) Amongst the most frequent predisposing causes to disease, is *intemperance in food and drink*. Too much and too great a variety, particularly of animal food, high-seasoned dishes and soups, rich sauces, the too liberal use of vinous, spirituous, or other exciting liquors, over-load, over-distend, and over-excite the stomach; dispose it, the liver, and bowels to inflammations and functional and organic disease; directly induce plethora; and, when this state is produced, inflammatory complaints in early life, and gout, apoplexy, paralysis, &c. at a more mature age, frequently follow. On the other hand, an unwholesome, poor, innutritious diet, or food of a fluid or watery consistence, predisposes to diseases of debility, by diminishing the powers of life, particularly in the digestive organs, and lessening the vital resistance to depressing causes. Typhoid or adynamic fevers, dysentery, cutaneous complaints, verminous diseases, tubercles, scrofula, scurvy, scorbutic dysentery, enlargements and affections of the joints, are common under such circumstances.

27. (*e*) *Excessive secretions* and *evacuations*, although in some instances a disease of themselves, frequently predispose to further disease. The abuse of remedies which have an evacuant operation, excessive perspiration, fluor albus, too long suckling, and venereal excesses, weaken the powers of life, and expose them to the invasion of exciting causes.

28. (*f*) *Indolence and too great exertion*, both predispose to, and occasion disease; whilst moderate exercise, especially in the open air, increases the energies of the frame. Fatigue generally favours the impression of causes which produce acute affections, as fevers and inflammations; whilst indolence and sedentary occupations dispose to chronic maladies, as congestions of the liver and abdominal organs, to corpulency, apoplexy, hæmorrhoidal affections, and derangements characterised by diminished tone of the nervous and vascular systems.

29. (*g*) *Sleep.* — The *want of* this restorer of the vital energies favours the invasion of fevers, inflammations of the brain, and disordered manifestations of mind; whilst too much sleep, and the horizontal posture too long retained, or too frequently assumed, predispose to apoplexy, paralysis, softening of the brain, inflammation of the cerebrum or of its coverings, and affections of the kidneys. Many, also, of the causes of acute diseases make their impression during sleep, when the body is relaxed, and thereby exposed to their invasion. On the other hand, early rising promotes both mental and corporeal energy. It has been remarked by the actuaries of Life Insurance Companies, that early rising is, of all habits, the most conducive to longevity; all long livers being early risers.

30. (*h*) Due regulation of the *temper*, the *passions*, and *desires*, and a proper conduct of the *imagination*, are also necessary to resist exciting causes. Indulgence of temper and passion not only predispose to disease, but also frequently directly excite it, particularly in nervous, irritable, and sanguine temperaments. Diseases of the heart, brain, liver, stomach, and bowels, often originate in these sources. Uncontrolled passions of every description occasion numerous functional and structural changes, seated chiefly in the viscera of the large cavities. Moderation in eating and drinking, in sleep, in the indulgence of those appetites, feelings, passions, and desires which have been implanted in our natures by a wise Providence for our advantage, gratification, social improvement, and happiness; an equable state of the mind, with confidence in our powers; and the pleasant excitement accompanying a well-regulated course of application to business or study; are the best means of resisting the impressions of injurious agents.

31. C. *General predisposing Causes.* — Of these, the most universal in their operation are certain constitutions of the atmosphere. Besides the variations in the temperature and dryness of the air, its *electrical conditions* also vary extremely; but as yet we are not possessed of sufficient data to enable us to state with precision how far these conditions may predispose to, or directly excite, disease, or what particular change in our bodies result from certain electrical states of the atmosphere. But that the electrical conditions, together with a more or less humid state of the air, are connected, in the relation of cause and effect, with the prevalence of disease, is extremely probable, although not satisfactorily demonstrated. Those conditions which predispose to disease are — 1st, temperature; 2d, humidity; 3d, these two states conjoined; and, 4th, electrical conditions of this fluid. Two very important subjects, very intimately allied to these, and which act both as predisposing, exciting, and specific causes, viz. ENDEMIC and EPIDEMIC influences, are considered in separate articles.

32. (*a*) *Temperature* has a considerable influence in generating a predisposition to certain diseases. Thus, in *low* states of atmospheric temperature, the functions of respiration are fully and actively performed, especially as respects the blood; and the diseases observed in such circumstances are of an inflammatory nature, are seated chiefly in the respiratory organs, and are characterised, unless when the reduction of temperature is remarkably great, or the air very moist, by reaction of the powers of life on the causes which excite them. Very *warm* states of the air impede the changes which the blood undergoes in the lungs; and, by thereby furnishing abundant materials for the formation of bile, occasion an increased secretion of this fluid. Hence bilious diseases are most prevalent during high atmospheric temperature. This effect upon the blood is still more marked, if warmth be conjoined with moisture (§ 34.). Under those circumstances, bilious fevers, hepatic diseases, dysentery, diarrhœa, and cholera prevail.

33. (*b*) *Moisture.* — In *dry states* of the air, changes are fully effected on the blood by respiration; its watery portions are more freely carried off from the exhaling surfaces; its purity is increased, its congestion and excessive fulness prevented; and, consequently, the vital energies are promoted; and the depressing causes of disease, as infectious animal effluvia, and terrestrial exhalations, make much less impression on the system. Disorders occurring in this state of air assume chiefly a phlogistic or sthenic character, and affect most frequently the organs of respiration and the nervous system. A very *moist state* of atmosphere causes opposite effects. It fails of producing to the full extent the requisite changes in the blood, and of carrying off the fluids exhaled from the surfaces, especially of the lungs; thereby rendering the powers of life more languid, and the system consequently more open to the invasion of the exciting causes. Less moisture, also, being exhaled, the elements of biliary secretion, and the watery portion of the blood, become redundant in the vascular system. Hence an abundant secretion of bile, fevers, affections of the liver, and determination of fluids to the intestinal canal, &c. are promoted. (See art. CLIMATE.)

34. (*c*) *Temperature and moisture conjoined.* — That *warm and humid* states of air are individually active as predisponents of disorder, has been shown; but it is when they are conjoined, that they are especially injurious. A warm and humid atmosphere dissolves and accumulates the specific causes, such as animal and vegetable effluvia; assists their operation; and favours a rapid transfer of electricity from the earth's surface, and the change in the condition and the accumulation of it in the air resulting therefrom. It has been shown by the experiments of PROUT, FYFFE, ALLEN, and PEPYS, in an artificially increased temperature, and by those I made in an intertropical atmosphere, that heat remarkably diminishes the changes effected by respiration on the blood; and these changes are further diminished by warmth associated with moisture, which, moreover, promotes the passage of positive electricity from the body. And as the researches of RITTER show that the

electricity of the positive pole heightens, whilst that of the negative depresses, the actions of life, the ultimate effect of humid atmospheric warmth, as respects both the state of the circulating fluid and the locomotive electricity of the body, will be to lower the whole circle of vital manifestations, and to dispose to, or even to induce, diseases of a low character — to occasion adynamic, continued, and remittent fevers, or agues of a pernicious and congestive kind, or dysentery, cholera, chronic asthma, diarrhœa, and affections of the liver and spleen. A moist and warm air may, therefore, be stated to be doubly injurious, inasmuch as it is of itself an extremely active predisposing and exciting cause, and as it is the means of dissolving vegetable and animal miasms, — of marsh, infectious, and pestiferous emanations, — and the vehicle or medium in which they act injuriously on the frame.

35. (*d*) *A moderately cold and a dry air* increases the respiratory actions, and the energies of the system; proving what is commonly called a bracing atmosphere. Diseases usually assume an acute, sthenic, or phlogistic form; and the respiratory organs are liable to suffer. — In *cold and moist* states of air, rheumatism, gout, nervous affections, scrofula, and glandular diseases, intermittent and adynamic fevers, erysipelas, dropsies, anasarca, and chronic disorders and congestions, often prevail, especially in low, ill-ventilated, and marshy places. The positive electricity being rapidly carried off by induction from the body, a salutary stimulus, and one which experiments have shown to be productive of increased activity of all the animal functions, may be supposed to be lost. But when the air is very dry, the transit of electricity from the surface of the earth and from the body is impeded; this fluid accumulating until a moister state of air diminishes its quantity, and changes the relation subsisting between the electrical condition of the frame and that of the atmosphere. In very *dry and warm states* of air diseases less frequently prevail than when it is both warm and moist; and are more frequently characterised by increased vascular action. Inflammatory fevers, inflammations of the brain, liver, and stomach, are then most prevalent.

36. (*e*) *Sol-lunar influence.* — Considerable importance has been attached to the influence of the *sun* and *moon* in creating a morbid predisposition. Close observation of the relation subsisting between the prevalence of fever and dysentery, and the full and change of the moon, has apparently established some degree of connection between them in warm climates, particularly in the eastern hemisphere; but the manner of explaining this circumstance has been by no means satisfactory. Some impute it to a direct lunar influence; and adduce in support of their opinion the fact, that dead animal matter, when exposed to the moon's rays, more speedily suffers decomposition than when protected from them. Others, who favour sol-lunar influence, argue that it proceeds from the height of the tides, at full and change of the moon, occasioning the rivers on the coasts to inundate their banks, and to deposit vegeto-animal matter, which is rapidly decomposed, when the water retires and leaves the low ground exposed to the sun's influence. But if the relation subsisting between the prevalence of disease, and the moon's changes, were owing to this circumstance, it could hold only in respect of parts situated in the low alluvial countries on the coast, and not in districts inland and much elevated above the level of the sea. This, however, is not the case; for observation has shown the influence, whatever it may be, to be as powerful in high and inland countries as in districts on the sea-shore.

37. (*f*) *Light and sunshine.* — That the power of the *sun's* direct and refracted rays, in the production and removal of disease, is by no means inconsiderable, is proved by their influence on the vegetable and animal kingdoms; and by the effects which ensue in the economy when they are entirely excluded. These effects have been described in the articles on the Blood (§ 47.), and Debility (§ 6. *c*.). The vital depression, attended by increased sensibility, mobility, and susceptibility to impressions, and the anæmia and general cachexy, which ultimately result from the protracted exclusion of light, are sufficient proofs of the beneficial influence of the sun's rays upon the frame. But additional and more direct evidence is furnished in the greater activity of the vital functions in spring; and in the genial excitement of the frame of the aged and debilitated, and indeed of both the minds and the bodies of all, by sunshine; light, as ordained and regulated by nature, being a salutary stimulus, and necessary to the energetic and healthy performance of all the functions. The exciting and depressing effects of the excess and absence of light respectively prove its influence over all the organic and mental manifestations, and consequently its power in predisposing to, and even exciting, disease — the intense or continued action of light inordinately exciting the nervous and vascular systems, and producing disorders of this kind; its abstraction weakening all the mental and bodily functions, and favouring the occurrence of diseases of debility. It is obvious from this, that light, especially sunshine — and even its abstraction — may be made subservient to the removal of disease, either in its individual capacity, or in association with a pure, dry, and temperate, or warm air, assisted by suitable exercise, and change of locality; and that the partial abstraction of one or both of these requisites to the due or energetic performance of the functions, must be ultimately followed by disease, however remote the effect, or numerous the intermediate links in the chain of causation.

38. ii. The exciting Causes. — These have been called *occasional* by some writers, and *direct* by others, *determining* by several, and *principal* by a few writers. I shall divide this class of causes into — (*a*) those which are *occasional* in their operation; and (*b*) those which are *specific*, or whose influence is followed by specific and determinate results. The causes already described, dispose the body to the action of those about to be noticed; either by impeding, modifying, or interrupting some one or more of the vital functions, or by changing the constitution or organisation of the tissues or organs which are the instruments of the functions under the dominion of life. But the predisposing causes may, either by their activity, or by their acting in combination or in close succession, of themselves produce disease, without the aid of any of those which are

usually termed exciting; the predisposing, being in such cases the true and only exciting, causes. Thus the indulgence of the appetites, fatigue, the depressing passions, moist states of the air, &c. — either alone, or associated with age, or constitution, or habit of body, &c. — are often the only causes to which disease can be traced. On the other hand, the *exciting causes* frequently produce their effects without the previous operation, as far as we have the means of knowing, of the predisposing causes; and many of them merely predispose the system to the action of others following in close succession.

39. 1st. *The occasional exciting causes* act either — (*a*) upon the vital functions, or the manifestations of life in the various organs and structures; or (*b*) upon the organisation of the part to which they are applied.

40. *A. Of the causes which primarily influence the functions.*—These will be considered in relation to the organs on which they immediately and chiefly act: —1st, Those which are applied to, and disorder or obstruct the functions of the external parts of the body; 2d, Those which make their morbid impression upon the respiratory organs; 3d, Those which act simultaneously upon both the cutaneous and pulmonary surfaces; 4th, Those which act primarily upon the digestive organs; 5th, Those which affect the organs of sense; 6th, and lastly, Those which excite the feelings, passions, and moral emotions, and thereby modify the manifestations of mind, or the functions and organisation of the body.

41. (*a*) *The causes which injuriously affect the external parts of the frame*, either disorder the perspiratory and eliminating functions of the cutaneous surface, or modify the sensibility, or obstruct the actions, of external parts. — *a.* The perspiratory offices of the skin are disordered by the diversified modes in which its temperature is affected. *Heat* increases the organic actions of this surface — by exciting the nervous influence, expanding and relaxing the capillaries and exhaling pores, and, indeed, all the integumentary tissues, by determining thither an augmented circulation, and thereby increasing the vital turgescence and excretory functions, — and *cold* diminishes or entirely arrests all these actions (as shown in the art. COLD); the excessive increase or diminution of the cutaneous functions in a part or in the whole of the surface, by disordering the balance between those performed throughout the frame, exciting diseases which assume varied forms and grades, according to the predisposition of different organs, the state of the system, and the causes which may co-operate with the change of temperature. Whilst insolation and unusual *warmth* in any form — as warm baths, vapour baths, currents of heated air, frictions, &c. — are powerful agents in the production or in the removal of disease, according to the circumstances in which they are employed, considerable or prolonged *cold* is equally efficient in both capacities. But it is more owing to the vicissitudes of temperature — to their rapid alternations—than to any excessive grade of either, that the supervention of disorder is to be imputed. The sudden suppression of a copious perspiration; the partial exposure, also, of certain parts, and the superfluous coverings of others; or the action of currents of cold air upon one part, and of radiant heat on another, as when seated near large fires; and wearing unnecessary coverings on the head, whilst the circulation is determined to it by position; are also no mean agents in the production of rheumatic and nervous affections, and inflammations, by deranging both the perspiratory functions, and the sensibility of the parts thus oppositely acted upon. The influence of too much clothing around the hips and thighs of females, and of too soft and warm beds and couches, in favouring uterine and vaginal discharges, and hæmorrhoids; and of too little clothing on the same parts, in obstructing the catamenia; is generally admitted. The want of personal and domestic cleanliness, by allowing the accumulation of sordes upon the cutaneous surface, and the continued irritation of hurtful matters which may have come in contact with it, is a frequent cause of disorder of both its functions and its sensibility, and a common origin of many of the eruptions to which it is liable.

42. *β. Obstructions to the free actions of voluntary parts* are often occasioned by the kind or fashion of the coverings which protect them; and, not infrequently, injurious pressure of parts is superadded. Very thick and unyielding shoes prevent the developement of the muscles of the lower limbs, particularly the gastrocnemii, weaken the ankle joints, and occasion a shuffling gait. Strait, confined clothes, on young and growing persons, cinctures of any part, and too close or straitly braced breeches, sometimes produce diseases of the organs of generation, varicose state of the veins, varicocele, flexures of the spine; and wastings, painful affections and organic changes of the testes. All impediments to free motion and the exercise of our organs are more or less injurious.

43. (*b*) *The respiratory surfaces* are affected by several of the causes which act upon the cutaneous surface. The operation of a warm and moist, or of a cold and humid, air on the lungs, and, through them, upon the whole frame, has already been pointed out. (See § 32—35., and art. COLD.) The specific gravity, also, of the atmosphere has some influence in disease; the diminution of it occasionally producing hæmorrhages from mucous surfaces. Exertions of voice or speech, long and loud speaking, running against the wind, and foreign substances floating in the air (as shown in the article on ARTS AND EMPLOYMENTS) are common causes of bronchial and pulmonary affections. The pollen or the odour of vegetables, grass, and flowers, the effluvium of new hay, &c., sometimes give rise to severe attacks of asthma, or that form of it which has recently been termed *hay fever*. The animal effluvia floating in the warm, moist, and often stagnant air of assemblies, theatres, camps, ships, hospitals, and crowded gaols, independently of the admixture of any of the specific miasms hereafter to be noticed, change the condition of the organic nervous influence, disorder the secreting functions, contaminate the circulating fluid, and, in this manner, produce effects which are injurious in proportion to their concentration or intensity — generally low or adynamic fevers. Chemical fumes sometimes excite bronchitis; and various simple or compound gases, the air of mines, the exhalations

of privies and sewers, and even of new-painted rooms, are productive of syncope, asphyxy, or even apoplexy, convulsions, and paralysis. In such cases, the diminution of oxygen in the respired air, or the impression made by the foreign fumes or gases upon the nerves of the respiratory organs, or both conjoined, impede, obstruct, or arrest the changes produced upon the blood in the lungs, and ultimately terminate in death, preceded by one or more of the above affections.

44. (*c*) Several of the exciting causes act upon both *the external and respiratory surfaces*; especially vicissitudes of season, of temperature, and of dryness of the atmosphere, suddenly passing from a cold to a warm air, prevailing winds (see Climate, § 11, 12.), the night or morning air; and numerous circumstances connected with the habitation or locality — especially the existence of the endemic sources of disease in its vicinity — ventilation, temperature, and dryness. The influence of north-east winds in reproducing attacks of ague and rheumatism; of the night and morning air in causing disorders of the mucous surfaces; and of low, damp, ill-ventilated, and crowded habitations, in giving rise to fevers; is well known.

45. (*d*) *On the digestive surfaces and organs.* — α. *Mode of operation.* — The numerous and diversified substances which are either commonly, occasionally, or accidentally received into these organs, produce their effects in different ways. Those which are injurious from their specific tendency, or from excess, as numerous poisonous and medicinal substances; and those which disagree, from idiosyncrasy, mode of preparation, or injudicious admixture with others, as various articles of food, drink, and condiment; act in some one of the following modes: — 1st, By irritating the villous surface, or altering its organic actions from the standard of health. 2d, By exciting, depressing, or otherwise modifying the nervous power of these organs; the morbid impression being propagated, in a greater or less degree, to other related organs. 3d, By both these modes of action conjoined. 4th, By the absorption of these substances into the circulating fluids, and by their exciting, depressing, or changing the vital actions, through this channel; the manifestations of life in the organic nervous system, or in the blood itself, or in the cerebro-spinal system, or in secreting and excreting organs, being individually or conjointly affected in one or other of these ways. And, 5th, both by their primary morbid impression on the digestive villous surface and nerves, and their consecutive influence, as stated in the 1st, 2d, and 3d heads; and by their absorption and action, in the manner now assigned.[*] (See, also, art. Poisons.)

46. β. *Food and drink.* — The full discussion of these topics would comprise the subject of Dietetics; upon which, however, the scope of this work will not allow me to enter further than very briefly in connection with the causation of disease. They have already received some attention in relation to climate and season (see Climate, § 26.); and to the habits of individuals as to their use (§ 19.). It must be obvious that any article of diet will occasionally be found difficult of digestion, or even injurious, in certain latent and open states of disorder. When obstructions of any of the viscera, or accumulations of secretions in the biliary organs or in the *primæ viæ*, already exist, owing to weak action or torpor of any of these parts, very slight aberrations from an accustomed diet, or substances not usually hurtful, may occasion very serious disease. It is also evident that the privation of food and drink; excesses in either, or in both; and, in this climate, too large a proportion, or the exclusive use, of either animal or vegetable diet; will be productive of correlative ill effects. The excessive use of animal food, particularly pork, gives rise to plethora, scrofula, and gout; and the want of vegetables, herbs, and fruits, in sufficient proportion to the salted provisions consumed, or an innutritious diet, is productive of scurvy, purpura hæmorrhagica, of an intermediate disorder which may be called land scurvy, and chronic diarrhœa and dysentery. Both flesh and fish are sometimes productive of disorder, owing to their being diseased at the time of being killed, to their becoming tainted subsequently, and to unwholesome ways of preserving them. A poisonous product is occasionally evolved in smoked and dried meats; and shell-fish, chiefly from being imperfectly boiled, and long kept by the retailers, is often extremely injurious. The plan very generally adopted by the fishmongers of London, of preserving fish — especially turbot, salmon, and, indeed, all the fish that is not sold before evening — by means of ice; a large proportion being frozen, thawed, and frozen and thawed again, as alternately exposed in the day on their stalls, and lodged in the evening and night in the ice-pits, until the cohesion of the fibres is lost, and the flavour dissipated; is most prejudicial to health, particularly during summer and autumn; and is one of the most frequent causes, in London, of disorders of the stomach and bowels, although overlooked by writers on this class of diseases. Nor does the evil end here; for all the salmon that becomes tainted from this mode of keeping, is either pickled or smoke-dried, and sold for that prepared in these modes from the fresh state. Independently, however, of these circumstances, all kinds of fish — some more frequently than others — may occasionally disagree, particularly with certain idiosyncrasies, and with weak digestive organs; as lobsters, muscles, &c. Some kinds are even poisonous, especially in warm climates; and others produce disorder from being out of season, as salmon, trout, &c. The injurious action of fish is exerted chiefly upon the stomach and bowels; generally in the form of cholera, attended by extreme vital depression; and sometimes by an eruption on the skin. That the poisonous elements are partially absorbed into, and act partly through, the circulation, may be inferred from their effects, and from their peculiar odour being afterwards detected in the cutaneous secretions. The means of preventing and counteracting the ill effects of fish are stated in the article Poisons. *Vegetables*, even, will also disorder the digestive organs if they be allowed to run to seed, or grow

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[*] The above classification is in accordance with that published by me in the *London Medical Repository* for May, 1822, p. 380.; and was the first that was based upon the absorption of substances into the circulation, and upon their relative action on the organic nervous, and cerebro-spinal systems.

too far, or if kept too long after they have been removed from the soil.

47. γ. *Cookery and condiments.* — Animal substances become indigestible by being either too much or too little cooked; and vegetable substances, chiefly, by being too little. Fried and baked meats are less digestible than roasted and broiled. Stewed dishes, meats prepared a second time, and very highly seasoned articles, are all prejudicial. Fish often disagrees with the stomach, from the manner of cooking, and the sauces taken with it; and, of these, butter is one of the worst ingredients. Vinegar, lemon-juice, and salt are the most wholesome condiments; and, if the fish be rich and fat, Cayenne or black spice may be added, — these being amongst the best antidotes to any ill effects it may produce. The livers of fish are generally productive of disorder in weak digestive organs; for, during boiling, all the oil — which is extremely wholesome, and even medicinal, and which might advantageously enter into the composition of the sauce instead of butter — is extracted, and, swimming on the surface of the water in which the fish is boiled, is thrown away with it; the part remaining being that only which is generally, but improperly, used. *Condiments*, excepting by those who have been long habituated to them, are hurtful, unless taken in very small, or at least moderate, quantity. Salt, vinegar, and lemon-juice are the most wholesome under all circumstances. The fact, that *salt* is necessary to health at all periods of existence, is not easily reconciled with the equally well-established fact, that the protracted use of salted provisions is a principal cause of scurvy, scorbutic dysentery, external sores, ulcers, as well as an evident predisposing cause of fevers, inflammations, &c. But it may be presumed that the combination of salt with the animal fibre decomposes it or modifies its effects upon the living system. Besides, salted meat, particularly when it has been long preserved, becomes less nutritious, and more difficult of digestion; the ill effects being equally attributable to the deficiency of vegetables, frequently conjoined with bad water, and the depressing passions.

48. δ. *Baked pastes, and pies, tarts, &c.*, and the boiled dough of puddings, are difficult of digestion, especially the former; and should never be taken by dyspeptics. *Fruit*, when in season, is much more wholesome. But if it be used either previously to being fully ripe, or when it has become over-ripe or stale, and particularly if it be uncooked, disorders of the stomach and bowels are frequently produced by it. New cheese is very injurious when partaken of largely; and nuts, cucumbers, and melons are always indigestible, however ripe they may be. A variety of fruits, immediately after a full meal, is also productive of disorder; the most wholesome being ripe oranges, grapes, strawberries, &c. All preserved and stimulating articles of dessert merely load the stomach, occasion thirst, and lead to the ingestion of a greater quantity of fluid, and of wine, than is consistent with easy digestion, and with the regular performance of the functions.

49. ε. *Drink and beverages* are also common sources of disease, either from being of improper kind, or used in excessive quantity. The most wholesome *wines* are port and sherry, after having been six or eight years in bottle, and the finest and highest flavoured French and Rhenish wines. The constant use, however, of even the best port and sherry occasions vascular plethora, and its consequent ills, unless very active exercise be taken. Delicate persons should dilute them with an equal, or one half the quantity of water. Champagne often excites gout: I have observed two or three glasses of it bring on an attack the following day. *Malt liquors*, although both tonic and nourishing, owing to the hop and extract of malt contained in them, occasion disease when constantly used, from these very circumstances; a plethoric state of the system, obesity, and various contingent diseases, being the result. The most wholesome of this kind of beverage is brisk small beer. *Cider* and *perry* are sometimes productive of colicky affections, gastrodynia, indigestion, and diarrhœa, especially if they be taken while the body is perspiring, or in very hot weather. *Spruce beer* is much more wholesome. *Spirituous liquors*, particularly those in common use, are most injurious to the frame; and, in the lower classes, are the most frequent causes of, first, functional, and afterwards organic, diseases of the stomach, liver, bowels, and brain, as well as of some other viscera, and of insanity. *Coffee* and *tea*, although, upon the whole, wholesome beverages, may be, in some constitutions and states of the system, productive of disorder. A strong infusion of *coffee*, taken soon after the principal meal, promotes digestion, and counteracts whatever ill effects the cold and poor wines used on the Continent might otherwise produce. But it is sometimes injurious, from its stimulant properties, in cases of cerebral irritation or excitement; and, when taken late in the evening, prevents sleep. The infusions of *black* or *green tea* are gently tonic and narcotic; the latter acting more energetically upon the cerebro-spinal system than the former. Green tea usually excites the nervous power; and, like coffee, increases the activity of the cerebral functions. But, when morbid, vascular, or nervous excitement exists, it generally proves an excellent tonic and sedative; procuring sleep, and diminishing both nervous and vascular disorder. In cases of asthenic vascular action, attended by coma or lethargy, I have found it a most valuable restorative of both vital and cerebral power. In addition to the above, the use of hard or unwholesome water, and either a high or a very low temperature of the ingesta, are often productive of disease.

50. ζ. *The effects of accidental or designed ingestion of poisonous substances*, as well as the means of counteracting and removing them, are considered at another place; and, although *injudicious uses of remedial means* are but too frequently causes of disease, and of its aggravation, especially the inappropriate use of mercurial preparations, of emetics and irritating purgatives, of vascular depletions; of stimulating and heating substances, exhibited with the view of restoring nervous power, or of promoting expectoration, when the increased vascular action from whence it proceeds should be allayed; and of secret remedies of every description; the nature of the subject precludes further allusion to it at this place. The influence of *morbid secretions poured into the digestive tube*, and the effects of arresting accustomed or salutary evacuations, as increased dis-

charges from the uterine organs, hæmorrhoids, &c., or vicarious secretions, without having opened an artificial outlet or produced artificial irritation and discharge, in extending, perpetuating, and aggravating disease, rather than originating it — for morbid states of secretion imply existing disorder — are sufficiently obvious.

51. (*e*) *The causes which act on the organs of sense* consist chiefly of the abstraction of the natural stimuli or impressions, and the application of them in unusually intense forms; the mental phenomena excited through the *medium* of the senses not falling under this head. — α. *Sight* may be weakened by prolonged darkness, and consequent inaction of the organ; but it is much more commonly injured by the unusual impression of light, which may so intensely excite and exhaust its sensibility as to destroy its functions. The rays of the sun, and lightning, have produced this effect almost instantaneously; and the light reflected from snow in northern countries, and from the sands of the arid districts of intertropical climates, has frequently occasioned it in a slower but not less effectual manner. Persons employed in glass-works, forges, founderies, &c., who frequently subject their eyes to an intense light and radiant heat; and those who are occupied on small, very near, or minute objects; are often affected by amaurosis, cataract, and other chronic disorders of the organ. When the sensibility of the eyes is increased by protracted darkness, the admission of even a moderate light often becomes painful and injurious, if it take place suddenly. Of the various colours reflected by the rays of light, white and red are most fatiguing to the sight. — β. *Hearing* is injured by very loud noises, or detonations, near to the organ: and persons of weak or nervous constitutions may even lose this sense by such causes; or experience convulsive seizures, syncope, violent palpitations, or disorder of the digestive and circulating organs. Loud noises are extremely injurious in all cases of cerebral and vascular excitement; and in cases of external injury, as well as of internal inflammation. M. Percy states, that he observed the wounded often very sensibly affected by the report of cannon during sieges and battles. — γ. The sense of *touch*, and the *sensibility* of external parts, are acted on by many of the causes already noticed; but often in an imperceptible manner. Numerous external irritants; extremes of temperature, either of the air, or artificially excited, as extensive vesications and burns; violent or protracted excitement of the senses of *sight* and *hearing*; or irritations or injuries of nerves; frequently affect sympathetically the whole frame; and even occasion convulsions, spasms, inflammation of the brain and spinal chord, or of their membranes; and, when extremely intense in relation to the vital resistance of the sufferer, great depression, and even fatal sinking, of the powers of life. — δ. The sense of *smell* may be impaired by over-excitement; or by causes acting in this, or in any other way. It is also partly through this sense that various agents invade the system, especially those of a depressing kind, as infectious effluvia. (See art. Infection.) Odours sometimes, also, produce syncope, nausea, vomiting, and nervous affections through this medium. — ε. The sense of *taste* is least frequently the channel through which exciting causes act: the impression, however, made upon the palate by certain articles are sometimes productive of severe disorder of the digestive organs; and, in the case of the more active narcotics, &c., of dangerous disease of the nervous system.

52. In the foregoing review, those causes which act *externally upon*, or *through the medium* of, the organs of sense have been noticed. But there are numerous changes, which are *intrinsic*, or take place in the organic, nervous, and circulating systems, as well as in the brain and secreting viscera, and which affect these organs in a very remarkable manner. These, however, are rather *secondary* or *pathological* causes — or the effects of agents acting primarily upon those or other parts of the frame, which effects become contingent or necessary causes of disorders of the organs of sense — from altering their condition, or the state of parts necessary to the perfect performance of their functions. Thus the senses may be disordered or altogether abolished by disease of the brain, or of their nerves, or by affections of the digestive and assimilating viscera. This influence of disease of one viscus or system, upon those anatomically or physiologically related to it, also subsists more or less evidently throughout the frame; the primary affection giving rise to a variety of sympathetic and secondary disorders, according to the progress it has made, to the circumstances that have influenced it in its course, and the predisposition of the individual (§ 21.).

53. (*f*) *On the sentiments and passions.* — The circulation of the brain, the action of the heart, and the functions of the digestive and generative organs, are frequently disturbed by causes affecting the manifestations of mind. — α. Excessive mental employment; long protracted attention, especially to one subject; over-exertion of individual powers, without the requisite repose, and the relaxation resulting from an agreeable diversity of pursuit; the distraction also occasioned by a number of pressing or abstract topics; can seldom be very long persisted in, without exhausting the mental energies, exciting or otherwise disturbing the circulation through the brain, and ultimately inducing either acute or chronic cerebral disease, as phrenitis, delirium, insanity, apoplexy, paralysis, epilepsy, &c.; especially if other circumstances concur to excite or overload the vascular system, and determine the circulation to the head, or if the requisite nightly repose be abridged or interrupted. — β. Certain trains of feelings, and particular desires or passions, as religious sentiments, affection, love, hatred, revenge, avarice, pride, vanity, &c., may all be carried to that pitch, by being constantly and exclusively entertained, as insensibly to pass into monomania, or other forms of insanity; or to occasion ecstasy, catalepsy, convulsions, or some one of the diseases mentioned above (α). — γ. Various circumstances occasioning solicitude, anxiety, distress of mind, sadness, fear, shame, penitence, disappointments and losses of all kinds, the indulgence of grief, and anxious or constant longings after objects of desire or of affection, may not only disorder the mental manifestations in a partial or general manner, but also disturb the functions of the heart, as well as those of digestion and assimi-

lation. All the depressing emotions of mind have an especial effect upon the circulation, upon the nutrition of the frame, and indeed upon all the functions dependent upon the organic nervous system; and favour chronic and asthenic diseases of the heart, particularly passive dilatation and enlargement of its cavities, indigestion, and constipation; also chlorosis, pulmonary consumption, hysteria, and tubercles, early in life; and hypochondriasis, melancholia, chronic diseases of the liver, spleen, and pancreas, and cancerous or other malignant diseases, at mature or advanced ages. — δ. Surprise, fright, terror, anger, and indignation, are not infrequently productive of apoplexy, paralysis, epilepsy, convulsions, syncope, violent palpitations, painful or acute affections of the heart, disorders of the stomach, liver, and bowels, hysteria, abortions, derangement of the uterine functions, and of the manifestations of mind. — ε. Great mental excitement, unlooked-for success, the sudden accession of fortune, extreme joy, and all the pleasurable emotions carried to excess, are not infrequent causes of insanity, of phrenitis, epileptic convulsions, hysteria, and catalepsy. — ζ. An improper conduct, and an insufficient control, not only of the sentiments and emotions, but also of the imagination, are amongst the most common causes of disorder in the manifestations of mind, as well as of the other maladies enumerated above (α, β). — η. Inordinate indulgence of the sexual appetite occasions epilepsy, loss of memory, and mental and corporeal debility, impotency, diseases of the testes, prostate gland, and urinary bladder, and affections of the heart and lungs in males; and in females, inflammation of the ovaria and uterus, fluor albus, hysteria, chlorosis, melancholy, irregular convulsions, organic or scirrhous changes in the uterus, diseases of the ovaria, and sterility, &c. (See art. Age, § 24.) — ϑ. Persons who have been habituated to excessive sexual indulgence, and become altogether continent, are liable to nocturnal emissions, to impotency, convulsive and other nervous diseases, and to disordered mental manifestations. — ι. Numerous acts of volition injudiciously attempted or directed may be productive of the most dangerous injuries and disease; as violent muscular efforts, of sprains, aneurisms, hæmorrhages, inflammation and caries of the vertebræ, or inflammation of the intervertebral substances. Positions with the head low, or on the back, and especially such as are uneasy or unnatural, too long retained, or too frequently assumed, give rise to cerebral disorder and curvatures of the spine; and encumbered, obstructed, or too rapid and protracted movements, produce injurious acceleration of the circulation, exhaustion, with other ill effects.

54. *B. The chemical and mechanical* causes of disease require little notice here; the former of these having received attention in the articles on Asphyxy, and Poisons; and the latter on that of Arts and Employments, *as Causes of Disease.* — (*a*) *Chemical agents* are injurious — 1st, by their influence on the functions of the part with which they come in contact, their effects varying with their individual properties; 2d, by the change they produce in the structure itself, either in combining with it, or otherwise changing its constitution, so as to render it incapable of its healthy offices; and, 3d, by totally destroying the nervous and vital influence, and intimate organisation of the part. — (*b*) Of *mechanical causes* and positions impeding, upon physical principles, the flux or reflux of the circulation and secreted fluids, continued pressure of various grades, and unnatural ligatures of parts, are the most common, and act slowly, and often insensibly and unremittingly. Shocks or concussions of a part or of the whole of the body, or other kinds of external violence, not only occasion the division, fracture, dislocation, bruise, and comminution of external parts, but also the rupture, laceration, hæmorrhage, displacement, vital depression, or extinction of function of internal viscera, as of the urinary bladder, liver, spleen, stomach, and bowels, brain, spinal chord, &c.

55. iii. The Specific Causes of Disease. — Of the causes which may be thus termed, emanations from the soil are, perhaps, the most common. — *A.* The *miasmata* arising from stagnant water, partially covering the soil, or covered by vegetating substances; from vegetable matter in a state of decomposition; from moist absorbent soils exposed to the sun's rays; from the muddy and foul bottoms of lakes, marshes, and lagoons, or the marshy banks of rivers and canals; and from low grounds which have been partially inundated by the ocean or by rivers; are productive of agues, enlargements of the spleen, of the liver, and even of all the glands, rheumatism, catarrh, &c., in cold or temperate climates; and, in addition to these, of remittents, bilious and gastric fevers, dysentery, cholera, diarrhœa, and hepatitis, in warm climates and seasons, according to the predisposition of the patient, and the circumstances which have aided the action of the efficient cause on the system.

56. *B.* When dead *animal matters* or exuviæ mix with vegetable substances, and putrefy along with them, in a warm and moist air, the effluvium assumes a more noxious form, especially if the air stagnates in the vicinity of its source; and it becomes more certainly productive of disease than that which proceeds from the decomposition of vegetable matter only; the effects produced by it being often of a more adynamic or malignant character. In warm countries, the localities enumerated above abound with dead animal bodies, and the exuviæ of immense swarms of insects; and hence may be inferred the reason wherefore terrestrial emanations in these climates give rise to more severe forms of intermittent and remittent fevers, depress more remarkably the vital powers, derange more the vascular system, and more sensibly affect the blood and the secretions, than the miasmata exhaled from similar places in northern latitudes. The water of low, moist, and marshy places is also productive of various maladies, particularly of dysentery, chronic diarrhœa, diseases of the spleen, Guinea-worm, &c. These causes and effects, with what is at present known of their operation, are more fully discussed in the arts. Endemic Influence, and Fevers.

57. *C. Emanations from animal matter* only, the air being in other respects uncontaminated, or frequently renewed, are seldom productive of any serious maladies. But when they burst forth suddenly, in a close and moist air, the effects are sometimes most pernicious. It has been recorded, that fevers of a very malignant kind have attacked

persons who have opened a grave and exposed the body whilst undergoing decomposition, the effluvium having instantly produced a sensible influence upon the frame. The effects of air accumulated in sewers, privies, &c., are shown in the article on ASPHYXY.

58. The *particular elastic fluids* which are evolved from the foregoing sources have not been satisfactorily demonstrated by analysis. They seem, however, to consist of an admixture of various gases, in very variable proportions, particularly sulphuretted hydrogen gas, and sulphuro-carburetted hydrogen, with azote, and aqueous vapour, holding the subtiler particles of decomposed animal and vegetable matters in solution; which particles most probably make the most injurious impressions on the frame, and are the actual causes of the consequent disease.

59. *D.* The various *exhalations and secretions* formed in the course of disease are most common and important causes. These consist either entirely of insensible emanations from the bodies of persons affected by the exanthematous and specific fevers, &c. (*infectious*); or altogether of a consistent and palpable fluid formed on the morbid surface of the diseased body or part, as the itch, lues venerea, &c. (*contagious*). Many of the maladies which spring from specific causes, propagate themselves, both by impalpable or invisible emanations from the body floating in the surrounding air, and by the contact of a consistent fluid or virus formed in the diseased part, with a part of an unaffected body rendered capable of being affected by it. Such is the case with small-pox and plague (*both infectious and contagious*). Maladies which are produced by the contact of a consistent fluid secreted by a diseased part, may be propagated artificially, or by inoculation, although not in every instance where it is attempted. Those, however, which do not form upon some part of the chief seat of disease a consistent secretion, capable of being artificially inserted in a healthy body, may nevertheless be conveyed from one person to another, by bringing substances capable of absorbing and retaining for a time the emanations given out from the diseased body, as frequently demonstrated by typhus and scarlet fevers, &c.; and all those which are propagated by contact, or by a palpable fluid, also, may be disseminated in a similar way. The substances thus imbibing and conveying the invisible or *infectious* emanations, as well as the palpable and *contagious* virus or consistent secretions, have been called *fomites* — if a single substance has been the vehicle, *fomes*. Of all the various materials which may thus become the medium of transmitting infectious diseases, animal productions, particularly woollen and hairy substances — manufactured or unmanufactured — furs and feathers, bedding and body-clothes, have the greatest disposition to imbibe the morbid effluvium, and to retain it the longest. It seems as if animal emanations were attracted and retained most strongly by substances belonging to the same kingdom. Next to these, cotton, flax, linen, and other substances of a soft and porous texture, are most likely to convey morbid effluvia. In respect of the diseases which are really *infectious* or *contagious*, or which proceed merely from terrestrial emanations, great difference of opinion exists, and has long existed. Many fallacies connected with the use of the terms in dispute, much misapprehension and ignorance, great prejudice, and unbecoming acrimony, have characterised the controversies which have arisen on this subject. The topics, however, connected with it, both essentially and collaterally, are fully discussed in the articles on FEVERS — *Causes of*; and INFECTION; — and in those on the diseases, respecting the nature of which difference of opinion has existed.

60. *E. Mode of action of specific causes.* — On this subject, a very general remark merely may be hazarded at this place. Those specific causes which are suspended in the atmosphere or dissolved in the moisture it contains, and inhaled into the respiratory passages, seem to make their first impression on the nerves supplying those parts; the organic nervous system being chiefly affected. That this is the case in respect of marsh miasmata, and other terrestrial emanations, is indicated by the periodicity — the intervals, the recurrences or paroxysms, the exacerbations, and the terminations, of the various diseases referrible to these sources. If the circulating fluid were early and chiefly affected by them, as some believe, morbid action would take place more rapidly, and assume a more malignant and continued form; for, as soon as the blood becomes affected, complete remissions are never detected; whereas all affections of the nervous system, especially those of a functional kind, are characterised by remissions and exacerbations; or by intermissions and regular paroxysms. In advanced stages, even, of those maladies, particularly after the various secreting and depurative functions have been disordered, the circulating fluid probably becomes changed, although not in a very remarkable manner; the chief morbid condition, however, still existing in the organic nervous system. When the miasms floating in the air consist principally or altogether of animal emanations — proceeding either from animal matter in a state of decomposition, or from persons affected by adynamic or specific forms of disease — not only may the first impression be made upon the organic nervous system, but the blood itself may also be early contaminated, although not at first in a sensible manner; for it is not unreasonable to infer, that the fluid emanations from the bodies of the diseased, and dissolved or floating in the respired air, may pass into the blood along with those constituents of the air which partially enter it, and in this way induce a similar disease of the whole frame, owing to the universal diffusion of this fluid, and the very intimate connection subsisting between it and the organic nervous system, even before the changes effected in it have become manifest to our imperfect senses.

61. iv. THE DETERMINING OR CONSECUTIVE CAUSES OF DISEASES require little observation, further than that the practitioner should not overlook the circumstance, that the exciting causes, whether common or specific, will frequently fail of being followed by any marked effect, when the system is in due health at the time of exposure to them, and is not subjected for some time afterwards to various additional influences or agents, particularly such as produce a depressing or debilitating impression. Thus, a person who has been exposed to emanations from the subjects of typhus fever, or from marshy grounds, &c., may experience no ail-

ment, until a change of weather — from dry to moist, &c. — or depressing mental impressions, or cold and fatigue, or venereal excesses, or, in short, any debilitating influence, occur to aid its operation and determine its action; and, if no such consecutive causes aid the principal or specific cause, in a few days from the exposure to it, disease will often not appear. I have frequently seen this exemplified in a very striking manner: one instance on a large scale will be sufficient. Between twenty and thirty persons were exposed all night, without cover, to the air of one of the most fatal sources of miasmata furnished by a warm climate, during the unhealthy season, but were soon afterwards removed to sea — far from any further exposure to this specific cause. They continued well for six or seven days, when about half their number experienced great fatigue. All these were nearly simultaneously — on the following day — seized with remittent fever; whilst those who had not been subjected to this consecutive cause, with the exception of two, who were not attacked till several days subsequently, entirely escaped, although all had been equally exposed to the specific cause of that form of fever. Further illustrations from my experience in different climates, and of various diseases, might be adduced; but the simple statement of the above fact is sufficient. The practical importance of it, however, should not be overlooked; for it shows — what I have frequently believed has been successfully practised — namely, that a person who has been subjected to the impression of a specific or any other exciting cause, may escape its effects, if he immediately fortify the system against it, and avoid exposure, for some time subsequently, to all other injurious agents, especially those which lower the vital energies of the frame. Persons even who experience the sensations more immediately caused by exciting agents of a specific kind, as infectious emanations, will often escape by observing this precaution, and having recourse to a restorative regimen, with the usual means of promoting all the secreting and excreting functions of the frame, as shown in the art. FEVER — *Prophylactic Means.*

62. It is unnecessary to enumerate the causes which most commonly come in aid of the exciting agents of disease. They comprise nearly all those already adduced as predisposing the system to, as well as occasionally exciting, morbid action; particularly such as depress vital power, by their specific properties and immediate impression; the abstraction of requisite or accustomed stimuli, as of warmth, food, &c.; whatever impedes the functions of respiration, digestion, assimilation, and excretion; all weakening discharges; depressing affections of mind, particularly fear of being affected by the cause to which the person was exposed; and all circumstances in any way deranging the accustomed tenor of the mind, and habits of life.

63. III. GENERAL DOCTRINE OF DISEASE, or PATHOGENY (from *πᾶθος*, disease, and *γεννάω*, I gender, or produce).—An examination of the systems of medicine proposed since the revival of learning in Europe, or even of those advanced in modern times, would occupy more of my limits than I could devote to the subject. I shall, therefore, proceed at once to the developement of those general views of disease, which observation and reflection have suggested to me, and convinced me to be of importance, not only in estimating aright the exact state of the more common specific maladies, but in forming safe opinions respecting those more anomalous or complicated affections, which frequently present themselves to the practitioner.

64. I have already contended (§ 7.), that, with few exceptions, which have been particularised, the causes of disease *first* modify the manifestations of *life* in some one or more of the systems and organs with which it is allied; or, in other words, first disorder the functions with which they have a direct relation; and that, after a period of longer or shorter duration, the disorder of function becomes a cause of further disorder in related or associated organs, and ultimately, if circumstances obtain hereafter to be noticed, of change of structure, either in the primary seat of disorder, or in that consecutively affected. From this, and what has been already stated, it will appear that a great proportion — nay, all — of those disorders of internal parts, which have been viewed as *intrinsic* predisposing and exciting causes of disease, are, in truth, pathological conditions, or existing states of disease, induced by some one or more of the causes specified above, and ready to produce further disease, or to lead on to a salutary change, according as the existing state of vital power or resistance, and the influences or agents acting on it, may determine the procession of phenomena, or incline the balance. These primary or early changes, or morbid conditions, may very aptly be termed *secondary* or *pathological* causes, when they give rise to ulterior change either of function or structure; but they are so diversified, that but little notice can be taken of them here, beyond what is necessary to the consideration of general principles; their different forms being more intimately viewed in the articles on specific diseases. It may, however, be remarked that they often exist in latent, or almost imperceptible, states, and predispose the frame to the invasion of causes to which it otherwise might have been exposed with impunity.

65. The great fault of all systems of pathology, down even to the most recent, has been their confined or narrow principles, and consequently their inadequacy to the explanation of all the states of morbid action constantly occurring. BROWN and his followers admitted but two modifications of the vital manifestations from the normal state, viz. depression and excitement, whilst he substituted an inappropriate and single term as a sign for those manifestations, which are as obviously and frequently changed in kind as in degree. Dr. PARRY referred the chief states of disease to the vascular system, and to changes in its states of action, without sufficient reference to the nervous system, as controlling and even causing these changes, especially to the organic nervous system, with which the vascular is so intimately connected; whilst his contemporaries, who considered that disease originates in the nervous, and affects the vascular, system consecutively, viewed the cerebro-spinal axis, and its various prolongations in the form of nerves of sensation and volition, as the parts primarily impressed. Considering, however, as stated in the article on DEBILITY (§ 13.), that the intimate association of the organic nervous system with

the vascular system throughout the frame, and particularly in vital, secreting, and assimilating viscera, fulfils important objects, — that these systems are the chief factors of *life* in the various structures and organs, which, however, modify its manifestations, giving rise thereby to specific manifestations of this endowment, according to the nature of their superadded organisation, so that the liver secretes bile and not urine, the pancreas its peculiar secretion and no other, the kidneys urine, &c. — I believe that the causes of disease commonly act directly upon one or both of these systems, most frequently on the former; and generally on their numerous ramifications in one or more of those organs or surfaces, with which the exciting and other causes are more immediately related, and with which they are brought in connection from their nature and properties. Thus, those causes which are applied to the respiratory surfaces, primarily affect the organic nerves distributed to them, and the blood-vessels of the lungs, and in some cases the blood itself; and those which are received into the digestive organs, make their impression on the nerves supplying them, thereby modifying their vital manifestations, as well as the functions of related or associated viscera, according to the properties of the individual agents. Having pointed out the intimate relation of the exciting and other causes to the organs on which they chiefly act, and having here and at preceding places noticed the particular system on which they seem to exert their primary impression, it becomes requisite next to enquire into the nature of that impression, or early disorder, and afterwards to consider the changes which consecutively accrue, and the means which nature employs to arrest their progress or to give them a salutary tendency.

66. i. Of the principal States of Morbid Action. — In considering the earliest aberrations from the healthy state following the impression of morbid agents, without especial reference to the system or organs on which they directly act, we are particularly struck with their very diversified nature; and, upon an intimate view of the numerous shades of difference, often evanescent or inappreciable, between effects apparently similar, we necessarily arrive at the conclusion, that, however multiplied the various *grades* of action or vital manifestation may be, some other differences than such as are purely *dynamic* exist; and that the changes may also be of an *anomalous* or *cachectic* kind, — that the vital manifestations in the various organs may not merely present simple changes of degree, but also complicated alterations of kind, — that vital action may not only be *depressed* and *excited*, but also *changed in other respects, or vitiated*, as well as at the same time either depressed or excited. Sufficient proof of the above positions will immediately suggest itself to the practitioner, when he considers the different states of action that may be even artificially produced by the ingestion of different stimuli, the grades of whose action may be very nearly the same; or when he views the very numerous modifications in degree, form, and kind, in which either vital depression or excitement assumes, even in affections of the same system or organ. He will, moreover, recollect that numerous maladies have come before him, in which the least distinctive characters were those resulting merely from grades of action; that the most prominent features, whether pathognomonic or diagnostic, had no reference to degree, but to form or kind; and that many of these were of the utmost importance in the recognition of the actual pathological condition, and as bases for therapeutical indications, however difficult it might be to describe or explain them, or to convey such an idea of them as he had himself formed, and successfully applied to practice. Indeed, every one must have remarked, that numerous phenomena, either cognisable to the senses of the observer, or merely connected with the sensations of the patient, indicate rather a change in the condition of life, a vitiation of its properties and manifestations, than any grade either of its depression or excitement. If we take the common symptom of pain, as remarked by Dr. Prino, we have no evidence that it is more intimately allied to increased, than to diminished, vital action. In imputing it to altered sensibility, we in fact imply that the alteration is not altogether one of grade merely; indeed, a careful examination of related phenomena will show that the most intense states of pain are more commonly connected with lowered than with exalted action. As respects, therefore, numerous changes in particular functions and organs, as well as in the whole body, and its general manifestations, it may be inferred, that the *condition or properties of life*, and consequently of vital action, may be altered very variously, otherwise than in degree; and that, as intermediate grades of action or vital manifestation are innumerable, and admit only of an arbitrary estimation, so are the modifications or alterations of it, in kind or condition, equally diversified, — merely the more prominent features admitting of recognition by our imperfect powers of sense and intellection.

67. 1st. Of the Dynamic States of Vital Manifestation. — Grades of action must necessarily be infinite, between the lowest consistent with life, and the highest to which excitement can be carried without passing instantly into complete exhaustion. They have been very generally divided into two classes or divisions, namely, those *below*, and those *above*, the medium grade of health; the former having the generic appellations of *debility*, *asthenia*, *adynamia*, and frequently of *exhaustion* when occurring consecutively, applied to them; the latter that of *excitement*, *hypersthenia*, sthenic or increased action, and often of *reaction* when secondary or indirect.

68. *A. Debility*, in its various conditions, — primary, secondary, and complicated; as well as its special manifestations and effects in the different systems, tissues, and organs; was fully discussed in an *article* devoted to the subject; where also its pathological relations — its associations, consequences, and terminations, with its practical bearings, were considered at length. I therefore proceed to give a succinct account of that state of vital action or manifestation which seems to mount above the standard of health; and which presents various modifications, and produces diversified effects, not only according to its cause, and the system or viscus primarily affected, but also as it may appear *primarily* or *consecutively*.

69. *B. Of excitement and reaction.* — No circumstance has tended more to prevent the acquisition of sound principles in pathology than the terms introduced by Brown and his followers, and the meaning attached to them. Indeed, it was a matter of no small difficulty to arrive at a precise idea of what meaning they did convey; for a single word was in itself an hypothesis; and "*excitability*" — accumulated, exhausted, &c. — "*sensibility*," "*susceptibility*," &c. were made to perform more than actually falls to their lot. As, however, these terms are frequently employed in medicine, and cannot now be conveniently discarded, it will be as well to state the idea that should be attached to them. *Sensibility* is the faculty of receiving impressions, and of being conscious of them. *Excitability*, the power of being excited by stimuli or irritants, whether consciousness attend the act or not; consciousness generally following their application to organs of sensation and volition, or of animal life; but not when applied to those of involuntary motion, or of vegetative life, unless the excitation be carried to a great height. *Susceptibility* is the power not only of receiving impressions, but of being affected by them, whether the agents be physical or moral, and whatever may be their mode of operation; consciousness either attending or not attending the act, according to the nature of the agent, and the organ it affects. Here it will be perceived, that *sensibility* implies a certain faculty; *excitability* the power of acting only in one direction; and *susceptibility* of being affected in every way, according to the nature of the cause; and that the meanings are the same, whether these terms be applied to a single organ or to the whole frame; they representing intimately allied manifestations of life in organised parts. The states, moreover, which these terms represent, are variously modified in different persons, according to temperament and constitution; but they are still more remarkably altered by the causes enumerated above, as well as by the successive changes characterising diseases; and hence they become important signs of the condition of vital power, and of the progress of functional and organic change. When existing in a very manifest or extreme degree, they are of themselves important pathological states, and in this respect they deserve notice.

70. Sensibility, excitability, and susceptibility are great or especially prominent in delicate, debilitated, nervous, and irritable persons, and are morbidly *increased* by whatever lowers the general amount of vital power, if the functions of the brain be not impeded, or by excited action in any part of the cerebro-spinal axis not attended by pressure. They are much less lively in the robust, lymphatic, and phlegmatic constitutions; and are more or less diminished in congestive diseases, particularly those of the brain; in many cases of vital exhaustion, when the blood becomes contaminated; or when pressure takes place in any part of the cerebro-spinal centres or prolongations. They are likewise temporarily or permanently impaired by the intense, frequent, or continued impression or action of the same impressions; and are restored or heightened by the abstraction of those which are of a lively or intense kind. Although *excitability* is easily and quickly roused in the delicate and nervous frame, and in states of simple debility, as specified above, yet is it more rapidly exhausted or altogether extinguished; whilst, on the other hand, it is much less readily brought into action in the robust; but when once roused, it is either more energetic or longer sustained than in the debilitated. In these states of disease, which I have denominated secondary and complicated debility, and especially when the cerebro-spinal centres are congested or pressed upon, or when the circulating fluid becomes contaminated, the excitability is either much diminished or altogether lost, — chiefly, however, as respects voluntary organs, when the nervous system of animal life is affected; involuntary parts still admitting of excitation, although not so readily as in health. *Susceptibility*, even more remarkably than the two other powers, is *increased* by debility and novelty of impression, and *diminished* by a robust and due manifestation of vital power; by a repetition of the same effect, whether it be stimulant or depriment, unless each succeeding application of the same agent be made before that of its antecedent had altogether ceased; as evinced by both the causes of disease and the operation of stimulating and narcotic remedies. The complete manner in which the susceptibility to be affected by certain causes of disease is destroyed by their full and adequate action, is shown by several of the specific agents.

71. *Excitement* may be of two kinds, according to the manner of its occurrence: it may directly follow the impression of the exciting or irritating cause, in which case it is *primary or direct;* or it may follow as a more or less remote effect of agents which lower the action either of a part or of the frame throughout, when it constitutes what is called *secondary*, or *reaction*, as in the case of the vascular excitement following the application of severe cold to a part of or the whole external surfaces. It is necessary to distinguish between these two grand conditions or manifestations of excitement; for the secondary, or that following indirectly the impression of lowering or sedative agents, may be variously modified throughout by the nature of the primary impression, and its mode of action. Hence one cause for the distinction here made. There are, besides, numerous other modifications of excitement, whether primary or secondary, referrible to the nature of the agent, and the parts of the body on which they have directly acted. The excitement caused by mental emotions is different in its progress, duration, and consequences, from that following the ingestion of spirituous or other stimuli; and this latter, and indeed both, are different from the increased action following sympathetically the irritation of some organ or viscus. In the *first*, the cerebro-nervous and vascular systems are simply excited, the excitement terminating in slight exhaustion, unless some part has been injured during its continuance. In the *second*, these systems are more than simply excited. A more manifest febrile state continues for some time subsequently, with concomitant lesion of the digestive functions or viscera, owing to the passage of a portion of the morbid agent into the circulation, and to the more immediate lesion experienced by the parts on which it made its primary impression. In

the *third*, the excitement is more especially expressed in the organic nervous and vascular systems — the chief factors of life — owing to its extension to the whole of these systems, from the part in which it originated, and still exists: hence its duration depends upon the primary lesion, and there is, in addition to the general or sympathetic excitement, disordered function of the part primarily affected, as well as of those more intimately allied to it. Even from what has now been stated will appear the importance, in pathological and therapeutical points of view, of instituting a comprehensive analysis of those states of vital action to which the term excitement has been applied, and which bears a very wide and often indefinite signification.

72. (*a*) *Primary or direct excitement* is one of the most frequent effects produced by the agents which surround the body. It may proceed from such only as are external to the frame, and to the part which it excites, or from such as are internal or intrinsic. Its phenomena and consequences vary as it arises from causes acting chiefly upon the organic nervous and vascular systems, and their immediately related organs — upon the organs and functions of organic life — and affecting them principally; or from such as act primarily upon the cerebro-spinal system, and organs of animal life, as those of sensation, reflection, volition, contractility, &c. But the modifications which spring from other sources, especially from the properties of the agent, the intensity of its operation, and the number of parts affected by it, are too numerous for a superficial view, even if the knowledge requisite to the attempt were attained. I must therefore content myself with noticing merely a few of the more prominent features of this condition of life.

73. *a*. *Excitement of the systems and organs of vegetative life* gives rise to various changes and phenomena, according to the nature of the impression, and its intensity. — Gentle excitation of the *digestive canal* increases the tone or insensible contractility not only of it, but also of all the circulating system, of the hollow viscera, and of fibrous or muscular parts. If the stimulus be considerably greater, either the same effect is produced, or the excitement is concentrated in the digestive viscera, and proportionately withdrawn from other parts. If the excitement be still greater, and be of a kind that irritates the villous surface, the secretions of this surface are augmented, and the muscular coats of the canal roused to more or less energetic action, followed by the excretion of their contents.

74. Excitement of the *vascular system* is generally a consequence of stimuli applied to the digestive surface, of irritation of any kind affecting the tissues, of local inflammation, of stimulating substances conveyed into the current of the circulation, of muscular exertion, and of the lively mental emotions, directly increasing the heart's action. The grade, duration, and effects of excitement originating in this system, vary with the cause and the state of the body at the time. Its gentlest, and, at the same time, most permanent, form is caused by the action of a pure, dry, and temperate atmosphere on the blood circulating in the lungs; whilst the most tumultuous and the most injurious, as respects its effects on the heart and blood-vessels, on the blood itself, and on the functions of vital organs, is that produced by inordinate or continued muscular exertion; and by the absorption of various stimulating and irritating substances into the blood. Violent exercise affects the crasis of the circulating fluid (see Blood, § 134.), causes its irruption through the capillary canals of soft and yielding tissues, as the mucous surfaces and the parenchyma of the viscera, induces inflammation of the heart and arteries, and excites similar disease in predisposed organs. Irritating or exciting substances conveyed into the blood, inflame the internal surface of the heart and arteries, alter the condition of this fluid, occasion various acute and chronic diseases of the vessels (see arts. Arteries, Heart, and Veins), and often severely affect the functions of secreting and excreting viscera, inordinately exciting or inflaming those depurative organs which carry them out of the system.

75. The *portal circulation*, and the liver, to which it is distributed, may be especially excited, owing to the quantity of stimulating, morbid, effete, or foreign matters carried into, or generated in, the blood which is returned from the digestive canal and other abdominal viscera. These may not only inflame the portal vessels, but also the substance of the liver; or, when the materials or elements in these vessels are of a less irritating kind, may give rise to morbidly increased secretion of bile, or to various organic changes and adventitious formations in this viscus.

76. The *absorbent system* is seldom or never co-existently excited with the arterial system. Indeed, inordinately increased vascular action is generally attended by a proportionate inactivity of the absorbents — both lymphatic and lacteal. Whilst it is frequently observable that a weak action of the arterial is accompanied with great activity of the absorbent system. It would seem as if diminished organic action, or that state resulting from an insufficient exertion of the organic nervous influence on the arterial and capillary systems — the chief source of nutrition, structural cohesion, and other vital manifestations — leaves, in consequence of the animal molecules being then held together by a weaker attraction than in an opposite state of this influence, a greater proportion of effete materials, by which the absorbent vessels are excited to increased action.

77. Excitement of *involuntary muscular parts* is characterised by spasmodic contraction of either a permanent or alternating clonic kind — or rather of the various intermediate states between sthenic and asthenic, as marking the extremes — and is generally occasioned by irritants of the surface covering the hollow muscles, and more rarely by direct excitation of the nerves supplying them, and by morbid states of the blood, affecting either them or the nerves supplying them. The asthenic or clonic form of spasm is most commonly associated with exhausted vital power or an impure state of the circulating and secreted fluids, the excitability of these structures being more easily acted upon in weak than in robust frames; and hence, when in action, is more rarely conjoined with excitation than with debility of other organs. It would seem that, in most spasmodic disorders, the excitation necessary to this state of action consists in the concentration of an undue proportion of vital power in the nerves supplying the affected muscles,

and in the muscles themselves, and a proportionate abstraction of it from other parts; and that when the excitability of an unaffected structure or viscus is energetically roused, the pre-existing morbid excitement will be derived from, or subside in, the parts in which it was seated.

78. The excitement of *secreting viscera and glands* presents various modifications and grades, according to the cause which induced it, and the elementary system especially affected. If the organic nerves supplying them be chiefly excited, the special functions they perform will be augmented — their secretions will be abundant. In this case the excitement will be more particularly limited to the organs whose excitability has been acted upon; the morbid condition consisting chiefly of a concentration of vital manifestation or action in them and derivation of it from other viscera, thus occasioning one of the forms of DEBILITY specified in that article (§ 8, 9.), the increased secretion generally preventing the occurrence of febrile commotion or acute sympathetic disorder, unless it be carried very far. But when the excitement is seated principally in the blood-vessels, and assumes the form of inflammation, the specific function of the secreting surface or organ will be variously altered; the fluid elaborated, in this case, by a secreting surface, being either increased or quite changed from the natural state, or both, according to the degree and form of the excited vascular action with which it is affected; and that secreted by glandular structures being also either much altered, diminished, or entirely suppressed, as in cases of inflammation of the kidneys, salivary glands, &c.; this form of excitement not giving rise to the state of vital concentration observed in respect of the former, but frequently to general or sympathetic febrile commotion. Excitement of secreting viscera, then, assumes two forms, viz. that affecting chiefly the organic nerves — the *excitement of irritation*, which is always attended by augmented secretion, and increased determination of the circulation to the part thus affected, but not necessarily with true inflammation, although this may follow; and that affecting the arteries and capillaries — the *excitement of inflammation*, which is accompanied with altered secretion, always in kind and frequently in quantity, — the quantity being often increased in mucous surfaces, and remarkably diminished from glandular organs.

79. The excitement of the *generative organs* may proceed from the accumulation and irritation of their proper secretions, from mental emotions, and from the excitation of adjoining and related parts, as when the rectum or urinary bladder is stimulated. It is, more especially at its commencement, a purely nervous change; the nerves of organic life which chiefly supply these organs being excited, either through the medium of the brain and sensorium, or in a direct manner, and as above stated. There is no part of the economy which furnishes so evident a proof as this does of the influence of the organic nerves upon the local or general circulation; their excitation being here shown to be followed, unless the susceptibility and excitability be entirely exhausted, by increased determination, vascular action, and vital expansion of the tissues; irritation of this class of nerves evidently determining also in other parts of the body, particularly in mucous, glandular, and cellular structures, as well as in these organs, increased flux of blood, and occasioning the turgidity or vital expansion of the vascular canals running between the extremities of the arteries and the radicles of the veins. The influence of sexual excitement upon all the other functions, especially at the period of puberty, and subsequently; its sympathetic action on the rest of the nervous system giving rise to various disorders, particularly to the numerous forms of hysteria, anomalous convulsions, epilepsy, catalepsy, &c.; and its more direct operation in producing menorrhagia, fluor albus, inflammatory and organic changes of the ovaria and uterus, besides other disorders in both sexes, more especially referrible to premature, too frequently repeated, or to excessive stimulation, and consequent exhaustion of the excitability of those organs; are circumstances familiar to the practitioner.

80. *β. Excitement of the organs of animal life* may arise from intrinsic or organic changes, as from the condition of the organic nerves and vessels distributed to them, or of the blood itself; or from causes affecting the instruments of sensation, the general sensibility of the frame, or any of the mental manifestations; or from those which excite to mental or physical exertion. Intrinsic changes may occur in the organic nerves and vessels, influencing the circulation through the brain, without any very obvious cause; and these may be such as will excite not only this part, but all others depending upon it for their functions. It is more than probable, that with the brain, as with other viscera, the excitation may be seated chiefly in the organic nerves distributed to it, and hence assume more of an irritative state, or of an exaltation of function, without any particular lesion, as when it is simply excited by vinous or spirituous liquors: or the excitement may extend to, and principally affect, the blood-vessels; giving rise, according to its degree, to certain states of inflammatory action, and to general febrile commotion, with more or less lesion of function. It is almost unnecessary to observe that either of those forms of excitement, related as now explained, or both of them coëtaneously, may originate in the exercise of those faculties, of which this organ is the instrument under the endowment of life. It often falls to the physician to trace the progress of excitement in relation to the brain, from the lively exercise of function characterising talent and genius, into exaltations, approaching to morbid, of one or more of the mental manifestations; and next, into inflammatory action or mania; and lastly, into a state indicating mental collapse, or structural change. The influence, particularly in susceptible persons, of lively or of violent impressions upon the instruments of sensation, in exciting the nervous centres, with which these instruments are in constant communication, is shown, not only by the effects of loud noises, and of a strong light, but also by violent or painful stimulation of any portion of the sentient system distributed throughout the frame. The sympathetic operation of external injuries, of extensive burns or scalds, of long-sustained or suppressed pain and sufferings, in exciting an irritative state of the cerebro-spinal axis and its membranes, in increasing their vascularity, and even in giving

rise to effusion, with the related phenomena of delirium tremefaciens, mania, general febrile action, or convulsions, is not the less true or important, from its being overlooked, and the exact seat and nature of the consecutive suffering, as well as the more immediate cause of death, being misunderstood.

81. Excitement of the *voluntary muscles and locomotive organs* takes place either from volition, or from causes acting in opposition to it. Exercise promotes the synovial secretions, and the developement of the muscular structures and of their energies. But long-continued exertion increases the flux of blood to the related parts of the cerebro-spinal axis, and to the muscles themselves. The morbid excitement, however, of voluntary muscles, which removes them out of the control of the will, has never being satisfactorily explained. Their more asthenic, or clonic anormal actions, which have been usually denominated convulsions, have been frequently traced to obvious lesion in the brain; but they have likewise been as truly referred to causes seated in the prima via, irritating the organic nerves, and, through them, the voluntary nerves. The almost universal state of sthenic spasm, called tetanus, has been ascribed to inflammatory excitement of the arachnoid and other membranes of the spinal chord, from the circumstance of its having been detected in several cases, and by myself in two instances. But this change is as probably a consequence of the muscular excitation, as the cause of it. How, then, does this state of muscular action originate? The answer is not easy. But when we consider the connection — anatomically and physiologically — subsisting between the muscular, the voluntary nervous, and the organic nervous, systems, the reasons wherefore irritants acting on either of the latter will affect the former, or those affecting the muscles themselves, or even their tendons, will, in certain circumstances, through the medium of the nervous systems, excite general muscular contractions of a permanent or recurring kind, will not appear so far beyond our comprehension. If we connect the causes of these affections with the earlier phenomena, we shall generally find, even when the exciting agent has acted on an external part, that the organic or sympathetic nerves have been thereby irritated; and that, owing to their influence on the voluntary nerves, a state of spastic action is kept up in the voluntary muscles, or recurs in them at intervals, the brain itself being affected only in those cases which present lesions of its functions. This opinion, published by me in 1821, subsequent experience — pathological and therapeutical — has confirmed me in the belief of, particularly in respect of those cases in which the brain is free from disease. (See arts. Convulsions, Tetanus.) It follows, therefore, as corollaries from the foregoing, that whatever irritates the voluntary nervous system, or makes an extraordinary demand upon its influence, or any of its functions, will excite it, in that part especially upon which the particular influence or function called into operation depends, or with which the part principally acted on is in communication; and will determine to it an increased flow of blood, which may, in certain circumstances, go on to inflammation or structural change; and that irritation propagated to the voluntary nerves will so express itself upon the muscles they supply, as to give rise to various states of spastic action, according as it originates in the sympathetic nerves, or in the brain, or is connected with other changes, functional or structural. Thus, mental exertion excites and determines the circulation to the head; muscular exertion, to the spinal chord; and local irritation occasionally gives rise, through the medium of the organic and voluntary nervous systems, to spasmodic action of the muscles of volition, of either a remittent, intermittent, or continued form.

82. (*b*) *Secondary or indirect excitement, or reaction*, is that state of increased function or functions following the impression of causes of a depressing or sedative kind: as when the powers of life, having been for an indefinite time more or less lowered by cold, by terrestrial emanations, or by the effluvium from the sick, react upon the state of depression, and give rise to various phenomena characterised by excitement, which thus becomes one of the terminations of direct Debility (see that article). Great diversity of opinion has existed as to the way in which the economy reacts upon injurious and depressing agents. The *vis medicatrix naturæ*, vital resistance, the conservative powers of life, with other terms, have been substituted as explanations of what admits not of explanation, either by names, however expressive they may be, or by any other means. We can merely express what appears to be a law of nature, and describe certain resulting phenomena. We believe that the organisation is built up and kept together by the aid and intimate alliance of life, and that this principle or endowment may be modified by changes in the structures, the instruments of its functions, — that, in short, so intimate is the union of life with all the organs and tissues, that it is constantly influencing them, according to its varying states, and being itself influenced by them, as they become changed, both in respect of its local alliances and its general condition. And all that we can know respecting *vital resistance and reaction* must resolve itself into the general inferences, viz. 1st, That the innate powers of the vital principle, and the intimacy of its union with its material instruments, are such, that it opposes, by means of these alliances, — by its manifestations throughout the organisation, and by their mutual dependence and reciprocative influence — and by the manner in which it is influenced or modified by changes in its allied organs, — impressions of an injurious nature, the intensity of which is not so great as immediately to dissolve its connection with the structures, or at once to overwhelm its energies; and that, whilst it thereby *resists* the further progress of change, it at the same time restores that which has been induced; these phenomena constituting what has been called *vital resistance*: 2d, That when the morbid impression is energetic, a succession of changes generally follow in some part of the economy, owing to the circumstances now adduced, calculated to remove the primary impression, and its more immediate effects, to recover the last balance of vital action, and to restore the impeded or interrupted functions, — to these changes the terms *reaction* and *secondary excitement* have been applied; which, however, may be variously modified, in form as well as in degree and duration:

3d, That when the impression and its immediate effects are very intense, relatively to the state of the person's constitution, the vital endowment may be thereby rendered incapable of resistance, or of developing any reaction; and, when this is the case, it sinks more or less rapidly, before the cause that effected it; sometimes, however, making certain feeble and abortive efforts at restoration, until, between its depressed state and the consequent changes on the tissues, its further manifestations and material alliance altogether cease.

83. If we endeavour to trace the succession of morbid phenomena characterising the simpler states of reaction, viz. those which take place from cold or from marsh miasmata, some idea of the way in which they are brought about may be formed. The impression made by cold upon the nervous, and, through it, upon the vascular systems, is evidently depressing, and vital action is diminished in the parts to which it is applied. Vascular determination, consequently, takes place to other, more especially to internal, parts; which are thereby excited, and their vessels enabled to react upon the greater quantity of blood sent to them. The consequence of this, in secreting organs and surfaces whose vital energy is not impaired, is an increase of their proper functions, as an augmented flow of urine, or free discharges from the bowels; but, during a state of predisposition to vascular lesion in any of the parts experiencing the increased determination, inflammatory action will be the result; and disorder will be extended thence to the whole frame, through the medium of the organic nervous and vascular systems, with especial affection of the internal organ primarily disordered. In other cases, a less simple process may take place; and the impression of cold not only may impede the exhaling and secreting functions of the surface or organ on which it directly acted, but, through the medium of the organic nervous system, may also interrupt the action of other secreting organs; and thus give rise to increased plethora, attended by the retention of elements in the circulation, which the healthy performance of the functions would have eliminated from it. The necessary consequences of these states will be reaction upon the distending and exciting contents of the vascular system; during the continuance of which, those organs which are most predisposed to disease, particularly to inflammation, will suffer especially. When miasmata act upon the system, it may be inferred, from the more immediate effects, that the nervous system of organic life is thereby especially impressed, and its influence diminished; the vital actions more immediately depending upon it impaired, and the secreting and excreting functions impeded. As those changes are often gradually induced, a considerable period of latent or of slight ailment may exist; until at last they reach their acmé, and the organic nervous energy is unequal to the active continuance of the circulation. When this point is reached, animal heat is imperfectly evolved; and the usual changes on the blood, as well as the proper functions of the viscera, are insufficiently performed. The necessary results are congestions of the large veins and yielding structures, and all the phenomena of the cold stage of intermittent or remittent fever; which rarely proceeds so far as to overwhelm the power of vital resistance, but more commonly ends in the developement of reaction. This is brought about by the greater fulness of the vascular system, and the more exciting properties of the blood, arising out of impeded secretion and excretion, and retention of exciting elements in the circulation, assisted by the influence of the rigors attending the cold stage in accelerating the circulation through the veins.

84. From what has been already advanced, it will appear evident that the nature of the *primary action*, or impression made upon the system by the depressing cause, will not only determine the character of the more immediate phenomena, but will also modify the state of reaction into which these may pass; and even the kind or *type* of action will not terminate with the developement of this form of excitement, but will generally continue long afterwards. This is remarkably exemplified by the morbid impression made by malaria, which will apparently act in the manner now stated, until the hot stage of the disease, or that of reaction, is produced by it; and, although this subsides, and is followed by free secretion, still the morbid impression is not thereby removed, or its type changed, but continues, in the organic nervous system, to exert its influence upon all the vital actions, and to reproduce the same series of morbid changes, until either it is exhausted by their recurrence, or some internal organ undergoes structural change, and the disease thereby becomes complicated, or in some respects modified. Such is the case especially when it is left to nature. That the morbid impression is made chiefly on the nervous system, is shown by the periodicity of action, by the circumstance of the successive changes and free evacuations terminating the paroxysm not bringing the disease to a close, and by the most efficacious means of cure being those which most energetically excite that system. That the impression is made upon the organic nervous, and not upon the cerebro-spinal, system, is shown by the more especial affection of those functions and organs which the former actuates, and the general absence of any considerable lesion, even of the functions of the latter.

85. C. *The intensity and duration of excitement, whether primary or secondary*, vary remarkably, according to the cause, the constitution and habit of the patient, the circumstances in which he is placed, the agents or influences which continue still to act, and the states of the individual viscera, and of the circulating and secreted fluids. As respects *intensity of excitement*, it may be inferred that, where susceptibility and excitability are both great, intensity of excitement will also be great, but only relatively to the state of vital power; and that it will so much the sooner, and the more completely, exhaust itself. But, where neither is considerable, action will be moderate, and reaction will more slowly and less perfectly supervene. Where, however, the excitability is great, and the susceptibility not remarkably so, as in many robust states of health, excitement may not be so quickly or so readily induced, but it will be more energetic and of longer duration. Thus we perceive that, in delicate, irritable, or nervous constitutions, excitement is easily produced, and soon arrives at its termination; whilst the reverse ob-

tains in the robust. In the phlegmatic, lymphatic, and cachectic constitution, it is excited less perfectly and with greater difficulty, and often assumes a modified form, particularly as respects its terminations. When excitement arises *directly* from a *cause* that is constantly present, as when an irritating body is lodged in the intestines, or in any of the tissues, it generally is continued, sometimes remittent, and of long duration; but when it occurs *indirectly*, or from a depressing cause, it may be either imperfect or of short duration, the consequent exhaustion being great. This is evinced by diseases arising from malaria; reaction being less perfect, and vital depression with its effects more remarkable, when the cause continues to operate, owing to the residence of the patient in the locality which generates it. Excitement is, moreover, *modified* by states of the air — humidity lowering it, and a dry, pure air developing it — by mental emotions, by the condition of the circulating fluid as respects purity, and by previous health and habits. How these will influence the occurrence and course either of primary excitement or of reaction, is evident. The state of the vascular system as to fulness has also a great influence upon both: *plethora* favours local excitement and determination; whilst, when very great, it prevents the free developement of reaction, and disposes to dangerous internal congestions in circumstances that would have otherwise induced a free and salutary reaction. The condition of the *secretions*, also, has a marked influence in the production and duration of increased vital action. The accumulation of morbid secretions in the prima via or in the biliary apparatus may either impede the occurrence, or shorten the duration, of excitement; or may determine it more especially to these parts. The state of the circulating fluid itself, particularly in respect of *purity*, will mainly influence this manifestation of vital power. If it contain stimulating elements in excess, reaction will be rapidly and strongly developed. But if materials of an opposite kind be carried into or developed in it, neither primary nor secondary excitement may at all appear; the conditions of life throughout the structures being thereby depressed and modified, and the living solids ultimately rendered unfit for the performance of their functions.

86. *D. The consequences and terminations of excitement, primary or secondary.* — (*a*) The *consequences* of excitement are, 1st, Various morbid productions or plastic formations, capable of organisation in certain situations, particularly when the vascular system has been affected in a subacute form; as the formation of coagulable lymph, and albuminous exudations in the form of false membranes, &c. 2d, The exudation of sanguineous, or sero-sanguineous, or muco-albuminous fluids; as in cases of acute irritation of mucous surfaces. 3d, The production of various changes in the structures (see Inflammation), and adventitious formations. — (*b*) The *terminations* of excitement are varied according to the system or tissue principally affected, the nature of the cause, and the concurrent circumstances. It has been stated as a general axiom, that excitement terminates in *exhaustion*, the degree of which is proportionate to the height to which the former had been carried. But there are numerous exceptions to this, especially as respects reaction; which may be very slight, and yet the exhaustion may be extreme. The nature of the chief cause, numerous influences connected with the constitution of the patient, the surrounding media, and the mental affections, will modify the results. — *α*. Excitement, in any of its forms, may gradually subside into a slight and chronic grade, in which it may give rise to certain changes in the nutrition or secretions of the tissues affected; to morbid depositions, and effusions in shut cavities or the parenchyma of organs; or to increased secretions from mucous and glandular parts. — *β*. It may also pass more rapidly into exhaustion, expressed more especially either in one of the nervous systems, or in the capillary and vascular system, or in the absorbent system, according as one or other of these had been principally diseased. (As to the effects of exhaustion on the different functions, organs, and structures, see the article on Debility, § 10—25.)

87. 2d. Of perverted States of Vital Power. — Having considered the simpler changes of the conditions of life, as manifested in the functions and characterising disease, those which are more complicated are next to be discussed; and it remains to be shown, *that the conditions and material alliances of life may not only be changed in degree, but also in kind* — the change in kind being, in some cases, unconnected with either excess or defect of action; and, in others, associated with the one or the other; but more frequently with depression, or an irregular distribution of the vital energies, and concentration of them towards particular parts. The conditions of life present *three states or stages of change in kind*, without any reference to degrees of action: — 1st, Modifications in function, or vital manifestation, the proper offices of the part being vitiated, but the structure not being sensibly changed. 2d, Modifications of function, in connection with change in the constitution of the part; the natural tissues having been metamorphosed by an alteration of their nutrition or secretions, and by adventitious formations. 3d, Modifications in function and organisation in several parts, or in the whole of the frame; generally attended by a vitiation of the circulating fluids.

88. *A. The conditions of life may be modified in kind, without any visible alteration of structure.* This state is often the commencement of the others now particularised; but it also frequently proceeds no further, or one form of it may merely pass into another, or terminate in health. Its slighter grades are more especially seated in the moving powers; the organic and cerebro-spinal nervous influences, and the vital properties of contractile parts, being chiefly affected; presenting, accordingly, a great variety of morbid phenomena, not strictly referrible to either excitement or debility, but consisting chiefly of alterations of the sensibility of these systems; of pain and anxiety in their numerous forms; of cerebral affections, and disordered mental manifestations; of lesions of the contractile and locomotive organs; of modifications of the sensible and insensible contractility of parts, of their susceptibility and excitability; and of many changes in the state of the secretions and excretions, independently of those that relate to quantity. In its more exquisite and widely diffused forms, this state proceeds from

several of those causes which I have termed specific; as malaria, animal and infectious effluvia, endemic and epidemic influences, the rabid virus, various poisons received into the stomach, lungs, or circulation, &c. These, as well as the causes which produce the foregoing morbid conditions, evidently modify the nature of the vital functions, without any change of structure or of the circulating fluids to account for the effect; and, when organic lesions do occur, they are consecutive, and sometimes accidental, alterations, which, in their turn, occasion a further change in the life of the part, or of the system generally.

89. *B. The manifestations, as well as the structural alliances, of life may be vitiated* in a part of the body, from causes which determine to it a greater share of vital power; or which act frequently or permanently upon its excitability, and occasion an irregular distribution of life throughout the economy; or which abstract from it any portion of its nervous or vital influence; or modify the condition of this influence by their primary impression or continued action, particularly in constitutions predisposed to some hereditary vice, or imperfectly organised, or debilitated. A similar result may also follow unwholesome or innutritious food; the too frequent or excessive discharge of recrementitious fluids, as the seminal and prostatic; the absorption of an imperfectly prepared chyle, or of morbid secretions; or products generated in the body; repeated excitation of an organ, or continued irritation of a particular part, ending in change of structure, &c. When the vital actions of a part are depressed, or modified in any manner, or from whatever cause, and the change continues, owing to the vital endowment being insufficient to overcome it by local or general reaction, and thereby to restore the healthy condition — the powers of vital resistance and restoration being incapable of removing the morbid impression, — a succession of alterations may supervene: the depressed or otherwise modified life of the part will impede or diminish its circulation, or occasion its congestion; thereby facilitating changes in its fluids, or giving rise to alterations of its secreting and nutritive processes; and, ultimately, to various organic lesions of a chronic or malignant kind. Also, when the organic nerves and vessels of a part experience a continued or often repeated excitation of too slight a grade to extend far, or to affect related and sympathising organs, but sufficient to modify either its secreting or its nutritive actions, or both, its elementary tissues at last become more and more altered, adventitious formations are developed, and the continued change in the conditions of life in the part at last gives rise to a complete metamorphosis of structure. The life of the diseased part, having thus formed to itself new alliances and instruments of altered manifestations, is thereby, in its turn, further acted upon, until the vital endowment is modified throughout the body; the local alteration of structure experiencing, from this circumstance, a remarkable increase: and hence the properties of life, and of its structural alliances, act and react upon each other, until they become very sensibly vitiated, first in the part primarily diseased, and ultimately in the whole frame. Such appear to be the origin and progress of various changes of structures of a local, specific, and adventitious kind — tubercular, scrofulous, scirrhous, fungous, carcinomatous, &c.

90. *C. The functions of life and the organisation are often vitiated, independently of grades of action, either in several parts, or in the whole frame.* — Alterations of this nature are frequently the most advanced states of the foregoing; commencing, as I have now stated, in modified vital manifestation of a part, or of the whole body; and irregular determinations of it, which superinduce alterations of secretion and nutrition, give rise to changes of the elementary tissues, and the formation of others which are adventitious, and terminate in the state now under consideration, with sensible alterations in the circulating and secreted fluids. But this general morbid condition may also occur more rapidly from causes producing a very powerful and quickly diffused impression on the organic nervous system, and affecting the circulating fluids; as several of the poisons, especially the animal poisons, infectious maladies of a pestilential or malignant kind, epidemic diseases, exanthematous fevers, &c. In all these, the grades of vital depression, or of excitement, — although most important circumstances, and each of them forming grand pathological conditions, when diverging considerably towards either extreme, — are much less distinctive features of the nature of the malady — are not so pathognomic — as differences of kind, which form the only true specific conditions by which we are enabled to distinguish one species from another; as typhus fever from plague, yellow fever from small-pox, scarlet fever from measles, &c. In these, as well as in several other maladies, grades of action merely, or the depression or the excitement of particular functions, or the irregular distribution of vital power throughout the frame, are far less attributes of their nature, than are perversions of their properties. The conditions of life in these are altered more especially in kind than in degree; this alteration in kind constituting the true morbid state. Hence one principal reason wherefore a lowering treatment is much less efficacious in changing the morbid action, than remedies which elevate the vital manifestations, and enable them to oppose progressive deteriorations in their conditions, and in the constitution of their allied structures. The delirium, and the morbid and *apparently* high vascular action, in many of such diseases, are often no reason wherefore remedies which excite the vital energies, and change their morbid actions, should not be employed. Every practitioner who has ventured beyond mere routine, or the track pointed out by the numerous authors who have written to obtain that experience of which their writings should have been the results, must have observed the beneficial operation of ammonia, camphor, cinchona, quinine, &c. in many cases of the above maladies; and even in states of action where it became a question whether or not an opposite practice should be employed.

91. *D. Of vitiation of the conditions of life, and of their allied fluids and structures, conjoined with depression or excitement.* — (*a*) The association of *depression* with vitiation of the conditions of life, and with change of the fluids and solids, obtains in the last stages of the maladies already instanced, particularly in those called malignant; whether originating locally or constitutionally and ad-

vancing slowly to the condition now being considered, as carcinomatous and their allied diseases; or taking place in a more rapid and violent form, as malignant or adynamic fevers, the effects of animal poisons, &c. It would seem that all deteriorations of the conditions of life are either consequences of, or otherwise related to, depression of them. If we trace the progress of those maladies in which the change in kind is the most conspicuous, we shall find that vital depression is a characteristic of the impression of their exciting causes, even although these causes may also irritate the vascular system, or impart irritating properties to the circulating fluids; for extreme depression of the manifestations of life — of its conservative and restorative properties especially — is frequently conjoined with an apparently high and, as respects rapidity of action, extreme vascular excitement. When great depression is the attendant upon vital and structural deteriorations, the sensible properties of the circulating fluid and of the tissues — the crasis of the one, and the vital cohesion of the other — experience rapidly progressive changes, until the bond of union between life and structure is dissolved; alterations of a very conspicuous kind taking place in various parts of the body some time before death. (See article Debility, § 11. 26.)

92. (*b*) The *excitement* which is sometimes associated with an alteration of the conditions and material alliances of life is essentially morbid, and is different from that which attends an otherwise unchanged or non-deteriorated state of the vital powers. This morbid excitement is generally expressed in particular systems and organs; the vital actions of the rest of the frame being proportionately lowered: but, whether it affect chiefly the nervous or the vascular systems, or take place primarily or consecutively, it soon terminates in profound exhaustion, and in a more or less complete vitiation of the conditions and alliances of life. This is illustrated by the advanced states of adynamic and epidemic fevers, by plague, &c. in an extreme degree; and by the worst forms of erysipelas and eruptive fevers in a less conspicuous manner. The excitement thus associated with other vital and material alterations may proceed directly from its efficient cause, which may excite or irritate, whilst it otherwise affects, the organic nervous and vascular systems; or it may take place indirectly, or consecutively on depression, and be more or less a state of reaction, developed by changes in the circulating fluids, arising either from the absorption of irritating materials, or the interrupted elimination of hurtful elements. But in either case a progressive deterioration is observed; the morbid conditions of life affect the secreting and excreting functions, and consecutively vitiate the circulating fluids, and even the living solids; and the irritating or vitiated state of the former excites the vascular system; and thus alterations of the one reciprocally increase those of the others, either until the alliance of life with the structures can no longer be preserved, or until, in consequence of the exhaustion of the vascular action, which had been excited by the changes in the circulating fluid, and of the effects of this fluid on the secreting and excreting organs, the balance of vital excitement is inclined in their favour, a new action takes place, their functions are resumed, morbid matters are thereby eliminated from the system, and health is ultimately restored; the change being either ushered in by critical phenomena, or promoted by remedies, the operations of which are merely an artificial or substituted crisis. (See art. Crisis.)

93. IV. Disease of the Fluids and Solids, originating in altered Conditions of Life, and generally in those already discussed. — Morbid exhalation, secretion, and nutrition may be viewed as stages of the same organic action; exhalation passing into secretion, and secretion into nutrition. Thus we perceive the natural exhalations, during disease, assume the characters of a secreted or elaborated fluid, and certain morbid secretions become more or less organised. I shall therefore notice — 1st, The simpler changes of exhalation and secretion; 2d, Simple modifications of nutrition; 3d, Preternatural exhalation and secretion, comprising the transformations and misplacements of these fluids; 4th, Preternatural or metamorphosed nutrition; 5th, Adventitious formations, or productions, foreign to the economy — consisting of secretions — (*a*) insusceptible, and (*b*) susceptible, of organisation; and, 6th, Of destruction of parts.

94. i. The simpler Alterations of Exhalation and Secretion. — I have considered in distinct articles, on account of their great importance, morbid states of the Blood, and Congestions of this fluid. I shall here briefly notice changes in the exhalations and secretions. — *A*. The *exhalations* into shut cavities, or in the areolæ of the cellular tissue, may be increased from the following changes: — 1st, From deficient tone, referrible either to the exhaling vessels and pores, or to imperfect vital cohesion of the tissues, or to both: 2d, From deficient action of the absorbents, depending on diminished vital power, or on obstructions in their course: 3d, From increased determination of blood in the vessels distributed to these parts: 4th, From inflammatory action terminating in, or being followed by, effusion: 5th, From obstructed and retarded circulation of the venous blood returning from these places, particularly in the liver, in the heart, lungs, &c.; the consequent nervous and capillary distension favouring augmented exhalation: 6th, From increased vascular or rather serous plethora, owing to the obstruction of some emunctory, — as anasarca, from the sudden arrest of the cutaneous and pulmonary exhalations; and this, as well as other forms of dropsy, from inflammatory or structural disease of the kidneys: 7th, From the sudden arrest of an accustomed discharge from the pulmonary or digestive mucous surfaces, the morbid exhalation being determined to the contiguous serous surfaces; and, 8th, From two or more of the foregoing states conjoined. (See art. Dropsy.)

95. *B*. *Alterations of the secretions* depend — 1st, upon the state of the organic nervous influence; 2dly, upon vascular action; and, 3dly, upon the condition of the blood itself — upon *the chief factors of organic action and life*; and they are thus indications of the manifestations of this principle. They may be — *α*. more or less *diminished*, — as from causes which lower the organic nervous influence, or retard the circulation; *β*. or more or less *increased*, chiefly from agents which alter the distribution or determination of organic influence, and consequently of

the circulation and vascular action, either by exciting the secreting structures themselves, and their intimately allied parts, or by depressing, impeding, or obstructing the functions of distant, and especially of other secreting organs, and from a superabundance in the blood of the elements of which the increased secretion is formed; γ. or more or less *altered* from the healthy state, independently of diminution or increase of quantity, — as when the conditions of life are modified otherwise than in grade, and when the circulating fluid is vitiated, either generally, or merely in respect of the greater abundance of some one element; δ. or both *diminished* in quantity and *altered* in quality, owing chiefly to lowered as well as modified vital power, to changes in the blood, and to morbid vascular action or inflammation of the secreting organ; ϵ. or, lastly, they may be both *increased* and *vitiated*, either from a morbid distribution, and alteration of vital influence and action, owing to the impression of causes on remote but related organs, or from irritation or excitement of the nervous influence of the secreting structure itself, by agents acting either exteriorly to the vessels, or interiorly, through the medium of the blood. Thus, various substances received into the digestive canal will increase and alter the secretions of its mucous surface; and the accumulation of the elements of bile in the blood, with other effete matters, will excite the liver, and give rise to an abundant as well as acrid or otherwise morbid bile. Such seem to be the chief *pathological states* on which morbid secretions depend.

96. From what has been stated, it will be evident that, although alterations of the secretions are often dependent upon vascular action in its various states, from augmented determination to inflammation and its results, and upon conditions of the blood, organic nervous influence has also a marked effect in generating them, and even in originating the vascular disturbances to which they have been most generally assigned by authors. And although the secretions are constantly and conspicuously disordered in fevers and inflammations, yet they are also often remarkably altered in other diseases; and, in some, even constitute the most prominent change from the healthy state. In fevers and inflammations, the secretions are more acutely affected, but are more disposed to a spontaneous and salutary change, than in chronic disorders. In those maladies in which their alterations form the chief pathological state, their natural conditions are very slowly restored; and, even when the restoration is effected, their derangement is apt to recur from the slightest causes. This is exemplified in diarrhœa, diabetes, and several other chronic diseases.

97. (*a*) The *recrementitious*, as the salivary, pancreatic, and gastric secretions; or the partly recrementitious and excrementitious, as the biliary and intestinal secretions; are more or less altered in most diseases, and from a diversity of causes. Agents, whose operations may be sufficient to excite the organic nerves, but not to produce inflammatory action; or whose properties are calculated to affect the influence of these nerves, rather than the action of the capillary vessels; may give rise to an increase or other change of the secretions in preference to inflammation. Thus, aromatics and stimulants will excite the flow of the gastric juices, but will not occasion inflammation unless taken in very large quantities; various substances will increase the intestinal secretions, but not inflame the villous surface; and mercury, in small or moderate doses, will remarkably augment the salivary fluid, but, in excessive doses, will inflame the glands and diminish this secretion. The effects of stimulants upon parts related or contiguous to those to which they are applied, also show the influence of the nerves on the secretions, — as the action of certain odours and savours on the salivary and gastric secretions, and of various purgatives on the biliary fluid. Even mental emotions affect the secretions through the medium of the related organic nerves supplying secreting structures; and this effect is not limited to the recrementitious fluids, but is also extended to those which are entirely excrementitious, as the urine, the sweat, &c. The influence of mental anxiety in producing both diuresis and enuresis, and of hysteria in occasioning the former, is well known. Deficiency of the recrementitious fluids causes dyspeptic, hypochondriacal, and other diseases of the digestive organs; impedes or otherwise modifies sanguifaction and nutrition; and favours the production of nervous affections. Morbid states of the biliary secretion are amongst the most important in pathology. Impure air, want of exercise, increased temperature, rich or full living, stimulating liquors, &c. change both the quantity and the quality of this fluid; rendering it either more copious, or of a deeper colour, and of a more acrid quality, than in the healthy state. Its more languid circulation through the ducts, or its undue retention in the gall-bladder, owing either to indolent habits, or to exhausted powers of digestion and assimilation, favours the absorption of its more aqueous parts, increases its consistence, disposes certain of its constituents to crystallise or to concrete into calculi, and gives rise to various chronic disorders of the liver and of its related viscera. Obstructions to its passage or discharge, and various other circumstances, favouring its absorption on the one hand; and torpor of the liver, or suspended action of this viscus preventing its secretion on the other, and causing the accumulation of its constituents in the circulation; are important pathological conditions, and constitute no mean part of several acute and chronic maladies, besides those in which the biliary fluid is more especially disordered. (See CONCRETIONS — *Biliary*; JAUNDICE, and LIVER.)

98. (*b*) The *secretions* which are elaborated by the intestinal mucous surface are often remarkably changed, both in quantity and kind. Diarrhœa, dysentery, and cholera present extreme increase and alteration, not merely of these, but frequently also of those poured into the digestive canal from the collatitious viscera, originating in the pathological states adduced above (§ 95.); and illustrate the action of morbid secretions upon the surfaces with which they may come in contact. When these secretions are produced in large quantity and altered quality, whether from a modified and excited condition of the vital actions, or from both, or from these conjoined with an impure state of the blood, the effects following their passage over the villous surface are often very severe, and even disorganising. Thus,

an altered state of the salivary fluid inflames and ulcerates the mouth, tongue, and gums; and the irruption of a large quantity of acrid bile irritates the duodenum, excites severe vomitings and purgings, sometimes with spasms of the voluntary muscles owing to the irritation of the visceral nerves acting upon the related spinal nerves, and, in more chronic cases when morbid secretion is prolonged, even excoriates the intestinal surface. A similar effect very probably is occasioned by the intestinal fluids themselves, as shown in *dysentery*. But the injurious operation of the fluids poured into the digestive canal does not arise only from their morbid increase. Diminished secretion, if it be attended by the accumulation and retention of the fluid in the secreting viscera, and of the mucus on the villous surface, may prove equally detrimental, but more insidiously and slowly. Morbid increase of these fluids is usually an acute, and diminution of them a chronic, disorder. The latter is generally accompanied with alterations in their properties, especially if they are long retained. When the retention and alteration take place in respect of the mucus contained in either the solitary or aggregated follicles, dangerous or even fatal ulcerations, or other organic changes, may be the results. Their accumulations on the intestinal surface favour the production of worms, indigestion, constipation, colic, &c. The manner in which one secretion may be greatly increased, whilst the rest are suppressed, is remarkably illustrated in pestilential cholera. In this malady it would seem as if the efficient cause suppressed the vital manifestations of all other organs, determined the remaining vital influence and circulation to the digestive canal, and occasioned an uncommon increase and alteration of its exhalations; the serous portion of the blood being in great part evacuated in this situation, leaving a portion of its albumen lining the intestinal surface in the form of a muco-albuminous and tenacious exudation.

99. (*c*) The *excrementitious* secretions are also altered by the pathological states already specified (§ 95.). The changes of these, as well as of the foregoing fluids, are important agents in continuing or aggravating disease, and furnish some of the chief indications of its nature, progress, and terminations. — As the office of the organs which secrete this class of fluids is to expel those elements which are effete, and would be injurious to the frame if retained in the blood, it must necessarily follow, that any interruption to this function, and especially a complete obstruction or suppression of it, must be highly injurious. The dropsical effusions in various cavities following interruption to the action of the kidneys, and the more acute effects of entire suppression of their functions, fully illustrate this. As a large quantity of ingested matters is carried into the blood, either directly from the stomach, or along with the chyle, and discharged from it by the emunctories, it is evident, not only that the kind of ingesta will affect very remarkably the properties of the excretions, but that obstruction or even interruption of any one of them will be followed by serious effects, unless some other organ perform an additional office, vicarious of that which is suppressed; and even in this case, disease will generally ultimately arise.

100. *α*. The *menstrual evacuation*, and even the *lochia*, may be considered as excrementitious secretions, interruption or morbid increase of them being followed by similar consequences to those arising out of suppressed perspiration. That the menstrual discharge has essentially a depuratory effect upon the blood, is shown by the alterations which it undergoes from morbid states of the circulation; thus, I have seen copious catamenia, the fluid being remarkably offensive, irritating, and otherwise sensibly altered from the natural state, form the crisis of erysipelas, and fevers; and a copious, offensive, and excoriating lochia evidently the means of preventing the accession of those adynamic and malignant diseases which often affect puerperal females, owing to the respiration of the impure air generated by several females confined in one lying-in apartment. The catamenia, moreover, is diminished, increased, vitiated, or changed into a serous or mucous secretion — into fluor albus — by the same agents and pathological conditions (§ 95.) as affect the other excretions.

101. *β*. Morbid states of the *perspiration*, independently of its increase or decrease, are not infrequent attendants on both acute and chronic maladies. They may even accompany apparently sound health, particularly when the bowels are habitually constipated; this evacuation being sometimes so offensive, or both copious and offensive, as to render the person thus affected a nuisance to those near him. In this case, the skin evidently performs an office vicarious of the diminution of the intestinal secretions. The perspiration is generally promoted by excited vital action of the cutaneous surface; in which case it is fluid and warm. But it may also be much augmented by a very opposite condition of vital power, as by syncope, the skin being cold and clammy; or by the extreme vascular depression occasioned by excessive fear. In these cases, the lost tone of the integuments, and of the excreting pores, allows the escape of a portion of the fluids contained in the superficial vessels. This change also occurs in many instances of extreme vital depression, and shortly before death in many diseases. It is a pathognomonic symptom of pestilential cholera, in which it is most remarkable; the cold, wet, livid, and shrunk surface, being the result not only of the suppressed vital powers, but also of the circulation of venous blood.

102. *γ*. The *urinary*, of all the excretions, is the least frequently suppressed; the consequences of such a state being, if not soon removed, the most dangerous, or rapidly fatal. Whilst this excretion is very much influenced by the quantity and nature of the ingesta, and by the temperature and humidity of the air, it is also variously altered by disorders of digestion, sanguifaction, and circulation; but more particularly by the conditions of the blood itself, by changes in the nervous influence, and by injuries to the spinal cord. On the other hand, interruptions of the urinary discharge affect the quantity and quality of the circulating fluid, disorder the nervous systems, ultimately increase the exhalations and the other secretions, and change the constitution of the soft solids. The other pathological relations of diseased urine are fully explained in the articles Diabetes and Urine.

103. ii. SIMPLE MODIFICATIONS OF NUTRITION may affect the whole frame, or a particular tissue or part, or merely a circumscribed portion of a single structure. The entire absence of parts, or deviations in the distribution and arrangement of the elementary molecules and tissues, producing the various kinds of *monstrosities*, will be left out of consideration, they being of less practical interest. Those changes which are most important may be resolved into the following: — 1st, Alterations of bulk; 2d, Modifications of density and cohesion, either of which may lead to various complicated lesions. *Hypertrophy*, or augmented nutrition, perhaps never affects all the tissues simultaneously; and although generally a disease, sometimes of dangerous import, yet, when seated in the muscles of voluntary motion, it cannot be considered in any respect as a morbid change. It may be conjoined with *softening* or with *induration*, with increase or diminution of density and vital cohesion. *Atrophy*, or impeded nutrition, may also be associated with similar lesions. Any one of these four alterations, or either hypertrophy or atrophy conjoined with softening or with induration, may commence in one, or at most two, of the elementary tissues, and extend to those most intimately connected with it. In these modifications of nutrition — producing variations in size and density — it is understood that the tissues still retain their distinctive characters. (See ATROPHY, HYPERTROPHY, INDURATION, SOFTENING, and ULCERATION.)

104. iii. OF PRETERNATURAL EXHALATION AND SECRETION. — *A. Transformation of the Natural Exhalations and Secretions.* — (*a*) The exhalations of *serous surfaces*, or shut cavities, may be altered according to the state of organic action in the surface producing them.—*α*. Exhausted vital action and cohesion will be followed, according to its grade, by the effusion of an aqueous, serous, or sero-sanguineous fluid, the relaxed state of the capillary pores and serous tissue allowing, instead of a simple halitus, the escape of the watery parts of the blood, sometimes with a portion of its albuminous constituents, and even of its red particles; and, under certain circumstances, as of obstructed return of blood from, and congestion of, adjoining parts, and dyscrasia of this fluid, — states not infrequently consequent upon exhausted vital power, — the effusion of a portion of blood itself. — *β*. When depression of vital power and diminished cohesion of the serous surface is associated with increased action of the vascular system and contamination of the circulating fluid, as in several adynamic fevers, the exhalations are not merely increased, they are also turbid and of various shades of colour, from a dirty grey to a dark brown. — *γ*. When organic action is morbidly increased in serous surfaces, the exhalation is changed into a sero-albuminous matter, which is at first fluid or semi-fluid, but which afterwards assumes modified states, according to the grade of constitutional power and morbid action, and the particular characters such action presents, — whether that of pure phlogosis or sthenic inflammation, or that of diffusive phlogosis or asthenic inflammation, or of the intermediate forms. If the organic action consist chiefly of the former, in an acute or sub-acute state, the effused matter will be more or less albuminous, concrete, and spread over the inflamed surface in variable quantity, and will contain a turbid serum in the opener spaces. If the inflammation be of a diffused kind, the effusion will be more copious, and fluid, varying from a turbid serum to a dirty, deep-coloured, or flocculent, or sero-purulent, or albumino-puriform matter, without any adhesion of the opposite inflamed surface; and thus the morbid exhalation will be altered in all acute cases, as the inflammation, owing to the degree of vital power, has partaken more or less of the sthenic or asthenic state. If the inflammation be of a chronic kind, the effusion will be more dense and coherent, or even become organised; and, when the albuminous exudation consequent upon acute phlogosis has given rise to adhesions, or passed into a chronic state, they become transformed into cellular bands, with or without a turbid or flocculent serum contained in the unadherent spaces.

105. (*b*) The exhalations and secretions from *mucous surfaces* are also remarkably changed by the states of vital power, of structural cohesion, and of organic action. — *α*. When vital energy and cohesion are much diminished (§ 91. 95.), the watery exhalation from these surfaces may be increased, and transformed to a serous, or sero-sanguineous, or bloody discharge; particularly in some malignant and cachectic maladies. If the tone of the extreme vessels be lost, vital action being at the same time depressed, the sanguineous exhalation will be what has usually been termed *passive*, and the crasis of the blood — both that effused, and that circulating in the body — will be either lost or deficient. But if vascular action be increased, the capillary vessels and pores being either expanded or relaxed, or the cohesion of the mucous tissue greatly impaired, the hæmorrhage will assume more of the *active* characters, and the coagulation of the effused blood be more or less perfect. Between these grades of action, however, — the terms *active* and *passive* expressing the opposite extremes, — there will be every intermediate degree; much of the appearances of the exhaled blood being those of its condition — or depending upon its condition previously to its discharge. (See HÆMORRHAGE.)

106. *β*. Not only may the purely *exhaled fluid* be thus altered, but both it and the more strictly *secreted fluid*, as the mucous, may be disordered either consecutively or coetaneously. This change is usually a consequence either of local determination and irritation, or of inflammation of a slight or specific kind. In such cases these fluids are thin, serous, ropy, glairy, albuminous, muco-albuminous, or puriform, frequently in succession, and secreted in large quantity. Thus, when the respiratory mucous surface is irritated by catarrh, its natural secretion, which is scarcely evident in health, becomes successively transformed into these states; and a similar effect follows irritation of the digestive surface. In acute and sub-acute inflammations of this tissue, its exhalations and secretions are altered, either to a muco-puriform matter, streaked with blood, or to a puro-albuminous fluid, or to an albuminous exudation, which concretes in the form of a false membrane in the surface that produced it. These modifications of the morbid productions are referrible to the degree in which either the exhaling or proper vessels of the sur-

face, or the mucous follicles, are respectively affected, and to the grade of vascular action.

107. (*c*) The exhalation usually poured into the *areolæ of the cellular tissue* may be similarly transformed, and the various alterations may respectively depend upon the states of vital power, of vascular action, of structural cohesion, and of the crasis of the blood, particularised above, — a watery, serous, sero-sanguineous, a purely sanguineous, sero-albuminous, or a puriform fluid being poured out in this tissue, either where it connects more external or superficial parts, or forms the parenchyma of the viscera. In such cases, the transformed exhalation is either diffused or circumscribed, according to the state of action, and the consequent nature of the transformation. Thus, great depression or exhaustion of vital power and cohesion is connected with the diffused infiltration of a serous, or sero-sanguineous, or even a bloody fluid, and, if this state be attended by increased vascular action, with the infiltration of a puriform, or sero-puriform, or even an ichorous matter. But when vascular action is increased, and partakes of the phlogistic or sthenic characters, a puriform matter is formed, and is circumscribed (see arts. ABSCESS and CELLULAR TISSUE). The diffused or circumscribed deposition of a puriform fluid, which sometimes occurs in the cellular tissue, and the cavities of joints, consecutively upon inflammation or suppuration in the veins or in remote parts, during states of vital depression, have been explained in the articles now referred to, particularly the former (§ 29.).

108. *B. Of the Exhalations and Secretions which are adventitious to the situation, — or misplaced Secretions.* — (*a*) *Fatty matter* has, in rare instances, been found in unnatural localities; as in the blood, in the urinary bladder, and in the intestinal canal, either in its cavity, or forming small tumours in the connecting cellular tissue of the parietes. — (*b*) A *yellow matter* has frequently been observed colouring the various tissues and the secreted and excreted fluids, occasioning jaundice; and, although generally referred to the colouring matter of bile, has only recently been proved by chemical analysis to consist of that substance. This change is often connected with biliary obstruction or disorder, but in many cases no such connection exists, as far as can be ascertained during life or after death. In such instances we must infer — and the inference is borne out by the very sudden manner in which the change takes place, and by other circumstances — that other organs and tissues than the liver may acquire the power, under certain circumstances, of forming or separating the colouring, and probably other principles of the bile from the blood. I have been often convinced by practical observation, that more than one of the principles of the bile have passed off with the perspiration, in persons whose biliary organs were torpid, and in those affected by chronic cutaneous disorders connected with hepatic obstruction, even although the colour of the skin remained unchanged. (*c*) *Cholesterine*, another principle of the bile, has also been found in various secretions and structures; and therefore it must likewise be inferred, that it also may be sometimes separated from the blood by the tissues. (*d*) The *urine*, and certain of *its peculiar principles*, have been secreted in unnatural situations. Facts of this description were often related by the older writers; and the more precise researches of modern times have determined the circumstance, as respects the presence of some of its principles in the supplementary secretions, which were formerly considered a metastasis of the urine: thus, uric acid has been detected in the sweat, and in gouty concretions, &c.

109. In respect of the *causes* of the misplacement of the secretions, it may be concluded that, as the elements of all the secretions exist in the blood, they may be occasionally separated from it by other organs or tissues, than by those which are the usual instruments of such separation and combination into the state of perfect secretions, particularly when the organs thus appropriated are diseased to the extent of impeding their functions. In such instances, however, the accumulation of the elements in the blood does not excite other organs to the elaboration of a secretion similar to the natural one; but merely to the elimination of the particular element or elements that may be in excess, in a separate form or different state of union to that which it naturally presents. Thus, when the urine is suppressed, it is only urea, or uric acid, that is found in the supplemental evacuations; or when the bile is obstructed, it is not elaborated bile, but certain of its principles, especially its colouring matter, that tinges the secretions, and, in aggravated cases, the structures; or when the milk is suppressed, it is not milk that is found in other situations than in the breasts, but caseum, &c. In the cases of obstruction of the urine and bile, the respective organs being unable, either from paralysed nervous influence, or inflammation, or structural change, to perform their depuratory functions, the aqueous and effete elements which consequently accumulate in the blood are either separated by the tissues, or pass off through other channels, but in different states of combination, the appropriated instruments of the function being incapable of elaborating them into the natural secretions. In cases, however, where this unnatural separation of elements occurs without evident interruption of the functions of the organ destined to excrete them, we must necessarily infer an exuberant formation of the elements in question in the blood, and a consequent elimination of them through additional channels. It is not uncommon to observe jaundice associated with a natural or copious secretion of bile, and even with a greatly augmented evacuation of this fluid; we must, therefore, conclude that the colouring elements are formed so abundantly in the circulation, as not to be sufficiently excreted from it even by the increased action of the liver; and, consequently, that they are accumulated to the extent of being separated by the different structures. It may further be conceded, that the elements may be combined into more or less perfect secretions in the organs destined to excrete them; but that, before they are discharged from them, or excreted from the system, they may be occasionally taken into the blood, and separated from it by other structures, and through different ways.

110. iv. METAMORPHOSED OR TRANSFORMED NUTRITION — or that change which consists of the

transition of one tissue into another — is of a less simple kind than that noticed above (§ 103.) — α. M. Andral has shown that the same principle of developement which obtains in the fœtus, extends also to the morbid transformations of the natural tissues; and that as the cellular is the matrix of the other textures, so it may, from disease, be changed into most of the other simple structures. There are, however, certain facts connected with such alterations deserving notice: — 1st. Cellular tissue, in being changed into some other, no further affects the proper texture of the organ, which it either invests or of which it forms the parenchyma, than in causing its atrophy in some cases. — 2d. Cellular tissue cannot be transformed into the nervous, unless in situations where the latter previously existed: thus, nerves that are divided, and of which a portion is removed, are first connected by cellular tissue, and subsequently by the extension of medullary substance from each divided extremity. — 3d. Other tissues, whose continuity has been dissolved, have the breach repaired, in the first instance, by means of the production of coagulable lymph, which passes into the state of cellular tissue; this latter being frequently afterwards transformed into a texture analogous to that which was divided; thus, divided muscles are reunited by a fibrous tissue; and so on, as respects bone, cartilage, &c. — 4th. The nature of the transformation of cellular tissue is sometimes regulated by the functions of the part: thus, when subjected to friction, it becomes a serous membrane; when exposed to external agents, it becomes tegumentary, &c. — 5th. Other tissues, besides the cellular, may be transformed, but the alterations are similar to the natural changes they experience in the processes of fœtal growth: cartilage being converted into bone, the mucous tissue into the cutaneous; or a reverse course may be followed, in respect both of these textures and of the muscular tissue, which can be changed only to the fibrous. Hence the metamorphoses of cartilaginous, osseous, fibrous, muscular, cutaneous, and mucous structures are much more restricted than those of the cellular. — 6th. All tissues, when remarkably atrophied, present evidence of degeneration towards their primitive or rudimentary state, viz. to cellular tissue.

111. β. The *causes* of the mutation of one tissue into another are not easily ascertained. Some have ascribed it to inflammation or irritation. By ascribing it to modified nutrition, we merely express an obvious fact, the cause of which is thereby not more nearly approached. It certainly is not occasioned by inflammation, although several of the transformations may be accidental or contingent consequences of that condition, especially in its slighter grades; for, however we may irritate, or determine blood to a part, we shall not transform it, unless under circumstances identical with those that are concerned in the production of those alterations. The series of analogous changes that take place in the fœtus is not connected either with irritation, or with inflammation, or with opposite states of organic action. We can, therefore, impute the metamorphosis only to modifications in the conditions and manifestations of life influencing the nutrition of the organ or part; for we know that increase of function, or of vital manifestation, will often occasion a transformation of nutrition in a certain direction — will change cellular tissue to a higher grade of structure, as in the developement of the organs of the fœtus; whilst the diminution or privation of function — that is, of its due vital endowment — will transform the organ which performed it into a more rudimentary tissue: thus, a part becomes atrophied from being unexercised, an unemployed muscle is reduced to a pale fibrous structure, and an impervious artery or duct to cellular tissue. In briefly noticing the specific metamorphoses of tissue, I shall commence with the simplest, and generally the earliest change, in the ascending scale of transformation.

112. (*a*) The *cellular tissue* having always existed as the matrix of the compound structures and organs, it is obvious, when, owing to suspended or abolished function, the superadded organisation devoted to such function is lost, that the cellular tissue will then remain as the primitive structural base. This is shown by the evidence already adduced. The coagulable lymph exuded during inflammation of serous surfaces may become organised into cellular, and even into serous tissue, and be the matrix of certain other changes (§ 140.).

113. (*b*) The *serous tissue*, and the cellular, are often transformed one into the other. Cellular substance may have serous cysts developed in it, in almost any part of the body, either from friction or pressure; or from the lodgement of a foreign body, or the existence of a coagulum, &c. But, independently of these causes, it may have cysts of various dimensions formed in it, either where it invests the different organs, or enters into their internal structure; the parenchymatous organs sometimes being either partly or altogether transformed into a serous sac, or having these productions attached to them. When thus developed, they have been attributed to irritation by some, to a diminution of the natural action by others, and to perverted action by several pathologists. There can be no doubt of the last being the case, whether other states of action may accompany it or not.

114. α. *Serous cysts* vary from the size of a millet seed to that of a child's head; they exist either singly or in clusters, have their external surface in contact with the organ in which they are produced, and are either intimately connected with the cellular tissue surrounding them, or entirely without any organised connection. Red vessels are seldom seen passing into them. The structures immediately surrounding them may retain their natural appearance; or may lose it for a time and regain it; or may be shrunk and condensed; or be altogether atrophied, and expanded over the cyst, as in the liver, brain, lungs; or be merely congested; or moreover be softened, indurated, or surrounded by pus, or by tubercular matter, or by blood. In this last case, the cysts themselves are sometimes broken down, or partially destroyed. The investing cellular tissue may also become fibrous, cartilaginous, osseous, or even calcareous; and additional layers thus may be superimposed on the original cyst. The internal surface of the cysts may be smooth, or may present changes altogether similar to those which serous membranes experience from disease; it may be uneven, rugose, granulated, covered by specks of concrete albumen, or

lined by false membranes, with or without cellular bands or partitions running across the cavity.

115. *β*. These *cysts* usually contain a limpid fluid, but other substances have been sometimes found in them; viz. 1st, a serous fluid tinged with the colouring matter of blood; 2d, blood, with its fibrinous coagulum; 3d, fluid or semi-fluid substances, of a dark colour, probably consisting of altered blood; 4th, a flocculent serum; 5th, a mucous fluid; 6th, a fatty substance; 7th, cholesterine; 8th, the different varieties of pus; 9th, tubercular matter resembling that found in the lymphatic glands of scrofulous persons; 10th, a solid elastic substance, probably consisting of altered albumen; 11th, several species of entooza. Occasionally two or more of these substances are found in different compartments of the same cyst; and without any appearances in its parietes to account for the circumstance; thus furnishing an additional proof that the state of the secretion does not always arise from any appreciable modification of structure. As to whether these cysts are formed before or after the matters found in them, it may be stated that, in respect of those containing the first three kinds of fluids, and possibly of some others, there can be no doubt of the effused fluid having caused the formation of the cyst enveloping it; but as to those that contain different productions in separate parts of the cells, it must be inferred that the matter is secreted by the parietes or part of the cyst in which it is found.

116. (*c*) *Mucous membrane* may be produced from the transformation of the cellular tissue — 1st, in the place of the old mucous membrane, which had been ulcerated or otherwise destroyed; 2d, in abscesses without external outlet; and 3d, in abscesses having some external outlet, and old fistulous passages. In the progress of this change, the cellular tissue becomes successively smooth, vascular, and raised to the same plane as the continuous surface. It then admits of being detached in shreds from the subjacent tissues; and, in the alimentary canal, ultimately becomes studded with villi. But in abscesses and fistulæ, villi are not formed; and neither there, nor in the digestive canal, does the transformed mucous surface contain mucous follicles. Meckel and Andral record some cases, in which the internal surfaces of cysts containing a viscid fluid could scarcely be distinguished from mucous membrane. I have seen this appearance in the ovarium, where it has been principally met with. The free surface of the false membranes formed on serous surfaces has, in one or two instances, where there existed an external opening, been converted into a mucous-like tissue.

117. (*d*) The *cutaneous texture* is generally incompletely reproduced after being destroyed; the newly formed part being composed of a cellulo-fibrous layer, without the vascular tissue in which the colouring matter is deposited. Owing to this circumstance, the cicatrices in the black races are usually white. But there are exceptions; the vascular layer being occasionally developed at a later period, and the newly formed texture assimilated to the surrounding surface. When mucous membrane becomes constantly exposed to the air, it generally assumes more and more of the characters of the cutaneous structure, but the transformation is by no means complete.

118. (*e*) *Fibrous productions* are also evidently formed at the expense of the cellular tissue, the change from the latter admitting of being traced through its various gradations. They are generally composed of delicate filaments, sometimes parallel to each other, at others matted together or interlaced, and occasionally coiled, convoluted, or rolled up; and usually containing cellular tissue between the fibres. These productions may exist as bands, distinct patches, and as rounded or irregular bodies. They may be either pale, or slightly vascular, or exceedingly so; and be disposed in the shape of chords; or in that of membranes, surrounding or covering other parts or adventitious formations; or in the form of tumours.

119. *α*. *Fibrous tumours* vary as follows:—1st, They are homogeneous throughout, and consist almost entirely of condensed fibres; 2d, They are lobulated, having cellular tissue interposed between the lobules, in which the fibrous structure is more or less distinct and variously disposed, as stated above; and, 3d, They are, according to M. Andral, granulated, the granules being disposed in lobules, connected by cellular substance. Fibrous transformations often undergo further changes, portions of them becoming cartilaginous, or even osseous. But, instead of these changes, they sometimes experience acute or chronic inflammation, which may disorganise either the fibrous structure or its connecting tissue, giving rise to infiltrations of pus, or of blood, or depositions of fibrine, the purely fibrous tumour thereby undergoing a complete metamorphosis.

120. *β*. To what *cause* is the fibrous transformation to be imputed? This can be answered only by adducing the circumstances under which it has been observed to occur. — 1st. Fibrous growths sometimes appear in an apparently healthy state of the organ in which they are found, and are so completely isolated, a few delicate cellular and vascular connections excepted, as to admit of being removed without affecting the adjoining structure. —2d. The proper tissue of the organs has occasionally disappeared as the cellular tissue has become transformed into the fibrous state. — 3d. The organs in which they are developed are sometimes the seat of inflammatory action, but it cannot be determined whether inflammation is the cause or the effect of the transformation. From these facts it may be inferred, that no conclusion, as to the immediate cause of the production of fibrous growths, can be offered with confidence; but that they may probably arise from altered organic nervous influence of the part modifying the state of vascular action and nutrition.

121. (*e*) *Cartilaginous transformations* are often found under the same circumstances as the fibrous. They are met with in the following situations: — 1st. In *the cellular tissue interposed between organs*, or *connecting different textures*, — as in that subjacent to serous membranes — usually in the form of grains, large spots, or irregular depositions or incrustations; and either unattended by any other lesion, or accompanying changes in the serous membrane under which they are produced, or in the substance of the viscus; these changes being of the most diversified kinds in the different cases. They may also occur in the cellular tissue surrounding morbid secretions and productions,

either as masses, or as membranes; and of themselves, or with the serous or the fibrous transformations, or with both, may form the cysts or envelopes of these secretions.—2d. *In the structure of parenchymatous organs*, the cartilaginous productions are formed, like the fibrous tissue, at the expense of the cellular. They may be deposited in masses, or in the form of envelopes of various morbid secretions. Whilst cartilage is most frequently formed beneath serous membranes, these membranes themselves never experience this change. It is rarely produced in the cellular tissue under the mucous or villous coats; and very rarely in these coats themselves, and then only consequently upon repeated or prolonged irritation. The osseous tissue may also be transformed into cartilage. But in respect of the change of muscle, and of parenchymatous viscera—as the liver, spleen, kidneys, &c.—into cartilage, it is more probable that the developement of this substance in the cellular tissue merely causes the disappearance of the proper structure in the part thus altered. There is, however, little doubt of a portion of brain being sometimes changed into cartilage.—3d. *In cavities lined by serous* or *synovial membranes*, cartilages have been found, either entirely loose, or attached by a membranous prolongation or pedicle to some part of the parietes. They vary from the smallest size to that of a bean, and are of different forms. They are generally homogeneous and elastic, and sometimes they contain osseous points in their interior. They have been found in the peritoneal cavity, by Laennec and Andral; within the serous membrane of the brain; within the tunica vaginalis testis; in nearly all the articulations, but most frequently in the knee and shoulder joints; and even loose in the interior of serous cysts, by Andral. As to their formation, this pathologist thinks "that they derive their origin from the fluid exhaled in serous and synovial cavities;" whilst Béclard and Laennec suppose that they are originally formed on the external surface of the membranes lining these cavities, and that they gradually protrude before them the portion of membrane covering them, thereby giving rise to the pedicles by which they are sometimes attached to the sides of the cavities. Morbid cartilaginous formations vary from a fibro-cartilaginous or mixed state, to one purely cartilaginous, in which the internal structure is perfectly homogeneous; they also vary in firmness. They occur in the following situations in some one of these states:—1st, In false articulations; 2d, At the extremities of bones of which a portion had been long previously amputated; 3d, In the situation of ligaments belonging to anchylosed joints; 4th, In cicatrices; 5th, In compound tumours of the uterus, ovaries, and thyroid; 6th, In the form of incrustations or patches, in the parietes of arteries; 7th, In the cysts and envelopes of morbid formations; 8th, In certain parenchymatous organs; 9th, In the interior of articulations; and 10th, In serous cavities, both natural and morbid.

122. (*f*) *Ossiform formations* differ in form, and somewhat in constitution, from the natural osseous tissue; and are generally confined to the cellular, the fibrous, and cartilaginous tissues.—*α*. The *cellular substance* is not susceptible of this change in all parts of the body; for ossific deposits have not been found in the sub-mucous, although frequently in the sub-serous, cellular tissue; the serous membrane apparently still covering the osseous formations, and giving them a smooth pale surface. This change has been found in the sub-serous tissue in every part of the frame; and it generally begins with slight thickening, and the infiltration of a turbid fluid; morbid nutrition, very evidently in this instance, and, indeed, in most other cases, as I have above contended, commencing in vitiated secretion. The connecting cellular tissue between the coats of arteries, especially that below its serous coat, is still more frequently ossified than the foregoing. Also the cellular substance surrounding fistulous openings, foreign substances, and adventitious secretions or productions, often become incrusted by plates, or grains, or complete layers of osseous matter. Thus tubercles, hydatids, &c. are sometimes contained in osseous envelopes.

123. *β*. *Ossification of fibrous and cartilaginous textures* is a part of the process of developement in fœtal and early life; and the process goes on through life, although generally in an imperceptible manner, until old age advances, when it extends more rapidly, and seizes on additional parts of these textures; the fibrous tissue of the arterial system, and the cartilages of the ribs, larynx, trachea, &c., being then often converted into bone. But when parts not liable to this change in old age are affected by it, or when those disposed to it are prematurely transformed, the circumstance is referrible to disease. The experiments of MM. Cruveilhier and Rayer show that a certain degree of inflammatory action or vascular injection of fibrous, fibro-cartilaginous, or cartilaginous tissues precedes the osseous deposit; and hence the reason that fractures or injuries are often followed by ossification of the adjacent parts of these textures; and that simple irritation of a slight but continued form has given origin to this alteration. But, in many instances, no cause or appearance of inflammatory irritation could be traced to the ossified part; as when the coats of arteries, the dura mater, the capsule of the spleen, &c. are thus affected.

124. *γ*. The *form, texture, and constitution* of ossiform formations vary much, both from one another and from the natural structure. As to *form*, they are—1st, *Granular*, and either isolated or in groups, their number being extremely various, and sometimes remarkably great; their size extends from a minute point to that of a pea; they are rounded, with either a smooth or a rough surface.—2d, *Lamelliform* or *membraniform*—developed in the adherent surface of serous membranes, or in the parietes of cysts, &c.—of various sizes, and sometimes of several inches in diameter, and consisting of thin irregular plates.—3d, *Amorphous*,—generally found either alone, or in conjunction with other morbid productions in the parenchymatous organs; they consist more of a phosphato-calcareous deposition, than of an ossiform formation. Their *texture* is—1st, *Homogeneous*, and without fibres or any division into compact and spongy parts; 2d, Obscurely *fibrous* or *radiated*, and more nearly resembling the natural flat bones. The *constitution* of natural bones is generally uniform; but that of the ossiform productions varies remarkably in respect both of their earthy or saline

constituents, and of the animal matters they contain. In some instances, the calcareous salts are found with little or no admixture of animal matter.

125. v. SECRETIONS AND PRODUCTIONS ADVENTITIOUS TO THE ECONOMY. — The morbid productions about to be considered present an infinite variety of appearances, in respect of consistence, colour, form, &c., occur under the most opposite circumstances, and are connected with the most diversified phenomena at their origin and during their progress. They have all a tendency either to increase by the juxtaposition of new particles; or to grow by the assimilation or intus-susception of matters transmitted to, and circulating in, their own vessels. But, in either case, they undergo various alterations, arising out of their own intrinsic properties, or of the surrounding parts, or of the state of the constitutional powers and vascular action. Such of them as are unorganised are liable to changes chiefly from the conditions of the system, and of the parts in which they are seated. These changes are of a more limited extent than are experienced by those which are capable of performing certain independent actions; and are generally confined to the removal by absorption of the more fluid parts when they are soft, and of the effusion of a fluid matter when they are hard and irritating to the parts containing them. Productions, however, which become organised, exercise functions of their own: they have become the instruments, under the influence of a derived vitality, of performing and secreting nutritive functions peculiar to them; and they thereby not only perpetuate and extend the morbid condition in which they originated, but also superadd others, either of a local or constitutional kind, or both.

126. α. The *local changes* connected with adventitious productions are various: — 1st. The parts in which they are developed may be natural, or merely compressed by their bulk. — 2d. The surrounding parts may be inflamed, injected, or congested, and variously coloured. — 3d. They may be either indurated or softened, at the same time that they are pale or injected.—4th. They may be hypertrophied, or remarkably atrophied in other instances; but most frequently the latter; the presence, and probably the pressure, of the adventitious formation diminishing their nutritive action. — 5th. They may exhale or secrete a fluid or puriform matter, which may dissolve the inorganised productions, or soften them, and dispose them to undergo further changes. The states now enumerated of the surrounding parts, or certain of them only, may take place in succession; and may follow one another with various degrees of rapidity.

127. β. The *phenomena* which attend their commencement are very diversified; but the powers of life more frequently evince various grades of depression, and even of perversion, than those of excitement. In many instances, however, such changes are very slight or scarcely perceptible; but they generally become very manifest in the progress of the morbid production; the functions of organic life — circulation, secretion, nutrition, excretion, &c. — experiencing more or less disorder. When affecting internal viscera, this disturbance may exist long without the nature of the lesion being more than suspected. But the symptoms, local as well as constitutional, will vary not only with the seat, but with the changes constantly supervening in the productions themselves, and in the structures surrounding them.

128. γ. The immediate *causes* of adventitious productions must necessarily vary with their nature. In most of them, the constitutional powers are in fault; and, in some, the cause is chiefly local. Some pathologists have referred them to debility; others, to increased organic action or irritation; and several, to the perversion of the functions of secretion and nutrition. The first and last opinions conjoined will, perhaps, the most nearly approach the truth; for it must be admitted that the perversion of these functions often originates in, or is associated with, debility. Those secretions, however, which proceed from sthenic or phlogistic vascular action, as healthy pus, coagulable lymph, &c., do not fall within this description. With those exceptions, therefore, they may be imputed to that condition of life to which I have already attributed them, viz. to depressed as well as perverted manifestations of vital power (§ 91.). The circumstances, extrinsic and intrinsic, in respect of the frame, under which they appear, — the agency of cold, moist, and impure air, of deficient and unwholesome food, and of the depressing passions, in producing them, — furnish strong evidence of the accuracy of this inference. Even as respects those changes which most frequently commence with signs of local irritation or vascular excitement or congestion, the general conditions of life, and, consequently, the whole economy, are more or less in fault; and are especially concerned in producing the local change, of which irritation, or any other form of local agent, is merely the efficient cause.

129. δ. The *terms* which have been assigned to the various productions falling under this head, have been sufficiently arbitrary; and a greater desire has been evinced to discover new species, and to impose on them new names, than to view them as they are actually presented to our observation, and without reference to the descriptions and opinions of their nature — too often erroneous, and improperly mixed up — that have been given of them. Nor have the *arrangements* of them that have been attempted been less arbitrary. Certain of them have been named, from their form, as tubercle; others, from their colour, as melanosis; and some of them, from their resemblance to healthy structures, as medullary, mammary, encephaloid substances: and they have been variously arranged; as, into such as are products of secretion without organisation, or of nutrition with signs of organisation. It must be evident, however, that the difference is chiefly that of terms; for nutrition is only a modification of secretion. They have also been divided into the *encysted* and the *non-encysted*; into the *local* and the *constitutional*; and into the *inert*, or not necessarily noxious, and the *malignant*, or contaminating. These distinctions, although very important, are not uniformly preserved; for the same substance may be both encysted, and non-encysted or infiltrated; and the alteration, which is merely local in some cases, may be constitutional in others, or become so; and that which may long or always remain inert in some instances, may sometimes be malignant and contaminating from the commencement. Besides, they may

originate either in changes in the nutrition of the natural tissues, the adventitious secretion being a consequent lesion; or in the production of new substances, alterations of nutrition being later lesions; or even the secretions, as well as the natural tissues in which they are elaborated, may undergo subsequent transformations. So extremely diversified are the causes which induce these diseases; the states of vital manifestation and of vascular action by which they are attended at their origin and in their progress; and so remarkably are they modified in their course by external agents and intrinsic states of action; and, moreover, so insensibly do they pass into one another, and so frequently and variously are they complicated; that any arrangement must necessarily be arbitrary, and a choice of difficulties. Reference, however, to the varying characters of the adventitious formations having been had in the articles upon specific morbid structures, and upon the varying alterations which the principal tissues and organs present, I shall here only take a general view of them, in the following order: — 1st, Secretions adventitious to the frame, and devoid of organisation: 2d, Adventitious secretions associated with morbid nutrition; or those that are apparently organised, but which depend upon the adjoining tissues for their vitality: and, 3d, Those which become organised, and possess an independent life.

130. *A. Secretions adventitious to the frame, and incapable of organisation or vitality.* — These substances present no trace of fibres, laminæ, canals, or areolæ; they are of various degrees of consistency; and certain of them change either from a fluid to a solid state, or from the latter to the former. They consist chiefly of albumen, gelatine, and the usual salts found in the serum of the blood. The substances that fall under this description are: — 1. Pus; 2. Tubercle; 3. Fatty matter; 4. Glue-like matter, or the colloid matter of LAENNEC; 5. Melanosis, or black matter; and, 6. Saline ingredients. These may exist either singly, or variously associated.

131. (*a*) *Pus.* — This term has been applied to a morbid secretion, whose physical properties vary considerably. That form of it which is usually secreted in a state of the constitution not remarkably depressed or vitiated, is a homogeneous cream-like fluid, of a yellowish white colour, faint smell, and slightly sweetish taste. But it often departs far from this state; and even that which is secreted from the same surface, may be very remarkably changed in a very short period, generally owing to modifications of vital power and vascular action. Sometimes it very closely resembles a thick cream; at others a mixture of curds and whey; and at others a turbid serum, or a grumous sanies, or the dregs of wine. Occasionally it seems disposed to become solid, and to assume the appearance of tubercle. At one time it is quite inodorous, at another very fœtid. Its colour also changes from white to yellow, from green to red; or this order is reversed. In some instances, it is yellowish green, or yellowish brown, and other related shades. The following are its *varieties*, according to its physical properties: — 1. Creamy, homogeneous, or laudable pus; 2. Curd-like pus; 3. Serous pus, or sero-puriform matter; 4. Muciform pus, or glairy puriform matter, or puriform mucus; 5. Bloody pus; and, 6. Concrete or lardaceous pus. These alterations are chiefly attributable to the texture in which it is secreted, to the degree of local irritation or action, to the period it has been retained, to the general state of vital energy and vascular action, to the condition of the circulating fluid, and to the diathesis and constitution of the patient. But these varieties often run into one another, showing that any arrangement of the physical appearances of this secretion must necessarily be arbitrary. In the scrofulous diathesis, however, it often presents certain distinctive characters, and inclines nearer to the curd-like variety, or seems more disposed to become solid, from the absorption of its serous portion, when it has been some time shut up. But the most specific differences that exist in pus are not to be ascertained by chemical research, nor external appearances. Two portions of this fluid, identical in every respect, will produce very dissimilar effects: when introduced beneath the cuticle, one will occasion merely a slight irritation; the other a most dangerous constitutional malady, capable of disseminating itself through thousands.

132. Pus has been found in every tissue, structure, and organ of the body, and in all the vessels, and in the blood itself, both imperfectly mixed, and in the centre of clots. It may exist in the tissues and parenchymatous organs, either collected in the form of abscesses, or disseminated and infiltrated through their structure. When formed in muscular, nervous, and even in some other structures, it is in reality furnished by the connecting cellular tissue, which is the chief seat of the inflammatory action producing it. In a great majority of cases, its presence, either in distinct collections, or in a state of infiltration, is accompanied with signs of irritation or inflammatory action; but instances occur, in which it is attended by no such appearances. The opinion, that it could be formed only where there is ulceration, has been shown to be unfounded: for it may be secreted on the surfaces of membranes, without any breach of continuity; or collected in the parenchyma of the organs, without any appearance of inflammation; or infiltrated between the fibres and in the areolæ of the tissues, without any loss of substance. It is met with in the second and last of these forms in the consecutive states of *suppuration*, or when puriform or sanious matters have passed into the circulation, from distant parts, or from disease of the veins, &c. When the production of pus has been preceded by any degree of vascular irritation, the surrounding tissues present — 1st, various grades of injection; 2d, various shades of colouration; 3d, different degrees of softening; 4th, solutions of continuity, which may either have preceded or followed the purulent secretion; 5th, the disappearance of the proper structure of the part, and its degeneration into cellular tissue, in the areolæ of which the pus is infiltrated. (For the various distinctive characters of pus, the pathological states which generate it, the symptoms that precede and accompany its formation, and the means of protecting the frame against its contamination, see the articles ABSCESS, § 7. *et seq.*; INFLAMMATION, and SUPPURATION.)

133. (*b*) *Tubercle* especially illustrates several of the pathological inferences stated above relative to the constitutional conditions favouring

the occurrence of many adventitious productions (§ 128.). The history of these formations in the lower animals, and the depressing causes so frequently connected with their appearance in the human subject, would lead me to infer — 1st, That the conditions of life throughout the frame, in tubercular disease, are not merely weakened, but also otherwise modified or perverted, either from original conformation, or from acquired diathesis: 2d, That this state of vital manifestation often obtains in connection with tubercles, without any symptom during life, or appearance after death, that can warrant the conclusion that they originate in inflammatory action: 3d, That they sometimes form under circumstances that would lead to the inference that inflammatory irritation is an energetic, although not a necessary, cause of their appearance: 4th, But, that local irritation, or that local or general inflammatory action, can no more account for their formation, than for the production of any other adventitious secretion, without the concurrence of those conditions of life alluded to above (1st); and that, whilst irritation or vascular action does not necessarily excite tubercles, they may occur without the least evidence of irritation: and, 5th, The general conclusion seems to be that the conditions of life modify or pervert the functions of secretion in those parts of the frame in which they are developed, and this perversion is often attended by vascular injection. (As to their SYMPTOMS, NATURE, and TREATMENT, see the article TUBERCLES.)

134. (*c*) *Glue-like, or gelatiniform matter, or colloid substance.* — Whilst *pus* and *tubercle* are chiefly composed of albumen, with varying proportions of water and salts, this secretion consists principally of gelatine. It is sometimes colourless, but it also occasionally presents shades from a yellow to a pale rose tint. It is without any trace of organisation. It is either infiltrated in the areolæ of the tissues, thereby altering very much their appearances; or it is collected in one or more masses, which slightly condense the surrounding structure. When infiltrated into the cellular tissue, it generally indurates this tissue, and constitutes a variety of scirrhus. M. ANDRAL states, that whether the induration is a true hypertrophy of the cellular fibre, or merely the result of mechanical condensation, the jelly-like substance is always traversed and divided into compartments, by numerous, white, hard, resisting plates, which seem to secrete it. Sometimes these plates pass into the fibrous or cartilaginous state; and red vessels have been observed ramifying on their surface, but have never been traced into this peculiar substance. It has also been found in tumours composed either merely of cellular tissue in a state of hypertrophy and induration, or of a variety of morbid products. It is often contained in serous cysts, which appear to have secreted it. When existing in this last form, it constitutes the tumours or cysts called *melicerous*, from the semblance of their contents to honey. It may thus be secreted in the different tissues in either an infiltrated or an encysted form.

135. (*d*) *Fatty substances* may be secreted in different parts of the system in two forms: 1st, that which is similar in every respect to the fat of the body; and, 2d, that which is in some respect or other different from it. The *first* variety has been noticed under the head of transformed secretions; the *second* differs in appearance from the natural fat. Cysts of various sizes contain, either alone, or with several other organised substances—as bone, hair, fibrous structure, &c.—a matter resembling suet. These cysts are found in several parts of the body, but most frequently in the ovaries. The parenchymatous organs may have their proper tissue atrophied and replaced by a fatty matter, forming the fatty degeneration of modern authors.

136. (*e*) *Melanoid* and other colouring matters have been secreted in almost every part of the body. (For its nature and pathological relations, see the article MELANOSIS.) The *golden yellow tinge*, sometimes observed in spots, or generally diffused, in fœtal bodies and new-born infants, constituting a variety of what has usually been called jaundice of this class of patients, has been ascribed to a peculiar secretion, called *cirronosis* (*κιρρος, yellow*) by Professor LOBSTEIN; but it is probably nothing more than a modification of the colouring principle of the bile secreted under circumstances described above (§ 108.).

137. (*f*) The *saline substances* usually existing in all the fluids of the body are sometimes secreted in uncommon superabundance in various parts. But besides these, others, not generally found in the fluids, are secreted; and are found, 1st, in the reservoirs and excretory ducts, through which the secretions, in which they have been formed, pass out of the system, as in cases of salivary and urinary calculi; 2d, in the cellular tissue and parenchymatous organs, either alone, or combined with other morbid productions; and, 3d, replacing other morbid secretions — tubercles being sometimes succeeded by calcareous concretions, &c.

138. *B. Morbid secretion associated with morbid nutrition, or secretions susceptible of organisation.* — This class of productions, in addition to a small proportion of the constituents of unorganised secretions, contain a large quantity of fibrine. M. ANDRAL supposes that a small portion of this substance, either coagulated in the blood-vessels, or extravasated into or upon the tissues, is the original source whence the organised productions are formed; the fibrinous deposit presenting the appearance of a whitish or reddish mass, of variable consistence, and having a tendency to become organised, although at first possessing neither organisation nor vitality. But I believe that all fibrinous exudations have a certain degree of derived vitality, disposing them to organisation, particularly when they continue in contact with the part that produced them. This pathologist considers, that a portion of fibrine may, when coagulated, indicate its vitality without presenting any blood-vessels or any determinate texture; in which state it may be compared to a zoophyte, which performs a certain grade of vital function, although destitute of a circulating system: and that the fibrinous mass, when impregnated with life, becomes the seat of various organic actions; has a tendency to assume the form of some one of the simple or compound animal textures; performs the functions of secretion; and exhibits the same morbid phenomena, when irritated, as the natural tissues do under similar circumstances. He fur-

ther supposes that several tumours, the origin of which has hitherto been mistaken, may be traced to the solidification of fibrine in the blood-vessels of the part; and adduces cases, from the minute dissection of which, he infers, that many of the adventitious productions usually called *cancerous*, *sarcomatous*, *encephaloid*, and *medullary* are entirely formed in this manner; the minute vessels — arterial, capillary, and venous — being filled with solid fibrine deprived of its colouring matter. It appears, however, much better established, that the *latter* especially of these productions are formed chiefly of coagulated or altered fibrine, thrown out of the blood-vessels owing to their perverted action, and either collected in masses, into which blood-vessels are produced, or infiltrated into the tissue of the part, the vascularity of which is increased along with the alterations that supervene in the adventitious formation and its containing structure.

139. It may be stated of organisable products generally, — 1st, that they seem chiefly to proceed from the secretion or formation, by the morbid state of the vessels, — frequently depending upon a morbid condition of the frame, — of a certain substance very nearly resembling coagulated fibrine deprived of its colouring matter; 2d, that this substance, from participating to a certain extent in the vitality of the structures in which it is lodged, and from the state of organic action in the parts which formed it, has circulating actions and vessels extended to it, and thereby becomes organised, and capable of performing a certain grade of function; 3d, that it is at the same time transformed into tissues, either similar to the natural textures, or entirely different from them, but equally organised and endowed with life. I shall next notice in a very general manner, — 1st, Organisable products arising from sthenic inflammatory action, and not necessarily depending upon a perverted or morbid state of the constitutional powers; and, 2d, Those adventitious productions, which not only originate in some constitutional vice, but which also increase both the local lesion and the vitiation of the circulating fluids and living solids.

140. 1st. *Adventitious structures consequent upon sthenic inflammatory action.* — (*a*) Organisable matter, of a fibrinous or fibro-albuminous nature, is frequently formed on *serous surfaces*, and is generally termed, in its unorganised state, *coagulable lymph*; and in its organised form, *false membranes*, *cellular adhesions*, &c., from its disposition to assume the appearance of serous and cellular tissues. That these adhesions or productions may be absorbed, and almost or altogether disappear, if the constitutional energies continue impaired, is established by the observations of MM. RIBES, DUPUYTREN, VILLERMÉ, and ANDRAL, as well as by my own experience. And I believe, moreover, that they may become more fully developed, and assume progressive alterations, when the vital powers are reduced or perverted. (As to the manner in which they are formed, and their progressive changes, see the articles INFLAMMATION and MEMBRANE.) — (*b*) The fibrinous exudation sometimes formed on the internal surface of the blood-vessels, and obstructing them, and ultimately causing their obliteration, is in most respects similar to that produced on serous surfaces; the chief difference is in its influence in attracting the fibrine of the blood, and in the consequent results. (See ARTERIES and VEINS.) — (*c*) A coagulable matter, more albuminous than that formed on the surface of serous membranes, is sometimes secreted by mucous surfaces. I believe that it is merely a modification of the transformed exhalation noticed above (§ 106.), and proceeding from inflammatory action affecting chiefly the exhaling vessels of the mucous tissue, and transforming the fluid usually given out by these vessels to a fibro-albuminous state; the morbid exhalation concreting in the form of a false membrane upon the inflamed surface, owing to the evaporation or absorption of its watery parts. — Its organisation has been a matter of dispute with French and German pathologists. M. GUERSENT states that he has seen vessels ramifying in the false membranes of croup, and anastomosing with those of the mucous surface. (See CROUP, § 36.; INFLAMMATION, and MEMBRANE.) — (*d*) The internal *surface of serous cysts* may become inflamed and form coagulable lymph, and thereby give rise to further results; — 1. merely to false membranes lining their cavities; 2. to lymph agglutinating their opposite surfaces, and gradually causing the obliteration of their cavities. This latter change often occurs in the cysts formed around coagulated blood, particularly when extravasated in the parenchyma of organs. — (*e*) The adhesion of *divided structures* takes place in consequence of the effusion of coagulable lymph, which becomes organised, and passes from a cellular to a fibrous state, and ultimately becomes identified with the tissues it unites.

141. 2d. *Adventitious productions, depending upon constitutional vice, as well as upon perverted organic action in their seat*, may be divided into two *species* — the *consecutive* and the *primary* — the former commencing in *carcinoma*, the latter appearing at once in the true *cerebriform* or *hæmato-cerebriform* states. The former is the connecting link between carcinoma, or hard cancer, and the cerebriform disease. They both have certain points of resemblance, — secretion and nutrition being perverted in both; adventitious productions, and subsequent destruction of the affected tissues, taking place in both; and both being attended by a perversion of the conditions of life, and an increasing contamination of the circulating fluids and living solids. Their chief points of dissimilarity are referrible especially to the manner in which the *former* originates. It occurs, like the transformations in which it begins, in certain parts or tissues in preference to others, and only at mature or advanced epochs of life; commonly commencing locally, and but rarely simultaneously in different parts of the same tissue, or in different structures and organs, however frequently affecting both the one and the other successively. — The *latter*, or primary, is met with chiefly at the early epochs of life; it attacks any texture or viscus, either simultaneously or successively, and at once appears as a soft, tumefied, spongy, pulpy, or cerebriform structure, or in some one of its modifications (§ 142.).

142. The *consecutive species* only sometimes occurs in the advanced course of scirrho-cancer, which usually commences in certain of the states of morbid nutrition and secretion noticed above,

especially in hypertrophy or condensation of the cellular and allied tissues, with a perverted secretion, and deposition of a firm, grey, semi-transparent substance in its areolæ, and without any specific boundary between it and the healthy structure, in some cases; or with a more distinct demarcation, and a regular or lobular formation, in others; or with the secretion of a purely gelatinous substance in minute masses, or in the areolæ of the tissue (§ 134.); or, lastly, with a uniform infiltration of a more albuminous and lighter coloured matter in the texture of the part, giving rise, respectively, to the different varieties of scirrhus. But these hard, grey, or gelatiniform, or lardaceous alterations, are generally softened, liquefied, ulcerated, or even partially destroyed, and have thereby passed into the carcinomatous state, before the adventitious production makes its appearance in any of the forms about to be noticed. Thus, scirrhus passes into carcinoma, or open cancer; and this latter, in rarer instances, into some one of the varieties which the cerebriform malady presents.

143. The *primary* species is very varied as to its colour, figure, size, and consistence. Some belonging to it have a homogeneous structure, resembling coagulated fibrine deprived of its colouring matter, and are of different degrees of hardness, occasionally approaching to cartilage, and sometimes being almost semi-fluid, or resembling putrefied brain. Others of these productions are composed of substances which are variously constituted; their structure being filamentous, or areolar, or cellular, or both cellular and lobular, generally with numerous canals or cavities containing different kinds of fluids. In all, there is an admixture of solids and fluids in various proportions; the latter being either colourless, resembling serum, or more or less coloured, or altogether fluid blood. This structure may be so arranged, as to constitute either of the varieties of *sarcoma*, especially the *mammary* and *medullary* of ABERNETHY; or it may, owing to its softness, the delicate nature of its vessels, the tendency to hæmorrhagic infiltration, the rapidity of its protrusion through its ulcerated coverings, and to the occasional bleeding from its surface, form the true *fungus hæmatodes* of several modern writers. When it assumes this last appearance, it is more or less coloured, either in parts, or throughout, from the admixture of fluid or coagulated blood, collected into small circumscribed masses, or infiltrated into portions of its tissue. (See HÆMATO-CEREBRIFORM DISEASE.)

144. It may be remarked generally, respecting all the forms of organic change characterised by the deposit of either an unorganisable or organisable substance, that the specific matters entering into their composition have been detected in the lymphatics, in the glands, and in the veins proceeding from the diseased part. Pus, tubercular matter, melanoid matter, cerebriform matter, &c. have all been found in these situations; the consecutive appearances of the disease in other parts being thereby explained, even although — in respect of certain of these maladies especially — it may also occur in more than one part, coetaneously, owing to the diathesis, or general condition of vital manifestation; and previously to the absorption of any portion of the morbid deposition, and to its consequent softening or destruction.

145. *C.* In respect of those *productions which are not only organised, but which possess an independent life*, and which constitute the *Entozoa*, I shall add but little to what I have stated elsewhere. They are found in all animals, either in the cavities, or in the parenchyma of organs: each of them having its special habitation — the *fasciola hepatica* in the liver, the *filiaria* in the cellular tissue, the *strongylus* in the urinary passages, and the *ascaris lumbricoides* in the intestines. They may be divided into three orders; the vesicular, the flat, and the cylindrical. Their organisation varies from a parenchymatous mass, or a cyst containing a limpid fluid, but without appendices, to that provided with one or more appendices, or with an evidently organised head; from this state, to a regularly formed structure, consisting of muscular fibres and an alimentary canal; and, ultimately, thence to a fully developed animal, possessed of sexual organs and the rudiments of nervous and circulating systems. LINNÆUS arranged the *entozoa* into the *intestinal* and the *visceral*. RUDOLPHI divided them into *five* classes, according to their form. CUVIER classed them into two orders; the *parenchymateux*, or those without any alimentary canal, and the *cavitaires*, or those possessing a digestive cavity. This last arrangement will be followed; inasmuch as in the article HYDATIDS will be noticed all those comprised in the *parenchymateux* of Cuvier, and under WORMS those belonging to the *cavitaires*.

146. As to the *origin* of the entozoa, much difference of opinion has existed, chiefly among German, French, and Italian writers. In respect of the first of the classes, viz. hydatids, little doubt can exist; but in respect of those that lodge in the intestinal canal, the case is otherwise. The subject, however, is sufficiently discussed in the articles referred to. But there is one important fact, which holds good in respect of the generation not only of hydatids and worms, but also of all adventitious productions and depositions; and which should not be lost sight of in devising means for their prevention and permanent removal, viz. that whatever depresses the manifestations of life throughout the frame — more especially those of healthy secretion and nutrition — will both favour their developement, and their increase or extension. These morbid formations may be even produced at will, by whatever lowers the vital energies; — by cold, moisture, unwholesome air and food; by a watery, vegetable, or impoverished diet; by the depressing passions; by exclusion of light or sunshine, &c.; — and not only may they occur singly under these circumstances, but they may also be complicated with various other maladies, of a constitutional or local kind, the nature of which may be thereby so far modified as to require a different treatment from what would be required in ordinary cases. Thus, complications of fever or of visceral inflammations with intestinal worms, are often the ultimate effects of long-neglected states of debility, and require less lowering measures than under other or usual circumstances, as well as differently appropriated remedies. Are we to suppose that, whilst the human œconomy is under the influence of the depressing causes

noticed above, the organic molecules are thereby prevented from being so perfectly assimilated, or so highly animalised, and indeed vitalised, as in health; and that, the vital attraction requisite to due nutrition being weakly or insufficiently exerted, they proceed to arrange themselves, according to the grade of vitality they possess, into much inferior beings in the scale of creation?

147. vi. Of Destruction of organised Parts.—This may take place in three ways: — 1st. By interstitial absorption, by means of which the part is first *atrophied*, and afterwards altogether removed; — 2d. By superficial absorption, or *ulceration*, which may be consequent on inflammation, or may proceed from the pressure of adjoining parts, and from loss of vital cohesion in circumscribed portions of membranes or superficial tissues; — 3d. By *mortification*, owing to intense grades of inflammation, either absolutely or relatively to the state of local or general vital energy, — to a destruction of the nervous influence of the part, — to interruption of the circulation from disease of the vessels, — to pressure impeding both nervous power and vascular action, — and to generally depressed vital power, associated frequently with a morbid condition of the blood, and sometimes with diseased blood-vessels, or with external pressure: hence the readiness of the occurrence of any of the forms of mortification in old age, during dynamic and exanthematous fevers, from erysipelas, from deficient or unwholesome food, and from syphilis or mercurial cachexy; — and 4th. By the softening and swelling arising from the greatly diminished or lost vital cohesion of cellular and adipose parts, and their infiltration with a serous fluid (comprising the *Noma*, or *watery cancer*, of authors) giving rise to a form of disorganisation different from the foregoing, that often passes rapidly into a state of jelly-like solution and gangrenous erosion, particularly in the lips, cheeks, and genitals of children. A similar destruction sometimes also takes place in the stomach; and the true softening of the brain, in its extreme states, seems to be of the same nature. This species of disorganisation is intermediate between ulceration and gangrene. (See Atrophy, Cellular Tissue, Gangrene, Softening, and Ulceration.)

148. V. Connection of Morbid Actions and of Organic Lesions with States of the Blood.— Depressed and perverted states of vital power have been shown to be often connected with a deficiency or vitiated state of the circulating fluid, in chronic and cachectic diseases, and with excrementitious plethora, or the accumulation of the constituents of the various secretions in the blood in the early and advanced stages of fevers. (See Blood, and Debility.) Primary excitement, in either its local or general forms, is often caused, or at least favoured, by *vascular plethora*; and reaction, or secondary excitement, with local determinations or inflammatory action, is frequently produced by this condition, existing either absolutely or relatively, or associated with the accumulation in the blood of the constituents of the secretions and excretions, owing to the interruption of these functions, as in the stage of reaction in fevers (§ 85.).

149. The connection of the *lesions of secretion* with the states of the *circulation* is one of the most important topics in pathology, and has therefore been noticed in this (§ 95. *et seq.*) and other articles. The superabundance and transformations of one or two of the natural secretions are sometimes owing to the alteration, interruption, or suppression of others, — to the derangement of the balance of healthy action, and to the consequent plethora or vitiation of the circulating mass. Thus, morbid states of the cutaneous or of the intestinal secretions are often caused by inactive function of the kidneys or liver; and alterations of the urine, or of the bile, are frequently produced by suppression of the perspiration, or of the secretions from mucous surfaces. Morbid increase of the exhalations, particularly those poured into serous cavities, or into the areolæ of cellular parts, is, in many instances, connected with *general plethora*, as well as with *local congestions*, and deficient excretion; whilst the transition of congestions into inflammations, and the transformation of these exhalations into a fibrinous or fibro-albuminous substance, by sthenic inflammatory action, are promoted by the abundance of this constituent in the blood, and the general exuberance of this fluid. When the recrementitious secretions are imperfectly elaborated, owing to depressed vital power, the functions of chylifaction, sanguifaction, nutrition, and depuration are also impeded; the usual results being insufficient excretion, an impure state of the blood, and ultimately slow irritative fever, marasmus, anæmia, and other chronic diseases. In such cases the morbid phenomena proceed in a circle, or rather act and react upon each other, either until vascular excitement is produced by the state of the circulating fluid, and the secreting and excreting functions are thereby restored, as shown in the article Crisis (§ 15.), or until some organic change supervenes. If we attempt to trace the procession of morbid actions, we shall often find that depressed vital power affects the secretions subservient to sanguifaction; these modify the quality, and ultimately the quantity, of the blood; the altered condition of this fluid disorders the vascular actions and depurating functions, whilst it further deranges the nutritious secretions; and thus the evil continues to increase until the living solids become changed, and incapable of performing their prescribed actions.

150. In connection with the various *lesions of nutrition* which have been brought into view, the blood can seldom long retain its healthy state. But the change is evidently, in the first instance, that of quality rather than of quantity, although it is very difficult to show in what respect the quality is modified. Excessive excretion and discharge will often, however, sensibly diminish the quantity of this fluid before any other change either in it or in the functions of nutrition becomes apparent. Local alterations of secretion and nutrition conjoined, whether originating in the organic nervous influence of the part, or in the quality of the blood circulating through it, ultimately change both the one and the other, and generally in a way that cannot be mistaken. In many instances the alteration of the blood is evidently owing to the absorption of the molecules which had been deposited, secreted, or combined in the morbid structure, and removed in the usual course of that transition of the solids into fluids, which obtains in the living economy, equally with the transition of fluids into solids. Animal

organisation is the complement of a process of combination and decomposition, — of attraction from, and dissolution into, the blood, of the constituents of the various tissues composing it; and if, in the former part of the process, the elements form heterogeneous productions, the dissolution of these productions, and commixture of their molecules in the blood, must necessarily vitiate both it and the structures through which it circulates. Accordingly we find, even in fevers, that the rapid absorption of a large portion of the molecules of the simpler or primitive tissues alters the circulating fluid often in a very evident manner; diminishes the density, cohesion, and bulk of many of the soft solids; and changes, at the same time, the colour, and other sensible properties, of both fluids and solids, to a remarkable extent. But as this resolution of a portion of the constituents of the textures into the fluid state, in fevers, generally takes place without any pre-existing adventitious formation or malignant production, the absorbed materials admit of removal by the emunctories without permanently contaminating the frame, or being deposited in various tissues or organs, and thereby increasing and extending the mischief.

151. In case of *chronic alterations of secretion and nutrition*, giving rise to various adventitious productions, whether local, constitutional, or malignant, the dissolution of the molecules that must necessarily take place (conformably with the law of organisation stated above (§ 150.), if they be organised; and owing to the irritation of the surrounding tissues, and consequent secretion of a fluid matter which dissolves them, and prepares them for absorption, if they be concrete and unorganised), and the passage of these molecules into the blood, will first vitiate it, and next diminish its quantity; at the same time that such of the molecules as are not quickly discharged by the emunctories from the circulation, will be deposited in other parts of the frame, forming consecutive productions of a similar nature. The consequences, therefore, of various local alterations of secretion and nutrition — as of pus, tubercle, carcinoma, &c. — will be, — 1st, As respects the *absorbent system* — (*a*) the presence of a portion of the molecules of these productions in the absorbents proceeding from the parts in which they are formed; (*b*) irritation of these vessels, excited by the morbid molecules, especially where they ramify and reunite in the glands; (*c*) the accumulation of the morbid matter in the absorbents, or its deposition in the glands themselves: 2d, As regards the *blood* and *vascular system* — (*a*) the passage of the morbid molecules into this fluid, either directly by the veins, or more circuitously by the absorbents, or by both channels; (*b*) the contamination of this fluid; (*c*) consequent irritation or inflammation of the blood-vessels; (*d*) an imperfectly assimilated or deficient quantity of blood, owing to disorder of the recrementitious secretions, and of the functions of chylifaction and sanguifaction: and, 3d, As respects *the soft solids* — (*a*) the deposition of the morbid molecules in the areolæ of the cellular tissue, or the infiltration of them into parenchymatous organs; (*b*) their secretion on the surface of serous membranes, or shut cavities, as those of the joints or bursæ; (*c*) their excretion on the mucous and cutaneous surfaces, with inflammation, softening, ulceration, &c. of these surfaces, or of their follicles; (*d*) their excretion by glandular organs, either with or without inflammation and disorganisation of those organs.

152. VI. Of the Procession of Morbid Phenomena. — i. *The Stages of Diseases* have been variously divided by pathologists. Some writers admit only three periods, viz. the *increase*, the *acmé*, and the *decline*; whilst others enumerate five, six, or even seven. The three stages now mentioned are sufficient to distinguish the principal changes of disease generally; but in respect of febrile diseases*, they may be subdivided with advantage. *A*. The *first* or incremental stage consists of — (*a*) the *precursory period*, or the time that elapses from the impression of the exciting cause until the disease forms, or manifests itself in an evident manner. The characteristics of this period are generally languor, a diminution of the usual physical and mental energy, a weak or slow pulse, or irregular accelerations of pulse, slight chills, alternating with flushings or heat of skin; change in the countenance; and weakened power of the digestive, secreting, and excreting functions. In many instances, little or no complaint is made; or, at most, only a slight *malaise*, or indefinite feeling of indisposition, indicative of depression of the vital energies. This period is of very variable duration — from a few hours to two or three weeks — and is the same with the "*stadium opportunitatis*" of Hildenbrand, the "*latent period*" of Dr. Marsh, and the period of "*incubation*" of the French pathologists. — (*b*) The *formative period*, or that of *manifest invasion*, comprises the time from which the commencement of the disease is usually reckoned, and critical evacuations expected. It is frequently attended by convulsions in young children; by syncope in females; and by chills, rigors, sickness or vomiting, pain, &c. in all classes of patients. These symptoms are generally accompanied by others, having a more especial reference to the nature of the disease which they usher in: as by aching pains in the head, loins, and limbs, in fevers; by acute pain and difficulty of breathing, in pleuritis; by vomiting, constipation, and pains about the umbilicus, in enteritis, &c.; and seldom continue longer than some hours. — (*c*) The period of *developed excitement*, or of *reaction*, or — if this pathological condition is not prominent — of aggravation of the chief symptoms: in which the pulse becomes quicker, fuller, and harder than in the former periods; the functions of digestion, assimilation, secretion, and excretion more or less impeded; the animal temperature and thirst commonly increased; and the tongue coated, &c. This period may continue only a few hours; or be prolonged to as many days, or even weeks, in sub-acute or local diseases. The whole duration of this stage is extremely various; but is usually much shorter in febrile than in local and organic diseases. — *B*. The *second stage*, or the acmé, consists — (*a*) of the period of *stationary reaction*, in which the symptoms, having reached their height, remain in this state

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* This division of the periods of fevers, and an abstract of my opinions of their pathology, taken from my Lectures delivered from 1824 to 1829, was published in the *London Medical Repository* for Sept. 1827, p. 238. I state this, as similar views have been promulgated by others *subsequently* to this last date.

for an indefinite time — varying from a few hours to several days, weeks, or, in local maladies, even to some months — presenting slight modifications and vacillations, tending either to a favourable or unfavourable termination. — (*b*) Of the period of *crisis*, in which new phenomena appear, indicating either a salutary or fatal issue. The whole duration of this stage is, in febrile diseases, generally shorter than that of the first; but there are numerous exceptions to this rule.—*C*. The *third stage*, or that of DECLINE, consists — (*a*) of the *period of decrement*, or *exhaustion*, in which the symptoms subside more or less rapidly, and the vital organs begin to resume their functions, in favourable cases; or the energies of life to sink, in those of an opposite tendency. — (*b*) Of the period of *convalescence*, in which the remaining traces and consequences of the malady disappear, and the vital and animal functions regain their healthy condition and balance.

153. There may be some doubts of the propriety of adopting certain of the above subdivisions, as they are chiefly applicable to febrile diseases; but they likewise obtain in some other maladies. In those in which they are less remarkable — namely, in organic diseases — any division into stages can seldom be adopted with advantage, or be made otherwise than in an arbitrary manner. In these maladies, and, indeed, in some others, the second or formative period of the first stage may not be manifest; nor the second, or critical period of the second stage; and many may question the propriety of making *convalescence* a period of the disease. But I believe, that, during the restoration of the various functions, there still remain certain pathological states or degrees of disorder, requiring the attention of the practitioner; and, in many instances, a marked tendency to relapse upon exposure to the exciting causes of the malady. For pathological reasons, therefore, as well as on account of the future health of the patient, convalescence should be always treated as a period of disease.

154. ii. *Grades of Action*. — The terms *active* and *passive* have been much employed in pathology, and often without regard to precision. They should have reference only to the kind of vital action characterising disease, and not to its duration; with which, however, they have been too frequently confounded. Thus the term active has been often employed synonymously with acute, and passive with chronic. But, although an active disease is generally acute, it is not so always or necessarily, and may even be of a chronic duration; whilst the most passive maladies, as respects the grade of vital action, may be most acute with reference to their continuance. It should never be overlooked, in our appreciation of pathological conditions, that medical terms are only conventional or arbitrary signs, employed, often too indefinitely, to convey our ideas of certain ever-varying conditions of vital manifestation and organic change; and that, in using the words active and passive, we should restrict them entirely to the expression of grades of vital action, and view them as possessing an arbitrary as well as a relative import, inasmuch as there is every intermediate degree between the most active and the most passive states of disease.

155. iii. *Of the Type or Form of Disease*. — The *type* is the order of succession observed to obtain among certain morbid phenomena; and admits of modification from various causes, without the intrinsic nature of the phenomena being essentially affected. It has commonly been divided into the *periodic* and the *continued;* the former being subdivided into several specific forms. —*A*. *Of the periodic type, and the periodicity of morbid actions*. —The intermissions or remissions of morbid phenomena, and their return or exacerbations after regular or nearly regular periods, constitute their periodicity; and are characteristic features of a number of diseases. These features are, however, more or less modified and marked in certain maladies than in others, in respect both to the paroxysms or accessions of morbid action, and to the intervals which separate them; and hence periodic maladies admit of various modes of arrangement, of which, however, that into the *febrile* and *non-febrile* (*pyrexial* and *apyrexial*) seems to be the preferable. The former are characterised by the regular stages of febrile action which the paroxysm presents in most instances, and the definite duration of the intervals or remissions: the latter are remarkable for the suddenness of attack, and their evident dependence upon, and affection of, the nervous system; as well as for the less regularity of their intervals. Of the various modifications, which these two classes of disease present, sufficient notice has been taken in the articles on FEVERS, and on the nervous disorders which possess this feature, especially ASTHMA, EPILEPSY, HYSTERIA, and NEURALGIC AFFECTIONS.

156. The *cause* of the periodicity of many diseases has never been satisfactorily assigned. Some have imputed it to the daily alternation of the erect and supine postures; others to the action of light, or, in other words, to solar influence. There is a certain tendency to periodicity in almost all diseases, in which the nervous functions are more or less affected, and even in convalescence: the remissions being often scarcely perceptible, and the exacerbations generally assuming the tertian type. The periodicity of morbid actions cannot be explained otherwise than by referring it to a law of the animal economy; and, as those maladies, in which the nervous systems are primarily and chiefly affected, are most remarkably periodic, we may infer that it is especially dependent on these systems. This law obtains to a certain extent in health, as respects the performance of many of the vital functions; its existence in disease, in a more evident or modified form, should not therefore be a matter of surprise, particularly when the functions of those systems on which it is more immediately dependent are principally affected. It is most distinct, and the intervals most complete, in maladies consisting especially of disturbance of the organic and cerebro-spinal functions, and in those in which the excretions are not much impeded, and the blood consequently not materially altered from the healthy state, or where the other causes to which the continued type is attributed (§ 157.) do not exist.

157. *B*. *The continued type* consists of an uninterrupted succession of the morbid phenomena, from the irruption of the disease to its termination. Some maladies present a nearly regular intensity during their course, and have therefore been called

by the older writers "*morbi continentes.*" Others evince slight morning remissions, with exacerbations in the afternoon or towards evening: others, in addition to these, experience some degree of exasperation on certain, most frequently on alternate, days; and others, as some kinds of fever, assume at first a remittent form, but soon become continued, and at last again slightly remittent during convalescence. Even the more strictly continued febrile diseases evince a remitting or periodic type, in some degree, during decline or early convalescence. It would seem that a marked tendency to periodicity exists in all diseases, and that the continued type is imposed — (*a*) by a high degree of inflammatory action; (*b*) by impeded or interrupted secretion and excretion, and consequent alteration of the quality and quantity of the circulating fluid. Thence it may be inferred, that the type will be the more evidently continued, the greater the pathological states to which I have chiefly imputed it; and that, as in respect of other medical terms, *continued* or *periodic* are usually employed in an arbitrary manner,— the one type passing into the other, the regularly periodic and the continued forming the extremes of the scale, between which there is every grade, ascending from the former, or regularly intermittent, through the less perfect and the remittent, until the continued is reached.

158. iv. *Of the Duration of Morbid Actions.*— The period intervening between the actual irruption and the termination of disease is of very various length. Hæmorrhages sometimes continue only a few minutes, cholera a few hours, whilst asthma, rheumatism, and gout, may remain the greater part of life. Some maladies, originating in infection, have a specific duration, as small-pox, measles, typhus, &c. If we calculate from the time when the exciting cause made its impression, many diseases, whose length often appears definite, will present a much less uniform character. Thus, in plague and other pestilential maladies, the effluvium from the sick has sensibly affected the healthy, and terminated existence in a few hours from its impression, whilst other persons have not been seized by the fully formed malady until many days after exposure to its cause. Marsh miasmata have, in some instances, not produced ague until several weeks after their impression was made on the frame; and the rabid virus has sometimes not occasioned its dreadful effects until many months after its inoculation. If we comprise the time that elapses from the first manifestation of functional disorder, to its termination from fatal organic lesion, the duration of numerous diseases will not infrequently form no mean portion of the usually allotted period of existence. Some maladies of a slight and febrile kind, depending upon disturbance of the stomach or bowels, occasionally subside in a few hours, or in a day or two, and from this circumstance have been called *ephemeral.*

159. *A.* The *terms acute and chronic* are very arbitrarily employed to designate the duration of morbid actions; and, owing to the circumstances of their being often used as general but loose characteristics of disease, they have been mistaken by the inexperienced as indicating the existence of two forms, between which there is none intermediate. To this misconception medical writings have contributed, chiefly by describing merely these two conditions as simple and unvarying forms, instead of considering them as arbitrary signs employed to indicate the more extreme states, in respect of duration, between which there may exist every intermediate degree. Many employ these terms, to express not only the duration of morbid action, but also its grade or intensity. Of this little need be complained, if the meaning attached to the words be previously assigned. Numerous writers, impressed with the vague manner in which these appellations have been used, have endeavoured to give them a greater degree of precision by adjoining qualifying epithets to them. — (*a*) Diseases have been generally viewed as *acute,* when they are not prolonged beyond forty days; some writers subdividing those thus characterised, into the "*most acute,*" when they terminate in three or four days, — into the "*very acute,*" when they do not continue longer than seven days, — into the "*simply acute,*" when they endure for fourteen days, — and into the "*sub-acute,*" when they reach forty days. — (*b*) Maladies which are prolonged beyond the last term have been usually designated *chronic;* but they hardly admit of a similar subdivision to the above, their duration being indefinitely prolonged. The subdivision of them into *functional* and *organic,* if the distinction could be made during life, would be of practical importance; but, although it might be made in diseases of some organs, it cannot so readily in respect of others: besides, most chronic ailments are first functional, and so gradually and imperceptibly run into organic change, that no line of demarcation can be drawn between the two states.

160. VII. Of the Terminations of Disease.— Morbid actions end ultimately in two ways: 1st, In health; 2d, Death. But before terminating in either, they may assume other forms, or altogether distinct characters; giving rise to what may be called the succession, the transition or conversion, and the metastasis of disease. — *A. The return to health* consists in the restoration of all the functions. It takes place in ways peculiar to the nature of the malady, and consequently in very diversified modes. — (*a*) In *local diseases,* and in those simple pathological states consisting of debility, excitement, exhaustion, &c., the terminations in health are the most direct. Nervous affections and hæmorrhages commonly end by the mere cessation of the phenomena of which they consist; and a similar occurrence obtains in respect of simple congestions and various functional complaints, as jaundice, disorders of the stomach and bowels, &c. In the restoration, however, of inflammations to the healthy state, the changes are more numerous, the various phenomena of which this lesion is composed either disappearing in succession and gradually, that is, in *resolution;* or giving rise to other alterations of a more or less serious or disorganising kind; and these to new secretions and states of nutrition, as purulent collections, ulceration, sphacelation, and ultimately to the productions of coagulable lymph, granulations, and cicatrisation. — (*b*) In *febrile* and *constitutional* maladies, the return to health is generally the result of a series of changes in the economy, however rapidly it may take place; and is usually characterised, *first,* by the subsidence or

exhaustion of the morbid state constituting the chief pathological condition, and, *second*, by the restoration of the secreting and excreting functions, the interruption of which constituted one of the chief features of disease. (See Crisis.) — (*c*) In *organic lesions*, the restoration of the health is less frequently effected, either by nature or by art, than in the preceding classes of disease, and is usually the result of modifications of the secretions and nutrition of the part different from those in which the organic alterations originated. Consequently the return to the natural structure is generally slowly, and often only partially, accomplished, — is always aided by a due manifestation of the vital energies and performance of the secreting and excreting functions, — and is frequently favoured by irritation of, and derivation to, some remote tissue or viscus, occurring spontaneously or excited by art.

161. In all diseases, the restoration to health is as much owing to the vital energy, as to subsidence of the particular morbid actions which constitute them. Thus, acute or sub-acute inflammations occasion various changes of structure; yet the mere disappearance of the inflammation does not constitute the return to health. The organic lesions still continue; but these are ultimately removed in the course of that constant process of attraction from, and dissolution into, the blood, of the special molecules of the tissues. Secretion and nutrition have been shown to be not the mere deposition of organic particles, but a constant circulation of these particles from the blood into various fluid and solid forms, and back again into the blood, after having retained these forms for a longer or shorter period: and, as the organic molecules are identified with the various structures, in virtue of the vital influence and attraction which actuate these structures, it follows that the more this influence is exerted, the more will nutrition be perfected, and any aberration from the healthy form avoided and restored. Consequently, in the course of this process, the natural type of formation will be preserved, and any morbid production be removed. — (*a*) Various phenomena (*critical changes*) of a very marked character indicate the termination of acute diseases in health; and have received, from their importance, the attention of physicians. (See Crisis.) — (*b*) As the functions become re-established and the pathognomonic symptoms subside, and at last disappear, so the decline of disease passes into *convalescence*, in which, at first, more or less of the phenomena constituting the disorder, and of debility, not merely of the organ chiefly affected, but also of the rest of the frame, still remain; the functional or the organic lesion gradually disappearing as the manifestations of life throughout the system become more and more developed, or attain their healthy state and balance. (See Debility, § 43.)

162. *B.* The *termination in death* takes place in various ways, both in *acute* and *chronic* diseases. It may occur in the *former* more or less suddenly — (*a*) from rapid sinking of the vital powers, as in adynamic fevers; (*b*) or from fatal hæmorrhage before exhaustion has reached its utmost, as in some diseases of the lungs and digestive canal; (*c*) or from pressure on, or interrupted circulation through, the brain, accompanied with convulsions, or coma, or with both, as in various diseases of this organ; (*d*) or from profound or prolonged syncope and sudden cessation of the heart's action, as upon quickly assuming or retaining the erect posture in states of exhaustion; (*e*) or lastly, from *asphyxy*, as pointed out in that article. Death may also occur much more slowly in acute maladies, owing to the gradual sinking and abolition of the vital manifestations; giving rise to the collapsed countenance, the frequent, weak, and unequal pulse and respiration; the loss of animal heat, and cold clammy perspirations, the resolution of the sphincters, and insensibility, the cadaverous smell, &c. observed some hours previously to, and ushering in, dissolution. In some *chronic* maladies, death often occurs suddenly, as in organic diseases of the heart, large blood-vessels and lungs, owing to effusion into the pericardium, interruption of the heart's contractions, to rupture of its cavities or valves, to bursting of aneurisms or profuse hæmorrhages, to suffocation from effusion into the bronchi, or into the pleural cavities, &c. More frequently, however, death takes place slowly in this class of maladies; and is chiefly owing to the exhaustion of the vital energies, or to the disorganisation of some important part, and the interruption of a vital function, disordering and ultimately obstructing others; as when fluid is slowly effused in any of the large cavities.

162. VIII. Of the Relations, Successions, and Complications of Disease. — *A.* The relations of disease are not easily explained in many instances; in others, however, they are more obvious. It cannot be shown wherefore a state of erethism, or inflammatory irritation of the digestive mucous surface, should frequently co-exist with acute or chronic eruptions on the skin otherwise than by supposing that the state of the circulating fluid is such as to excite or irritate the vascular reticulations of both the skin and villous membrane; and, although this fluid may be in excessive quantity in the majority of such cases, yet quantity merely will not account for the phenomena, without calling into aid an alteration of quality; which, while it excites the digestive mucous surface, also inflames the cutaneous vessels, during the depurating process they exert upon the blood. But the state of this fluid will not explain all the relations of complicated morbid actions. The reciprocative influence of the organic nervous and cerebro-spinal systems, and of the former and the vascular systems, must be considered as the earliest and chief sources of morbid associations. When the dependence of vascular action and of the secreting and excreting functions on the organic nerves, — of the conditions of the circulating fluid on the states of these functions, — and of the cerebro-spinal manifestations on both the organic nervous and vascular systems — on the strictly organic actions, — is duly considered, the relation and succession of several morbid conditions will appear as necessary results of this union. When we perceive the processes of digestion, secretion, and defecation imperfectly performed — processes essentially dependent upon the organic nervous influence — should we be surprised to observe further disorder supervene? and are we not rather to expect morbid phenomena to present themselves, referrible to the vascular system, to the circulating fluid, to the nutritive functions, and to the purely animal manifestations? When important eliminating processes are either impeded or increased

to such a degree as to constitute disorder, ought not other states of disease to be looked for? When the urinary secretion is interrupted, excrementitious vascular plethora, followed by a morbid increase of the exhalations, dropsy, congestion or effusion on the brain, convulsions, coma, &c. will necessarily follow. When this excretion is morbidly increased, the other secretions will be diminished, and assimilation and nutrition impeded. When the menstrual discharge is delayed or suppressed from torpor of the generative organs, an important depurating function is not performed, the co-existent debility of all the organic actions is thereby increased, the cerebro-spinal functions are weakened; ultimately assimilation and nutrition are reduced to the lowest grade, and anæmia and marasmus supervene. But when this discharge is copious and frequent, owing to increased action or excitement of these organs, the blood is purged of its impurities, all the organic functions assume a proportionate activity, and the cerebro-spinal system evinces augmented susceptibility and excitability: sanguifaction and frequently nutrition proceed rapidly; and vascular plethora, with a tendency to local determinations, to inflammations, to hysteria, to convulsions, &c., is the consequence, particularly upon any interruption of the discharge.

164. *B.* Also, when morbidly increased secretions have become habitual, other and more important diseases may succeed any interruption they experience. An habitual diarrhœa, when suppressed, may be followed by peritonitis or ascites; an old bronchorrhœa, or chronic bronchitis, may, when arrested, be succeeded by hydrothorax; leucorrhœa, or menorrhagia, if injudiciously treated, may pass into inflammation of the womb, or of the peritoneum, and even into ascites. In these the succession of morbid actions admit of ready explanations; for these morbid secretions or discharges being generally the result of local determination and plethora, their interruption or suppression merely changes their direction from a surface, whence they were evacuated, and where they, consequently, were comparatively innocuous, either to the substance or to the surface of the organ or part affected, where their retention and accumulation occasion dangerous or fatal effects.

165. *C.* Whilst the mutual dependence — the reciprocative influence — of the different systems and functions of the frame, explains the relations and successions of diseases, it also accounts for their *complications*, and for the comparative infrequency in practice of those simple or specific forms or states of morbid action described by nosologists. Indeed, when we reflect on the intimate manner in which the various parts of our frame are anatomically related and functionally dependent, we should rather be surprised to find disease so simple as it often is, and be prepared to observe not only associated lesions of structure and disorders of function, but also the one variously complicated with the other. There are numerous circumstances which favour the complication of disease. Amongst these the following are the most important: — 1st. Constitution and diathesis, — as the scrofulous, the rheumatic, the gouty, the plethoric, and the debilitated; — 2d. The nature of the predisposing and exciting causes, viz. those which act upon the organisation generally, as impure air, unwholesome food, &c.; — 3d. The state of the secretions and excretions, particularly the vitiation or interruption of them; — 4th. Vascular plethora, anæmia, and a morbid state of the blood; — 5th. The disposition of membranous or continuous parts to experience an extension of morbid action, particularly when vital resistance is weak, and the excretions unnatural or interrupted; — 6th. The influence of irritation of a part upon remote organs, through the medium of either the organic or cerebro-spinal nervous systems; — and, 7th. Injudicious treatment. It would be inconsistent with my limits, were it possible, even to enumerate the complications which result from these and other causes; but there are certain *illustrations* required to show the truly practical importance of this branch of pathology.

166. (*a*) Tubercular productions in the viscera, or in the membranes, often co-exist with disease of the absorbent vessels and glands. Rheumatism and gout not merely modify the character of other diseases, but may seize on a number of parts successively, and even on several simultaneously, whilst they are very often associated with a torpid state of the liver and bowels, and disorder of the stomach and urinary organs. A plethoric state of the vascular system, whether absolute or relative, associates congestions of internal viscera with various disorders of secretion and excretion; with affections of the nervous system, and of the female generative organs, and sometimes with eruptions on the skin. Debility disposes to the extension of inflammatory action to continuous or contiguous parts, and associates disorders of the digestive and assimilating viscera with those of the nervous system and sexual organs; and thus examples of the *succession and complication of disease from diathesis and constitution* (§ 165, 1st.) are constantly appearing in practice.

167. (*b*) Extremes of temperature, and humidity, and impure air often seriously affect more than one organ. A warm and impure air frequently produces, either successively or simultaneously, not only functional but also structural disease of the liver, spleen, and bowels, as well as fevers in which these viscera and the stomach are principally affected. Unwholesome food contaminates the chyle, the circulating and secreted fluids, and ultimately occasions co-existent disease of several viscera, — the *complication of causation* (§ 165, 2d.).

168. (*c*) A vitiated, copious, or interrupted state of one or more secretions not only affects the organs which produce them, and the viscera to whose functions they are either directly or indirectly subservient, but also vicariously influences other secretions, and changes their quantity or quality. A copious flow of acrid bile may complicate disease of the liver with inflammation of the mucous surface of both the stomach and the intestines, particularly of the latter; and functional disorders, or inflammations, or structural change of the kidneys, may so alter the conditions of the urine and blood as to associate with them either renal and vesical calculi, or inflammation and structural disease of the urinary bladder, or dropsy of one or more of the shut cavities, and of the cellular tissue. Also, interrupted discharge of the secretions, particularly of those that are excrementitious, from disease of their outlets, not

infrequently occasions consecutive changes in the organs which elaborate or retain them. Obstructions to the due evacuations of the urine, from obstacles existing either in the urethra, or about the neck of the bladder, or in the ureters, superinduce alterations of the kidneys, or of the bladder itself; and disease of the biliary ducts commonly associates with it lesions of both the gall-bladder and liver, and of the digestive canal; furnishing examples of *superinduced complications* (§ 165, 3d.).

169. (*d*) Changes in the quantity and quality of the circulating fluid, especially when carried far from the healthy state, although usually the consequences of disorder of one or more of the secreting and assimilating viscera, yet become the causes of co-existent disease of several organs and structures, modifying their interstitial secretions, their nutrition, and their vital cohesion and manifestations; the whole organisation generally presenting more or less of change. These complicated effects may assume varied forms, and implicate particular organs in a more remarkable manner than the others, according as either plethora or anæmia may be associated with the accumulation of excrementitious matters in the blood, or as the quantity and nature of these matters may vary — thereby causing diversified *humoral complications* (§ 165, 4th.).

170. (*e*)—α. When we advert to the circumstance of disease essentially the same having different symptoms, and producing varied effects, merely in consequence of a slight difference in its seat, one reason for the frequency of what should be called rather the extension or succession of disease, than its complication, will be apparent. Thus, when inflammation of the fauces extends down the trachea and bronchi, there may be either a succession of disease, if the inflammation disappears from the former seat as it extends to the latter; or a complication, if it exist at the same time in all; and yet the nature of the morbid action is essentially the same, as long as the vital energies remain unaltered. When inflammation extends along the digestive mucous surface, or to distinct parts of it only, a similar succession or complication, but without difference of the nature of the disease, also obtains. These are instances of the *succession* or *complication of continuity*. — β. But disease may extend from one tissue to another, instead of being thus limited to the same, as in the above instances; — it may originate in a membranous surface, and involve the substance or parenchyma of an organ, and ultimately even its opposite and differently organised surface, and either disappear from the former upon affecting the latter, or implicate them all simultaneously, thereby giving rise to a succession or complication of morbid actions, without altering their characters, although materially changing their symptoms. Thus, bronchitis may pass into pneumonia, and this latter into pleuritis, or they may all co-exist; and inflammation of a part of the digestive mucous surface may be extended to the cellular tissue connecting the coats of the alimentary tube, and thence to the peritoneum; and so on in respect of other organs, which, equally with these, not infrequently furnish examples of the *succession* or *complication of contiguity* (§ 165, 5th.).

171. (*f*) Irritation and other disorders of an organ or part not infrequently associate with them a morbid condition of remote as well as adjoining parts. Worms in the intestinal canal often induce either febrile or convulsive affections, Congestion, inflammatory irritation, erethism, or merely functional excitement of the female organs, may occasion epilepsy, irregular or anomalous forms of convulsions, hysteria, altered sensibility of the nerves — referred by some writers to irritation of the spinal chord—vitiated appetite, and disordered manifestations of mind. Injury of a tendon or nerve may produce tetanus; and the accumulation of fæcal matters in the large bowels may excite, and be complicated with, various disorders of the stomach, inflammation and ulceration of the fauces and pharynx, febrile disturbance, hæmorrhoids, numerous nervous ailments, and disorders of the uterus. These may be termed the *sympathetic associations or complications of disease.*

171. (*g*) That injudicious treatment often complicates disease, may not be so readily admitted as the circumstances now adverted to. But I can state, as the result of observation, that lowering measures carried too far will occasionally favour the extension of disordered action and structural change, either by continuity or contiguity (§ 170.), or by promoting the function of absorption, and the passage of morbid matters into the blood (§ 169.); and that stimulating remedies used too freely will, either by their operation on secreting organs and surfaces, or by irritating the parts to which they are applied, sometimes superinduce inflammatory action in addition to the disease which they were intended to remove. Thus, arsenic exhibited too freely, in order to cure agues, has produced inflammation of the internal surface of the heart and arteries; and bark or quinine, given freely before morbid secretions and fæcal matters have been carried off by purgatives, has superinduced hepatitis or dysentery, or both, upon the intermittent disease for which it was prescribed. Stimulants and tonics taken in some forms of dyspepsia, as complicated functional or structural disease of the stomach, liver, and bowels; and astringents imprudently employed, have excited inflammation in the organ whence the discharge, for which they were exhibited, proceeded, as well as disease in some related organ.

172. IX. Of the Metastasis of Disease. — *Metastasis* (*μετάστασις*, a change, migration, from *μεθιστημι*, I change, or transfer) of disease has been often improperly confounded with the terms *Metaptosis*, *Epigenesis*, *Diadoxis*, and *Metaschematismus*, which have had different meanings attached to them. *Metaptosis* has usually been used to mean a change in the nature or state of a disease, without a change in its seat; — *Epigenesis*, the superinduction of another, upon an antecedent, disease; the anterior affection not being ameliorated by the occurrence; — *Diadoxis*, the succession of a less, to a more, important malady; — *Metaschematismus*, the transformation of disease simply; — and *Metastasis*, the displacement or disappearance of disease from one part of the frame, and its seizure of another of more vital importance. It will be perceived, that the phenomena which these terms have been employed to express, have been already noticed, excepting those which fall under the last. When rheumatism or gout disappears from a joint and attacks the head, heart, or stomach; or when erysipelas, or any febrile or chronic eruption, forsakes the surface and is fol-

lowed by angina, or pneumonia, or internal abscess, or inflammation of the alimentary canal, or peritonitis; there is a metastasis, or change of the seat, of the disease.

173. *A*. There are certain topics connected with this subject, which have been much discussed, viz. Whether the disappearance of disease from its original seat is the consequence, or the cause, of its seizure of another part; and through what channel does the transfer take place. The abettors of the humoral pathology explained the occurrence of metastasis, by considering that a transfer of the *materies morbi*, or morbid matter, takes place from one part to another, through the vascular system; and that the consecutive disease is generally the consequence of the disappearance of the antecedent. The supporters of solidism, whether with reference to nervous influence or to the doctrine of excitability, supposed that disorder manifests itself in the new seat owing to its suppression in the old,— the cerebro-spinal nervous system being the medium of displacement; whilst they admitted — particularly the disciples of BROWN — that its irruption in the former frequently subdues it in the latter, owing to the excitability being more intensely acted upon in the one than in the other. A greater desire, however, has been displayed by either class of theorists, to conform facts to their views, than to investigate the matter in a legitimate manner. In order to draw accurate inferences, it is necessary to interrogate Nature herself, by an intimate observation of the phenomena to which the term metastatic has been applied; and, when the practical importance of this subject is considered, the results will repay the investigation. A few facts which have fallen under my observation will serve to elucidate the subject. — 1. A medical friend had gout in the lower extremities, for which he took a large dose of colchicum before the morbid secretions had been evacuated. He almost instantly had a violent attack of the disease in the stomach, with simultaneous disappearance of it from the original seat. The free use of stimuli caused it to relinquish the stomach, and to reappear in the extremities. In this case, the transfer from one place to the other was instantaneous; the medium being evidently the nervous system.—2. Another patient had, upon suppression of gout from the lower extremities, an attack of simple apoplexy, for which he was bled and purged. When I saw him, he was still comatose. The head, however, was cool. I directed mustard cataplasms to the feet, and camphor and ammonia internally. The gout suddenly reappeared in the feet, and at the very same instant he awakened as if from a profound sleep, evincing not the least cerebral disturbance, organic or functional.—3. A middle-aged and not robust man had most severe rheumatism in the thighs and legs, for which he took a large dose of croton oil, which produced hypocatharsis, and the complete cessation of the pains of the limbs, *followed* by the most distressing agony referrible to the heart, with palpitations, &c. He was actively treated, but he died in a day or two. With the exception of a somewhat increased vascularity of the substance of the heart, no disease could be detected in any part of the body.—4. A female, about 30, sanguine and plethoric, had rheumatism of the lower extremities, which she attempted to remove by a quack embrocation. The disorder disappeared from the extremities, but she was instantly seized by most acute pains and tenderness in the region of the uterus and ovaria, the latter being greatly enlarged, so as to form small tumours. Similar cases to the above have been observed by me, and show that rheumatic and gouty diseases, when suppressed in one part, or suddenly subdued by lowering remedies or evacuations, will often be manifested in some vital organ, and be removed from it, in such a way as can be explained only by nervous agency: and, when the conformation of the parts consecutively affected are considered, and the proneness of the disease thus superinduced to assume an inflammatory and congestive state, retaining at the same time the gouty or rheumatic character, is taken into account, it is reasonable to suppose that the organic nerves are the chief channel of transfer, and seat of the affection; their intimate anatomical connection with the blood-vessels explaining the morbid state of vascular action with which the transferred disease is so frequently accompanied.

174. *B*. But there are metastases of a somewhat different kind from the above; but which, equally with these, present morbidly excited action: the difference consisting chiefly in the extreme degree in which sensibility is altered in those already noticed. In the exanthemata, and even in the course of several chronic eruptions, the cutaneous affection suddenly disappears, and dangerous disease is developed in an internal organ. In some cases, the superinduced malady is merely the localisation or determination of the morbid action to a single organ, the external affection disappearing in consequence — a result not infrequently of depression of the powers of life, or of irritants acting upon the part thus secondarily diseased, or of both causes conjoined. In other instances, particularly in chronic eruptions and discharges, the internal or consecutive malady is the consequence of the suppression of the external disorder. In order to form an opinion relative to the nature of metastatis in exanthematous diseases, it is necessary to attend to the following circumstances: — 1st. That they are frequently caused by the neglect of sufficient evacuations early in the disease, by a cachectic habit of body and constitutional vice, by breathing a foul air, and by injudicious regimen; — 2d. That whatever suddenly lowers the nervous energies, or weakens vital resistance to hurtful agents, or perturbates the frame, will often cause a metastasis of the disease; — 3d. That the metastasis may be either complete, the external eruption disappearing entirely; or incomplete, the eruption still partially remaining. In these diseases, the morbidly excited vascular action of the skin evacuates a peculiar matter, which is capable of propagating the disease, and which is either carried off chiefly in the insensible perspiration, as in measles and scarlatina, or in the more consistent matter of the eruption, or in both, as in small-pox. When, therefore, the morbid vascular action and its attendant evacuation are either prevented from appearing in, or suppressed from, the cutaneous surface, it may be reasonably inferred that they will be determined to some internal viscus, giving rise to inflammation of, and serous effusion from, mucous or serous surfaces; and congestions, infiltrations, inflammation or hepatisation of parenchymatous organs. Thus, in scarlatina, measles, small-pox, erysipelas,

&c. the suppression of the eruption not infrequently produces one or more of the above effects, and constitutes the chief diseased appearances in fatal cases.

175. *C.* There is another form of metastasis, that consists chiefly of morbid secretion; and although vascular action is concerned in producing the matter found in the secondary seat of disease, still the transfer from the original seat evidently takes place through the channel of the circulation. We not infrequently observe purulent or ichorous matter, which has been formed in one part, removed from thence, and infiltrated, or secreted and accumulated, in another part; occasioning consecutive abscesses (see ABSCESS), or some other structural change, in a parenchymatous organ, or puriform effusion into natural cavities. In these cases, the passage into, and presence of morbid matter in, the blood, excite increased vascular action in some part by means of which it is either evacuated from the system, if the morbidly excited part be an emunctory; or infiltrated and collected, if it be a parenchymatous organ; or effused and retained, if it be a serous or synovial cavity. Thus, collections of puriform matters have been found in the liver, in the joints, in the lungs, in the brain, &c. after small-pox, erysipelas, fevers, inflammations of veins, or of remote or external parts, and after fractures; and often without any antecedent disease of the viscera thus consecutively disorganised, or disorder referrible to them, proportionate to the extent of disorganisation observed on dissection of fatal cases.

176. *D.* From the foregoing I conclude, 1st. That metastases may be *divided* into — (*a*) those manifesting fully expressed disordered action, in which the sensibility is more or less excited; and (*b*) those consisting of latent disorganisation, and produced chiefly through the medium of the circulating fluid: or into — (α) those which affect the substance of an organ; and (β) those which take place to an excreting surface or viscus — as the skin, the intestinal mucous surface, the kidneys, and the salivary glands — and which frequently terminate favourably by evacuation from the circulation of noxious matters that were the chief cause of the metastasis. — 2d. That they are brought about — (*a*) by means of the organic nervous system, as in gout and rheumatism; — (*b*) by the influence of this system of nerves upon the blood-vessels and capillaries, determining to various surfaces or structures a preponderating degree of morbid action and its results, according to the operation of numerous intrinsic and extrinsic causes, as in exanthematous metastases; — (*c*) by the absorption of hurtful matters into the circulating current, where they excite, internally as respects the capillaries, the increased or morbid action of some secreting surface or emunctory, or occasion the disorganisation of some predisposed parenchymatous organ.

177. X. THE CIRCUMSTANCES MODIFYING THE FORM, COMPLICATIONS, DURATION, AND TERMINATIONS OF DISEASE, are as numerous as the causes, — predisposing, exciting, and determining, — in which it originates. The constitution and diathesis of the patient; a cachectic or vitiated habit of body; the continued operation, during the course of the disease, of the causes which induced it; the depressing passions; impure or stagnant air; all sudden mental and physical perturbations; extremes of temperature; injudicious treatment and regimen; the use of medicines which either suddenly or intensely excite, or depress, the vital or nervous energies, and weaken the restorative powers; neglect of evacuations, and of the state of the secretions and excretions; the *nimia diligentia* of the practitioner, or improper interference with the salutary processes of nature, and with critical evacuations and changes; the too early recurrence to a full or stimulating diet, or exposure during convalescence to any of the causes specified above; will not only modify the states and duration of disease, but also occasion the *succession* of one disease into another, render morbid action more or less *complicated*, *transfer* it from one structure or organ to another, and occasion *relapses* of greater or less severity. (See PHYSIC — *Practical Principles of*; and SYMPTOMATOLOGY.)

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DROPSY.

— SYN. *Ὕδρωψ, Th.* (*ὕδωρ*, water, and *ὤψ*, aspect, appearance). *Hydrops*, Lat. *Hydropisie*, Fr. *Die Wassersucht, Die Hydropsie*, Germ. *Idropisia*, Ital.

CLASSIF. — 3. *Class*, Cachectic Diseases; 2. *Order*, Intumescences (*Cullen*). 6. *Class*, Diseases of the Excremental Function; 2. *Order*, Affecting Internal Surfaces (*Good*). IV. CLASS; I., II., and III. ORDERS (*Author*).

1. NOSOL. DEFIN. *The accumulation of watery fluid in the natural cavities, or in the cellular areolæ, or in both, causing distension, impeded functions of the affected and adjoining parts, frequently with fluctuation, softness, &c.*

PATHOL. DEFIN. *A collection of fluid arising either from increased exhalation or from diminished absorption, each of which conditions depend upon antecedent states of disease.*

2. After having taken a general view of the *nature* and *treatment* of dropsical effusion — of Dropsy in its generic acceptation, — I shall proceed to consider its specific forms. By thus viewing, in a connected manner, the various species of dropsy, which have been improperly separated the one from the other, much unnecessary repetition will be avoided, and several advantages obtained.

3. I. PATHOLOGY OF DROPSY. — i. *Brief Historical View of Opinions.* — Different views of dropsical diseases may be found in several parts of the writings ascribed to HIPPOCRATES. There can be no doubt, however, of the connection between them and a state of active vascular disorder, as well as of obstructions of the liver and spleen, having been known to him. ERASISTRATUS is said to have referred these maladies chiefly to engorgements of the liver; and ASCLEPIADES to have viewed them as being either acute or chronic. ARETÆUS gave merely a lively description of the history of dropsies: but GALEN, in the unconnected observations on these maladies scattered through his writings, stated some just views of their nature. He pointed out the seat of the ascitic effusion; contended, in opposition to ERASISTRATUS, that dropsies often depend upon other causes, and upon disease of other viscera, beside hepatic obstruction; and that they frequently proceed from a morbid state of the blood. CÆLIUS AURELIANUS assigned, as their causes, lesions not only of the liver, but of the spleen, of the womb, and of the large and small intestines. AËTIUS made some reference to a cachectic habit of body in relation to them; and ALEXANDER of Tralles noticed, but in a superficial manner, their connection with diseases of the lungs, and with antecedent fevers and inflammations.

4. Amongst the Arabian writers, little respecting dropsy beyond what is contained in the works of their predecessors is to be found. AVICENNA, however, attributed it to the liver and to the kidneys; and stated that the latter, owing to the coldness or warmth of their temperature, or to obstruction or induration of their structure, fail to attract or separate the watery fluids. MESUÉ gave a similar view to the foregoing, and both agreed in stating that the liver does not concoct pure, but a watery and phlegmatic, blood. When we reflect that the lights of modern science have shown that the liver is both indirectly and directly concerned in sanguifaction, that the crasis and vital constitution of the blood is really affected in many states of dropsy, and that the kidneys are often very demonstratively diseased, and in a way that may be expressed in general terms nearly similar to those used by AVICENNA, we must conclude, that some of the pathological opinions of the ancients are not so despicable as many of the moderns suppose; and that, even in recent, as well as in bygone, times, there have been more absurd theories than sound views of morbid actions, and a greater disposition to generalise from a few imperfectly ascertained states of disease, than to take into account numerous concurrent circumstances and morbid associations.

5. Since the revival of learning, but little was added to the knowledge of dropsies, until the writings of WILLIS appeared. This very eminent physician first called in the state of the vessels to the explanation of these diseases; and argued that, whilst the vascular extremities are either too relaxed or too constricted, causing thereby an increased effusion and diminished absorption respectively, the blood itself is often altered, and its circulation impeded by scirrhous tumours, tubercles, and obstructions in any of the abdominal viscera. ETTMULLER and LISTER adopted the views of WILLIS. The experiments of tying the veins, first performed by LOWER, confirmed the opinion promulgated but not carried its due length by WILLIS, that interruption of the venous circulation is a chief cause of dropsical effusions. F. HOFFMANN repeated the experiments of LOWER, and, as well as BOERHAAVE and VAN SWIETEN, admitted the importance of venous obstruction in the pathology of dropsies. MORGAGNI says, "Quacunque causa diutius potest sanguinis aut lymphæ cursum morari, aut humoris quo cavæ corporis madent, aut secretionem augere, aut exitum deinde imminuere morbo huic potest originem præbere." LUDWIG first directed attention to an atonic state of the vessels as a principal source of those maladies, and his contemporary MILMAN assigned as their chief causes a laxity of the fibres, exhausted power arising from copious evacuations, and acute diseases passed into the chronic state.

and an obstacle to the return of the blood through the veins. The views of Haller were nearly those of Ludwig and Milman; but he considered not only that the mechanical obstruction, but also that that grade of debility of the veins, which would retard their circulation, would occasion dropsies. The opinions of D. Monro and Cullen coincided with the foregoing; the former considering, and indeed proving by experiment, that the notion entertained at the time he wrote, as to rupture of the lymphatics being a cause of the effusion, was not well founded.

6. When lymphatic absorption became generally insisted upon, owing to the writings of Hunter, Hewson, and others, an additional cause of these maladies was acknowledged, and, as might have been expected, the part assigned to these vessels was greater than they perform. Vogel applied the doctrine of atony to them; and most of his contemporaries entertained a similar view. Soemmerring, Wedel, Assilini, and Mascagni, nearly altogether deprived the veins of their share in the production of aqueous effusion, and assigned its source almost entirely to the lymphatics. These writers, with many of their predecessors, still conceived that the rupture of these latter vessels sometimes caused it, and adduced cases in which this lesion was detected on dissection. Mascagni considered that, besides other alterations, the absorbents are either obstructed in their glands, or dilated to such an extent as to prevent their valves from opposing the reflux of the fluids absorbed by them. The untenable hypothesis of a retrograde action of these vessels was advanced by Mezler and Darwin, but found no support.

7. The division of dropsies into *active* and *passive*, or *acute* and *chronic*, may be traced to Rivière, or Riverius, who denominated them *hot* and *cold*. Boerhaave, Backer, Tissot, Stoll, and later writers, have given greater precision to this division, by denominating the former plethoric, active, sthenic, and inflammatory, according to the state of the circulation and of vital action. It was, however, chiefly Tissot, Stoll, and J. P. Frank, who drew attention to active, plethoric, or acute dropsy; and Grapengiesser, the pupil of Frank, Blackall, Fauchier, Poilroux, Breschet, Abercrombie, and Ayre, have further illustrated this doctrine. Grapengiesser, with much justice, observes, "Omnis, enim, inflammatio modica si organon secernens occupat, functionem ejus auget." Geromini, a recent Italian writer, carried the inflammatory origin of dropsy as far as a medical sectarian might have been expected to have done, and discarded venous obstruction from any share in the production of this lesion. The facts, however, which have been adduced by Dr. D. Davis, M. Bouillaud, M. Velpeau, and Dr. R. Lee, demonstrate the important part obstruction of the veins performs in the causation of at least partial dropsies; and the interesting researches of Dr. Bright, followed up by Dr. Christison and Dr. I. Gregory, disclose the great share the kidneys have in occasioning this class of diseases. As to the existing state of our knowledge of their pathology, fuller details will appear in the sequel.

8. ii. Of the Causes of Dropsies. — It is evident that the chief causes of these diseases are the pre-existing lesions which will be hereafter described. But there are others, more remote in their operation, which deserve to be succinctly noticed. — *A. Remote causes.* — *a.* The *predisposing* causes are chiefly a cold and moist climate, or a warm and moist temperature when conjoined with an impure air; the lymphatic, phlegmatic, and bilious temperaments; a soft, relaxed, and plethoric habit of body; the scrofulous diathesis (Heister); the syphilitic taint (Piderit and Hufeland); and advanced age. The infrequency of these maladies in warm and dry climates, as Egypt, Syria, Arabia, and Nubia, has been remarked by several writers. — *b.* The *exciting causes* are, — 1st, External, or physical agents, which occasion chiefly the more idiopathic and active forms of dropsy; and, 2d, Antecedent diseases. — *a.* Of the former, the most influential is cold conjoined with moisture, particularly if acting upon a person in a state of perspiration. The influence of a humid atmosphere may be imputed to the circumstance of its impeding the pulmonary and cutaneous transpirations, and occasioning the accumulation in the vascular system of the watery parts of the blood, or a recrementitious plethora, if the kidneys perform not a proportionately increased function; and this effect is promoted if cold be superadded. When a moist air is loaded with miasmata, the injurious effects are still further heightened, as internal congestions and obstructions of the liver and spleen are thereby produced; humidity and cold frequently giving rise to acute, and warm moisture with malaria to passive, dropsies, or those depending chiefly on visceral obstruction. The operation of humidity in causing these diseases was explained by Erastus, Van Swieten, and De Haen, on the supposition that a portion of the moisture was absorbed from the air into the circulation. Unwholesome food and a poor and watery diet, although justly considered as a cause by Bonet, Fothergill, and others, can act only by debilitating the frame, and inducing a state of general cachexy, or disease of some viscus terminating in effusion. Van Helmont and Pezold conceived that the use of pork is productive of dropsies; and I believe that there is some truth in the opinion. That this diet favours the generation of the scrofulous and gouty diathesis, is certainly a result of my observation. Drinking cold fluids, particularly when the body is perspiring and fatigued, not infrequently causes the active states of these diseases; and all kinds of ingurgitation, especially drunkenness, are perhaps the most common agents, in as far as they seldom fail of producing those visceral lesions on which watery effusion so often depends. Violent fits of passion were considered by Ludolff and De Meza, indolence by Tissot, sedentary occupations by Ramazzini, and general debility by Wainewright, De Haen, D. Monro, and Ludwig, as occasional sources of dropsies. The influence of anxiety and the depressing mental emotions, in favouring their occurrence, if not in directly exciting them, cannot be doubted. Pregnancy, and abortions; severe injuries, succussions and concussions of the trunk (Bonet, De Haen, &c.), difficult dentition, may also excite some one of these maladies. The complication of ascites with pregnancy has been observed to every practitioner. The sudden suppression of cutaneous eruptions and accustomed

discharges is one of the most common causes of dropsical effusions, particularly when other concurrent circumstances are present. Lentin, Hautesieck, Bacher, Riedlin, Thilenius, Willich, Schmidtmann, and Frank, insist much upon the repulsion of the acute exanthemata and erysipelas; and Gmelin, Hufeland, and Osiander, upon that of the itch, herpes, lepra, and porrigo. I have often seen acute hydrocephalus appear after the use of external remedies in the cure of porrigo, to the neglect of internal measures. Morgagni, Piso, Guyon, Fischer, Michaëlis, and others, instance the occurrence of acute dropsies after the suppression of gout and rheumatism; Cælius Aurelianus, Rhodius, Forestus, and Schmoeger, after the disappearance of hæmorrhoids; and Morgagni, Hoffmann, Ab Heer, Oberteuffer, Demiani, Brisbane, Frank, and Fauchier, after the suppression of the menses and the lochia. The sudden arrest of an habitual diarrhœa and of chronic dysentery has been observed by Hippocrates, Riedlin, Frize, and Stoll, to produce effusion, particularly in the peritoneal cavity; and general dropsy has been observed by Bartholin, Lister, De Haen, Pomard, and Lentin, to result from suppression of urine. That aqueous effusion should follow excessive depletions and hæmorrhages, has been doubted by some of those who consider it as a consequence of plethora or increased action: but Forestus, Blankard, Hoffmann, Haller, De Haen, D. Monro, Gordon, Helwig, and others, have met with such occurrences.

9. β. The *diseases* upon which dropsy most commonly supervenes, are chiefly fevers, and visceral inflammations and obstructions. Quotidian and quartan intermittents, and bilious remittents, when purgatives have been neglected, or when bark and stimulants have been too freely exhibited, to the neglect of requisite evacuations, are often followed by dropsy. Thomann states, that he has seen it consequent upon sanguineous evacuations carried too far in these maladies. The occurrence of effusion as a termination of inflammations, particularly of serous membranes, and from diseases of the heart, lungs, liver, and spleen, has been generally admitted in modern times. The frequency and the characters of dropsy after scarlet fever have attracted the notice of most writers on these diseases, particularly of Withering, Frank, Ploucquet, and Hufeland. Its occasional supervention during *phthisis*, bronchitis, chronic catarrh, and hooping-cough, must have been familiar to every physician of experience. An aqueous or aqueo-sanguineous effusion into the serous cavities was a common circumstance in the scurvies which formerly proved so destructive to fleets and armies. The connection of dropsies with chronic and obscure diseases of the kidneys, imperfectly noticed by Aëtius, Avicenna, Mesuë, Lentin, and Tiling, and fully established by the researches of Dr. Bright, is of the utmost practical importance. The occasional dependence of these maladies upon lesions of the uterus and alterations of the organs already mentioned, as well as upon others, will be more particularly noticed hereafter.

10. iii. Appearances observed on Dissection. — *A. In the cavities and parts the seat of the effusion.* — (*a*) The serous membranes are frequently found thickened and opaque, sometimes softened, and occasionally harder than natural. In many cases, evidence of antecedent inflammatory action, as coagulable lymph, and cellular bands, or the remains of old adhesions, exists in the pleuræ or peritoneum. Bonet observed the latter membrane inflamed and covered by a mucus-like matter; De Haen and Barron, granulated or tuberculated; Tacheron and Ayre, thickened, opaque, and white; and Stoërck and others, indurated, and in parts cartilaginous. Similar changes are detected in the pleuræ. Both membranes are often blanched and thickened when the effusion has been of long duration. The cellular tissue in anasarca is sometimes merely infiltrated, and its areolæ distended by the watery fluid. Portal states, that it is frequently thickened, the cells dilated or lacerated, and the intermuscular tissue indurated and almost cartilaginous. When the infiltration and distention become great, the denser structure of the cutis vera is sometimes penetrated, owing to the separation of its fibres (Bichat); and the epidermis is either raised into blisters,—some of which have been seen unusually large by Morgagni, — or lacerated, the fluid partially or nearly altogether escaping through the apertures. Occasionally the cellular tissue is much softened and plastic after the liquid is removed; or it is very white or blanched, its appearance suggesting the idea of maceration.

11. (*b*) The characters of the *effused fluid* have been remarkably overlooked. They vary extremely, but they generally have some reference to the state of vascular action in the seat of effusion. When this has been considerable, the fluid is more or less whey-like and turbid; or it contains pieces of albuminous matter, or flocculi, or fragments of a filamentous lymph; and the serous surfaces are often slightly covered in parts with a reticulated lymph, or a muco-albuminous substance. In cases where the effusion has been chiefly owing to an altered state of the blood and diminished vital cohesion of the tissues, the accumulated fluid is frequently dark-coloured, turbid, of a dirty or sanguineous appearance. These conditions are principally found in dropsy of the pleuræ, pericardium, and peritoneum. When the disease occurs slowly, and is chiefly owing to debility, original conformation, or impeded circulation, the fluid is usually more limpid; and it is frequently remarkably so, being also nearly devoid of animal matter, as in chronic hydrocephalus and spina bifida. In some instances, and particularly in ascites or ovarian dropsy, the fluid collected after repeated tapping often assumes very diversified appearances. It has been remarked of a yellowish, greenish yellow, or greenish colour; or brownish, or even nearly black, by Morgagni, Littre, and others. It has likewise presented puriform, viscid, gelatinous, milky or chylous characters, according to Willis, Morton, Becker, Coste, and Prochaska. It has, moreover, been found possessed of a fœtid or penetrating odour by some authors now mentioned, and by myself. The milky or chylous fluid is ascribed by several pathologists to rupture of a lymphatic vessel. The puriform and viscid or jelly-like effusion is most probably caused by sub-acute or chronic inflammation. The yellowish or greenish yellow tint is some-

times owing to concomitant jaundice, or disease of the liver occasioning the accumulation of the colouring constituents of bile in the fluids; and the green, brown, or black colour probably arises from the presence of a portion of the colouring matter of the blood. The offensive odour, as well, perhaps, as some of the above alterations, may be the consequence of the admission of air into the cavity after tapping, and of the supervention of inflammatory action upon this operation, or of the long retention in a high temperature of a fluid containing a large proportion of animal matter, or of both circumstances conjoined. The liquid effused into the ovaria is generally possessed of very different characters from those presented by the fluid found in the pleuræ or peritoneum; and that of chronic hydrocephalus and spina bifida is commonly different from all others, — the liquid found in the ovarium, and in the brain, presenting, respectively, the opposite extremes of fluidity, or rather of animal matter. As the properties of the fluids are different not only in the several seats of the effusion, but also according to the states of vital action accompanying it, but little importance can be attached to the results of chemical analysis, unless they be derived from an extensive and diversified series of cases. These obtained by Dr. Marcet are not materially different from those furnished by Bostock, Barruel, and Berzelius, who found that all the specimens of fluid contain nearly the same saline ingredients as the serum of the blood; and that the chief difference consists in the quantity of animal matter, chiefly albumen and incoagulable mucus (the osmazome of Berzelius and Barruel) they furnish. The following table is given by Dr. Marcet: —

In 1000 grains of fluid.	Specific gravity.	Total solid conts.	Animal matter.	Saline matter.
		grains.	grains.	grains.
Fluid of Spina bifida -	1007·0	11·4	2·2	9·2
——— Hydrocephalus -	1006·7	9·2	1·12	8·08
——— Ascites - -	1015·0	33·5	25·1	8·4
——— Ovarian dropsy -	1020·2	—	—	8·0
——— Hydrothorax -	1012·1	26·6	18·8	7·8
——— Hydrops pericardii	1014·3	33·0	25·5	7·5
——— Hydrocele - -	1024·3	80·0	71·5	8·5
——— Blister - -	1024·1	—	—	8·1
Serum of Blood - -	1029·5	100·0	90·8	9·2

12. *B. The lesions of the viscera* which are connected with the production of dropsies, include almost every variety of which they are susceptible. The heart, its valves, and membranes; the blood-vessels, particularly the veins and lymphatics; have presented, in different cases and states of the disease, nearly every alteration described in the articles on the morbid anatomy of those parts. To these I must refer; but here may add, that the absorbent vessels have been found varicose and otherwise diseased, and the glands in the vicinity of the blood-vessels indurated and enlarged, by Morgagni, Morton, Soemmerring, Haase, Assalini, Bichat, Mascagni, and Hodgson. The frequency of inflammatory appearances in the inner membrane of the arteries, and the presence of ossific deposits in them and in the aorta, have been remarked by Hoffmann, Franck, Bader, and myself. The respiratory organs, the liver, gall-bladder, and spleen, present, in different cases, all the appearances described in the articles on these viscera. As respects the liver, it may be observed, that those changes and morbid productions which interrupt the circulation through the ramifications of the vena portæ, as remarked by Dr. Bright; also the nutmeg-like state of its substance, obstruction of the branches of the hepatic duct by inspissated bile and cholesterine, and calculi in the gall-bladder; are the most common lesions.

13. The next important changes are detected in the kidneys. Morgagni gives a case from Piccolhomini, in which one of them being lacerated from the presence of calculi, the urine flowed into the abdomen. Ribe (*Schwed. Abhandl.* b. xiv. p. 47.) found them scirrhous; and Hufeland met with numerous hydatids contained in cysts formed in their substance. Instances, however, were few, in which disease of the kidneys was mentioned by authors in connection with dropsy, and, when noticed, it was in a very vague and unsatisfactory manner, until Dr. Bright furnished numerous proofs of the frequency of lesions of structure in these organs, and described their various forms, and relations to dropsical effusions. The *first* form which he particularises, seems to consist of wasting of the structure, and diminished vascularity and firmness, of the kidneys, which are of a yellow mottled appearance externally; their internal structure being also -yellow, slightly tinged with gray, and the tubular portions of a lighter colour than natural. They contain no morbid deposit. This change is connected with a cachectic habit of body and debility; the urine being only slightly coagulable. The *second* form is that in which the whole cortical part is converted into a granulated texture, with a morbid interstitial deposit of an opaque white substance; giving, in its earliest stages, when the tunic is taken off, an increase of the natural fine mottled appearance of the organ; subsequently, with innumerable specks strewed over its surface, and distributed throughout its whole cortical substance, and with deficiency of its firmness. At a later period, the granulated texture shows itself externally, occasioning irregular projections of the surface, the organ being generally somewhat enlarged. In the *third* form of disease, the kidney is quite rough and scabrous, and its surface rises in numerous projections, not larger than a pin's head, of a yellow, red, and purplish colour. Its shape is often inclined to the lobulated; it is nearly of a semi-cartilaginous hardness, and it gives great resistance to the knife. The tubular portions are drawn near to the surface, every part of the organ appearing contracted, and less interstitial deposit being present than in the foregoing variety. Dr. Bright connects these two varieties with coagulable urine; and thinks that, as the one appears to pass insensibly into the other, they are commonly grades, or stages of the same change. Besides these, there are other lesions of the kidneys found in dropsies: as preternatural softness; obstruction of the tubular structure, by a white deposit resembling small concretions; scrofulous matter infiltrated or deposited in the cortical substance, and in the interstices between the tubuli; and, indeed, most of the lesions described in the article Kidneys. It is very justly remarked by Dr. J. Gregory, that disease of these organs is chiefly found in those dropsical patients who are of a strumous diathesis, or who are addicted to

spirituous liquors. The uterus and ovaria often present numerous lesions of structure, but none that are especially connected with dropsy, excepting those accumulations of fluid which sometimes take place in the latter organs, and which can scarcely be considered as a species of this disease. Various morbid appearances are also found in the omentum and mesentery, particularly in ASCITIS. (See DROPSY *of the Abdomen.*)

14. iv. OF THE CHIEF PATHOLOGICAL STATES OCCASIONING DROPSIES. — The lesions, to which dropsical effusion has been imputed in modern times, have been too generally those alterations of structure either preceding or attending it. But, although these are manifestly important agents in its causation, yet they are not the only agents, for we very frequently find them in their most fully developed forms without any effusion. Of the numerous remote and pathological causes enumerated above, there is none, which will singly produce dropsy. And, perhaps, in no other disease is a greater concourse of causes requisite to its appearance, than in this. In recent times, the changes of structure have been investigated, somewhat to the neglect of vital conditions or manifestations; and the former has been too generally looked upon, in respect of the diseases now under consideration, as proximate causes, instead of being viewed as concomitant lesions resulting from anterior changes implicating the functions of life, in one or more of the systems and organs of the frame. The association, however, of these lesions should not be overlooked; and the share which each may have in augmenting or perpetuating the other ought to be kept in view, but with a philosophic reference to anterior conditions.

15. Up to the end of the last century, dropsies were considered as essentially depending upon obstructions or debility; although some among the ancients, particularly HIPPOCRATES, admitted the propriety of bleeding in some cases. STOLL, STRAK, BRAMBILLA, SCHMIDTMANN, J. P. FRANK, and GRAPENGIESSER, at the epoch now alluded to, inculcated the frequent inflammatory origin of these diseases. WELLS, BLACKALL, ABERCROMBIE, STOKER, and AYRE followed in the same track; and, excepting a slight disposition to carry this doctrine too far, contributed to the advancement of this branch of medical knowledge. At present it is generally admitted that dropsy may arise from sur-action, or sub-action,—from general or local plethora, as well as from obstructed circulation,—from deficient excretion, and from excessive evacuations rendering the blood thin or watery. The numerous changes detected in connection with aqueous effusion, and allowed to favour both it and the accumulation of the fluid, may be resolved into a single proposition, viz. increased exhalation and diminished absorption, which comprises all the views promulgated on the subject, the matter chiefly in dispute being as to which of these changes is the accumulation of fluid chiefly owing. It has been attempted to settle the point by experiment and *post mortem* research. But a matter purely of function — lesions so dependent on vital action and structural cohesion as effusion most undoubtedly is in many cases, however associated, or otherwise dependent upon organic change — cannot admit of a satisfactory elucidation in this manner alone.

16. Those who favour the doctrine of increased exhalation argue, that this change usually follows excited action, or irritation of serous surfaces, or relaxation of the exhaling pores, or this latter state associated with increased action of the larger vessels; that the appearances of the fluid and the constitutional symptoms indicate the existence of excited action; and that absorption is not diminished, is shown by the increasing emaciation attending the effusion, and by the fact of this function being generally augmented with the progress of debility. The believers in diminished absorption contend that, when the agents of this function — either lymphatics or veins — are obstructed, an accumulation of serum takes place in the parts beyond the obstruction; that when plethora, general or local, exists, absorption is diminished, as shown by the experiments of MAGENDIE and FODÉRA; and that, as vascular fulness and action are removed, this function becomes restored to its natural activity. That the balance of function — of exhalation and absorption — is broken, is very obvious; but the question is, to which is the fault chiefly attributable? It is evident that exhalation preponderates over absorption, in all cases where vital action or vascular plethora is increased; and that, on the other hand, diminished absorption chiefly obtains where the venous or lymphatic circulation is either impeded or obstructed. These propositions are proved by experiment, and confirmed by repeated observation and numerous pathological facts. So that, instead of contending as to which of these functions is chiefly disordered, it would have been more correct to admit that either may be more or less affected in different cases and forms of the disease, according to the states of vital energy and the nature of concomitant organic change. Conformably, therefore, with these facts, rejecting all exclusive doctrines, and following nature as closely as I am enabled to interpret her actions, I believe that dropsy may arise as now stated, as more precisely expressed in the article DISEASE (§ 94.), and as will be more particularly described in connection with lesions of vital manifestation and of structure.

17. In considering the pathological states occasioning dropsy, the *conditions of vital action* appear equally important with *structural change*, the more especially as the effusion, even where the latter is the most obvious, depends as much upon the former as upon it; alterations of vital manifestation giving rise to both the change of structure and the effusion, whether or not the effusion be a concomitant or a consecutive result. This consideration has so forcibly influenced the ablest writers, as to induce them to arrange the forms of this disease with strict reference to it. Thus they have been divided into the *acute* and *chronic*, the *sthenic* and *asthenic*, the *tonic* and *atonic*, the *active* and *passive*, the *inflammatory* and *non-inflammatory* or *leucophlegmatic*, and into the *idiopathic* and *symptomatic*, or the *primary* or *secondary* — as they proceed directly from their external causes, or from some visceral disease. These forms are met with in all the seats of dropsy, but in different degrees of frequency. The acute, sthenic, or active state — the effusion consequent upon increased determination and excited action — occurs most frequently in the ovaria and brain, and next in the

pleuræ, pericardium, cellular tissue, and peritoneum. Although these states are nearly allied to, they are not identical with, the inflammatory variety of dropsy, which is also most common in the former of these situations. Idiopathic or primary dropsy very generally assumes these states, being connected either with plethora, with increased determination, or with inflammatory action, the augmented exhalations supervening to, and promoting the resolution of, its acute or early stages. This connection will, therefore, be kept in view in the following remarks.

18. *A. Primary or Idiopathic Dropsy.*—(*a*) *Acute dropsy, or effusion from increased action* (the *Sthenic, Tonic, Acute, Active*, and *Inflammatory*, of authors; the *Augmented Secretion of Irritation* of DUPUYTREN and BRESCHET; the *Hydrophlegmasiæ* of M. RAYER; a form of *Hypercrinia* or augmented secretion, by M. ANDRAL). TISSOT, GEROMINI, and BOUILLAUD consider this form of disease to be intermediate between healthy exhalation and inflammatory action; and Dr. PARRY, that it is the result of increased momentum or determination of the circulating fluid to the seat of effusion. That it often originates in vascular excitement of the part chiefly affected, and is frequently connected with general, relative, or excrementitious plethora, have been fully demonstrated. But the vascular excitement, and especially the injection of the capillaries usually accompanying it, is often dissipated, either partially or altogether, soon after the effusion it occasions has become considerable; and but little remains of the vascular action, which may have approached the inflammatory state at the commencement, or of its usual results, but the unabsorbed fluid. — As soon as the vital tonicity of the exhaling vessels or pores become even partially exhausted, or the vital cohesion of the serous or cellular tissues diminished, even the natural momentum of the circulation in the larger vessels will be sufficient to produce or keep up a morbid increase of the exhalation.

19. *a.* The *exciting causes* of acute dropsy are suppression of the perspiration and of any of the natural secretions and discharges, repulsion of the exanthemata and acute eruptions, and the usual causes of inflammatory diseases. It is often consequent upon scarlatina, and the puerperal states; or connected with inflammations, particularly of the viscera invested by serous membranes; and with sub-acute inflammation or active congestion of the central parts of the brain, the substance of the lungs, the pleuræ, the pericardium, the uterus. and the ovaria. It occurs most frequently in the young and comparatively robust; and is either an *idiopathic disease*, as I have here chiefly considered it, or a *termination* of a morbid state nearly allied to inflammation, or a *consecutive or symptomatic* malady, as when it is preceded or attended by lesions of some adjoining or remote viscus, in which form it will be considered in the sequel.

20. *β. Progress.*—Although acute dropsy generally appears suddenly and increases rapidly, yet various symptoms of disorder precede those dependent upon the effusion. The preliminary disturbance is often indefinite; but a sense of uneasiness, soreness, or slight pains of the parts in the vicinity of, or inclosed by, the cavity about to be the seat of the effusion, with disturbance of their functions; more or less derangement of the natural secretions and excretions; increased hardness, or fulness, or frequency of pulse; irregular chilliness or febrile phenomena, and a feeling of general indisposition; often precede, in various grades of severity, and for a longer or shorter time, the pathognomonic symptoms of effusion. When these first appear, the pulse is usually hard, full, and accelerated, and the skin hot and dry. There are also restlessness, pains in the back and limbs; tenderness of the surface of the body, particularly over the chief seat of disease; loaded or white tongue, thirst; constipated bowels; scanty, thick, high-coloured urine; and, if the effusion takes place in the thorax, dyspnœa, cough, and other symptoms of that form of the disease, generally precede rather than accompany it. The febrile symptoms often partially subside in a few days as the effusion increases, whilst the symptoms caused by the accumulation become more and more urgent. The urine, in this form of dropsy, generally furnishes, by heat and acids, more or less of a coagulated albumen, — a fact first insisted upon by Dr. WELLS and Dr. BLACKALL, and imputed by Dr. BRIGHT to disease of the kidneys. There is no doubt of this being a frequent phenomenon, both in acute dropsy, where there is no evident lesion of these organs, and in other forms of the disease, where they are extensively altered. I have, however, occasionally observed it where there was neither dropsy, nor any disorder of these emunctories; but it is probably more frequently connected with these disorders, than otherwise.

21. (*b*) *Sub-acute dropsy.* — The preceding may be viewed as the most acute or inflammatory form. Yet there are states of the disease intermediate between it and that next to be noticed.— *a.* Those which approach the nearest to the *sthenic* or *acute* arise from similar causes, are often preceded by the same indefinite symptoms, and manifest themselves more or less suddenly, but advance less rapidly, than it. Sub-acute dropsy most commonly occurs in the cavities of the chest and pericardium, or in the cellular substance; and is not infrequently complicated with bronchitis, or with inflammation and hepatisation of the lungs. It sometimes follows scarlet fever, or even measles. I met with two cases of it after severe attacks of the influenza of 1833. — *β.* Those states of it which approach the *asthenic* or *passive* form (§ 22.) are most frequently seated in the peritoneal cavity, or in the cellular tissue, or in both; are sometimes connected with the puerperal states, or chronic bronchitis; and are seldom preceded or attended by any fever, increase of temperature, or tenderness of surface: but all the secretions and excretions are more or less impeded, and some of them are entirely interrupted. The urine is only occasionally, or slightly, coagulable, and chiefly in those cases which approach closest to the acute. — *γ.* The subacute form of dropsy, especially, may *arise* from whatever will determine or solicit a greater flow of blood than natural to serous surfaces; particularly if the tonicity of the exhaling pores, and vital cohesion of the tissue, are insufficient to oppose the momentum of the circulation.

22. (*c.*) *Asthenic or passive dropsy* is much more rarely a primary or idiopathic disease than symptomatic of, or dependent upon, the pathological states about to be described. In its primary form, it may be attributed chiefly to relaxation of

the exhaling pores, and of the serous and cellular tissues, and to increased tenuity, or alterations of the blood existing independently of any considerable structural change. It is sometimes *caused* by excessive sanguineous evacuations, or exhausting discharges; by the suppression of secretions; and by a deficient, watery, vegetable, or unwholesome diet. The dropsy that sometimes prevails among the poor in times of scarcity is generally of this kind. It is usually *characterised* by a weak, unequal, small, and frequent pulse; paleness of the lips, tongue, and gums; flaccidity of the muscles; anhelation on slight exertion; feebleness of the joints; swellings of the lower limbs, or anasarca attending or preceding the effusion into the cavities of the trunk; an unhealthy appearance of the cutaneous surface; and absence of those symptoms which indicate the existence of visceral obstruction or disorganisation. The urine does not coagulate by heat or acids. This form of dropsy is usually chronic, and is, in adults, most commonly seated in the abdomen, or in the cellular tissue, or in both; sometimes appearing in these situations, particularly the former, after parturition, when it may assume a less asthenic form than that now described. It occurs most frequently in females, and is occasionally associated with hysteria. I have seen it supervene on chlorosis. In infants it usually takes place in the head, and proceeds from constitutional disposition or congenital vice.

23. *B. Secondary or Consecutive Dropsies — Symptomatic Dropsies — Chronic or Passive Dropsies* — are of most frequent occurrence. They are sometimes preceded by inflammatory action; are seldom, however, attended by acute, but often by sub-acute or chronic inflammation, or by active congestion. They are usually of long duration, and frequently the effects of complicated organic change, although generally more immediately dependent upon some specific lesion.

24. (*a*) *Dropsy from disease of the heart* is always preceded, for a long or indefinite period, by symptoms of disease of this organ. When effusion commences, early evidence of it is presented in the countenance, particularly in the morning, in the eyelids; and next in the feet and ancles, in the evening; or in the hands and forearm, particularly the left. These partial anasarcous swellings usually continue a considerable time before signs of the accumulation of water in the chest are manifested, and still longer before any effusion takes place in the abdomen. In some cases, indeed, no fluid is found in this latter situation. The pulse is frequently, but not always, much affected long before any anasarca is observed. When water collects in the face, hands, or arms, after protracted ill-health, and without pulmonary symptoms, disease of the heart may be inferred, notwithstanding the regularity of the pulse: but auscultation will detect its nature. Generally, as the effusion increases in these parts, so symptoms of its commencement in the chest or pericardium, most frequently in both, make their appearance. The patient at first requires his head and shoulders more elevated than usual in bed; and at last he cannot lie down, the effusion increasing in the cellular tissue, and extending to several or to all the shut cavities. In some cases, particularly when the disease of the heart is of an active nature, hæmoptysis, pneumonia, or pleuro-pneumonia, or congestion, takes place in the lungs in the course of the dropsy, and favours or increases the thoracic effusion. When the cardiac disease consists chiefly of passive dilatation and thinning of the cavities, the effusion is usually also of a passive kind, or attended by vascular and general asthenia, a lowering treatment accelerating a fatal issue. Occasionally the anasarca disappears, or is diminished, for some time before death; but the symptoms of the internal accumulation of fluid become more urgent. When obstruction in the valves of the left side of the heart exists, congestion of the lungs, with sudden increase of the effusion into the pleura, not unfrequently occurs, and terminates life by asphyxy. The *urine*, in this state of the disease, is often without any albuminous coagulum, or with very little: but it may, or may not, exist even in the same case, at different stages of its course. This form of dropsy is very frequently benefited by treatment, or for a time apparently removed; but it as often recurs, until the progress of the primary lesion, and the exhausted vital energies, at last favour an increased, a more general, or more sudden effusion, often associated with pulmonary congestion, and life is thereby quickly terminated. When the excreting functions are impeded, the effused fluids may, from effete or irritating matters being secreted along with them, act injuriously upon the surface or tissue with which they are in contact; and, in this manner, much of the appearance of irritation or of structural change, observed either in its course or after death, may be superinduced.

25. (*b*) *Disease of the blood-vessels and lymphatics* is often productive of dropsies; but in many instances its seat and nature cannot be determined during the life of the patient, and frequently with difficulty afterwards. — *a*. The actions of the *arteries* and *capillaries* are more or less affected — are obviously increased in acute, and diminished in passive, dropsies; — but the change is one of function rather than of structure. There are, however, few cases of the chronic or passive forms of the disease met with in advanced age, where the arterial system is entirely devoid of structural lesion. But when we consider the frequency of alterations in this system in old age, it becomes a question whether it be connected with effusion, otherwise than as both may be coincident results of anterior disorders. Some French pathologists, however, believe that the simple retardation of the circulation, occasioned by structural change in the arteries, favours effusion into the cellular tissue and serous cavities.

26. *β*. In respect of disease of the *veins*, it may be inferred *à priori*, and pathological facts have confirmed the inference, that obstructions of them will occasion dropsical effusions, unless a collateral circulation be established sufficient to prevent extreme congestion of the vessels below the part where the impediment exists. This position, acknowledged since its demonstration by LOWER, has been frequently illustrated by the details of cases. RAIKEM found, in two instances, anasarca of the lower limbs, fibrinous concretions obstructing the vena cava and internal iliac veins. MORGAGNI observed a similar state of the extremities from a tumour which pressed upon these vessels; and attributes, in some cases,

dropsy within the head to pressure upon the superior vena cava. Haller states, that compression of the jugular veins has produced dropsy of the ventricles and membranes of the brain. Laennec found obliteration of the vena cava in a case of ascites and anasarca. I have seen, in two cases, enormous distention of the thigh and leg, from the pressure of a psoas abscess upon the iliac vein; and analogous facts are recorded by Hodgson, D. Davis, Bouillaud, Velpeau, Meckel, and Lee. Organic change about the right side of the heart, or tumours pressing upon the thoracic portion of the vena cava, will obviously produce a similar, but more general effect. And I believe, with several pathologists, that congestion or engorgement of the large veins, from deficient vital power, particularly if it continue for any time, will, independently of mechanical obstruction, be sufficient to occasion both increased effusion and accumulation of fluid, owing — 1st, to impeded circulation, consequent dilatation of the smaller vessels, and escape through the pores of a part of their more fluid contents; and, 2d, to diminished absorption, which M. Majendie has shown by experiment to exist in parts whose blood-vessels are inordinately congested. If we allow, with this physiologist, and with several others, who have furnished evidence in recent times, that the veins exert an absorbing function, either directly by their radicles, or by lymphatic vessels opening into them, we must necessarily admit that any obstruction, vital or structural, of the venous circulation, will be followed by an accumulation of fluid in parts beyond the seat of obstruction.

27. γ. Diseases of the *lymphatics*, both functional and organic, have been viewed, as stated above, as causes of dropsies. It is obvious that little beyond the evidence of analogy can be advanced in favour of impaired function of these vessels: but when we consider that many of them open into veins, without passing through glands, we may admit that they will experience the same modifications of function as those vessels with which they are thus intimately connected. And when we reflect on the various circumstances calculated to retard or to entirely obstruct the circulation in the lymphatics passing through glands, and conveying their fluids into their principal trunks, the admission of impaired function, in some cases, cannot be unreasonable. Of this species of lesion, it is obvious that *post mortem* research can furnish no positive proof: but of structural change direct evidence may be advanced, although the difficulty of obtaining it, even in cases where it may exist, will necessarily diminish the amount. It has been considered by several of the authors mentioned above (§ 26.), that rupture of the lymphatics; by Morgagni, Assalini, Bichat, Soemmerring, &c. that a varicose state of these vessels; by Scherb and Saviard, that concretions formed in their principal trunks; by Haase, Boyer, Hunter, Cruickshanks, Soemmerring, Mascagni, &c. that compression of either them or their glands; by most of the authorities now named, that obstruction, destruction, or extirpation of these glands; and, lastly, by some of them, that inflammation of the lymphatics, may severally be followed by dropsical accumulations. On the other hand, ases have been adduced by Morton, D. Monro, llen, A. Cooper, Bichat, and Laennec, in which the principal lymphatic trunks were obstructed without any collections of fluid having been formed.— D. Monro and M. Dupuytren tied the thoracic duct in the lower animals, but dropsy was not the consequence; whilst Mr. Cheston found it obliterated in a case of anasarca. I therefore infer, that alterations of these vessels either may, or may not, be the principal pathological cause of the accumulation of fluid; that, in respect of these species of lesions, as well as of others, additional changes are frequently requisite to the production of effusion; and that, in many instances where disease of these vessels has been found in connection with dropsy, it has been rather a coincident effect of functional or structural change, or of both, in some vital organ, than the chief source of the collection of fluid. From what has now been stated, it may be concluded, that opinions as to the exclusive operation of any one set of vessels in producing symptomatic dropsies are altogether erroneous, and that either of them may be concerned in the result, more especially the veins.

28. The *fluid* collected in dropsy from obstruction in the circulation differs from the serum of the blood chiefly in containing much less albumen. It is usually limpid, inodorous, either colourless or of a citron tint; and, in some instances, when the obstruction has occurred suddenly, it is slightly coloured by the escape of a few of the colouring particles of the blood. The parts containing it are commonly free from any material change, excepting in the more chronic cases; and it often collects in very considerable quantity, before much disorder referrible to the accumulation is complained of. The symptoms will necessarily vary with the seat and rapidity of the collection, and the parts primarily or consecutively affected. The *diagnosis* of effusions depending upon disease of the circulating vessels is very difficult in all cases, and nearly impossible in many. When it occurs in the strumous diathesis, or early in life, or is connected with, or consequent upon, swellings of the lymphatic glands, lesions of the lymphatic system may reasonably be inferred; and when it commences as a local œdema, or is limited to a single limb, or continues in the lower extremities without any signs of disorder referrible to the large cavities, the obstruction of a considerable venous trunk may be inferred. If it appear very slowly in the lower extremities, and increase very gradually, and be attended by a slow, or unequal, or irregular pulse, great coldness of the limbs, with or without discolouration or sores of the legs, particularly in aged or gouty persons, the arterial system will very generally present structural change, as ossific deposits in some part of its course.

29. (*c*) *Dropsy connected with disease of the lungs.* — Either hydrothorax or anasarca, or both, may occur in consequence of pulmonary affection, or merely as coincident effects of the same causes; and in many instances effusion may take place in the pericardium, in addition to the other forms of dropsy. The acute states of anasarca are not infrequently connected with inflammation, congestion, or hepatisation of the substance of the lungs, or with acute bronchitis, particularly after exposure to cold and moisture, or after scarlatina or measles. In many of these cases the pulmonary affection is somewhat obscure, the symptoms

being imperfectly developed; and, unless auscultation be used, is liable to be overlooked or mistaken. Dropsy from chronic bronchitis generally supervenes and proceeds much more slowly than that which is connected with the acute diseases now mentioned, but it usually appears in the same manner; the face, particularly the eyes, and upper extremities, first becoming œdematous, and subsequently the ancles. When any aggravation of the bronchial affection occurs, or if the inflammation extends to the substance of the lungs, the dropsical effusion often increases rapidly. After repeated exasperations of the pulmonary disease, with occasional amelioration during summer, in the more prolonged cases, the anasarca becomes more and more general, and at last effusion takes place into the pleuræ, the pericardium, the cellular substance of the lungs; less frequently into the peritoneum; and in some instances into the ventricles, or between the membranes of the brain; and the patient is more or less suddenly cut off.

30. As fluid is effused into the pleuræ, or cellular parenchyma of the lungs, difficulty of lying down, and dyspnœa, come on and increase; and as it collects in the pericardium, irregularity of the pulse, palpitations, anxiety, œdema of the countenance, fulness of the jugular veins, &c. supervene. If it accumulate on the brain, stupor, coma, paralysis, or apoplexy, takes place. Dropsy occurring in the latter stages of tubercular consumption or chronic pleurisy is generally confined to the lower extremities. It sometimes, however, extends more generally, and occasionally more or less fluid is effused into the cavities of the chest.

31. (*d*) *Dropsy from disease of the liver and spleen.*— The ancients imputed dropsy more to the liver than to any other part; and during the fifteenth and sixteenth centuries, this organ was generally considered as being always its cause. Warmbold, Pezold, Vater, Bianchi, and others, however, showed that it was sometimes free from alteration, even in ascites; and more recent and precise research has proved that it is often not materially changed; and that, in many cases of dropsy, where it has presented certain alterations, disease was likewise found in other viscera, to which the effusion might be referred with greater justice than to the hepatic lesion. But collections of fluid are very frequently formed in the last stages of most chronic diseases of the liver, especially in those which impede or obstruct the circulation of the vena porta. As to the nature of the lesion, very imperfect, or hardly any, knowledge can be obtained during life, or even previously to the effusion, unless as to the existence of enlargement, and sometimes of abscess, which may generally be ascertained by careful examination and percussion.

32. When, however, the dropsy has been preceded, for a long period, by dyspeptic symptoms, particularly by flatulence, uneasiness in the stomach after a meal; by pain or tenderness in the right hypochondrium, below the right shoulder-blade, or at the top of the shoulder; by short, dry cough, and the usual signs of chronic disease of the liver, more particularly by the projection of the edge of the organ below the cartilages of the false ribs; by jaundice; light or clay-coloured stools; scanty red or high-coloured urine, depositing the lithic acid sediment; and by slight evening fever; the accumulation may be imputed to the liver, the disease of which, and its attendant symptoms, being frequently of very long duration before any collection forms. The dropsy usually appears first in the ancles, towards night; or in the abdomen, occasioning slight fulness; or nearly at the same time in both. The urine is then more scanty; and sometimes becomes dark, muddy, turbid, or thick. The skin is often harsh or dry, the bowels constipated, and thirst increased. The progress of the accumulation varies considerably. Occasionally the anasarca of the lower extremities and the ascites increase equally and gradually. In some instances, the former proceeds much more slowly than the latter; and, in others, the ascites arrives at its utmost extent without much œdema of even the ancles. In many cases there is great vacillation in the course of each; the one increasing and the other diminishing, or either or both experiencing a sudden aggravation, and rapidly reaching the acmé. Sometimes, the collection in the abdomen advances rapidly, and arrives at the utmost in a very few days, without any attendant anasarca; the bowels being obstinately constipated, and the urine nearly suppressed. In these cases, the patient generally complains of much pain and soreness, and frequently of tenderness, of the abdominal parietes — probably owing partly to the rapid distention; and possibly, also, to the action on the peritoneum, of the irritating properties of the collected fluid, arising out of the circumstance of its containing much of the injurious constituents that are usually removed from the system in the excretions which are so completely suppressed. In dropsy from diseased liver, there is seldom any effusion into the serous cavities of the chest or head. But as ascites reaches the utmost, dyspnœa becomes urgent, owing to the diaphragm being carried high up into the thorax; and, during the last few days of existence, slight or low delirium appears, at first during the night; the pulse and breathing becoming rapid and weak, and the general weakness extreme, sometimes with distressing nausea or retchings, and the patient sinks.

33. When dropsy depends upon disease of the *spleen*, evident enlargement of it generally precedes the accumulation of water, which, as when it arises from disease of the liver, usually forms in the abdomen, and in the lower extremities. In some cases, particularly in those who have resided in warm countries, or in miasmatous localities in temperate countries, the enlargement of the spleen is associated with chronic alterations of the liver; and the consequent dropsy is but little under the control of medicine. But when the lesion of the spleen is its chief or only source, it may be removed by treatment, along with the disease in which it originated. When dropsy comes on after repeated attacks of ague, and residence in an insalubrious climate, enlargement of the spleen is often influential in its production, or co-operates with other lesions in causing it. In these cases, change of air is one of the best means of removing it.

34. (*e*) *Dropsy from disease of the kidneys.* — It may be stated of lesions of these organs, as well as of others found in dropsies, that they are often the principal pathological causes of the effusion, but that they frequently also exist without this effect resulting from them. There can be

no doubt that every change of structure, to which the kidneys are liable, may be more or less concerned in the production of effusion, especially those which impede or interrupt their functions. Of this latter kind seem to be the principal of those so well described by Dr. Bright (§ 13.). Dropsy may arise either from disease of the kidneys alone — which but rarely occurs, and in which case it usually commences with anasarca, at first affecting chiefly the lower extremities — or from lesions of these organs associated with those of the heart, or of the lungs, or liver. In such complicated cases, the disease of the kidneys may be either *primary* or *consecutive;* perhaps, more frequently, the latter. — *α.* When it is *consecutive*, the dropsy commences, as already described, in alterations of either the circulating or respiratory systems; the accession of the affection of the kidneys being often distinctly indicated by pains in the loins, sickness, vomiting, occasionally purging, and coagulable urine. In some instances, however, renal disease may exist without these symptoms being prominent; and coagulable urine may be present without the kidneys being particularly implicated. — *β.* When the renal affection is the *primary* alteration, the dropsy commences as anasarca; but rapidly extends to the cavities of the pleuræ and pericardium, of the peritoneum, and not infrequently of the arachnoid. In most of these cases, the symptoms are more acute, and the progress of the disease more rapid, than in any of the other forms of symptomatic dropsy. This seems attributable to the disease of the kidneys being such as prevents them from removing all, or even a large proportion, of the injurious elements constantly requiring elimination from the blood; to the consequent secretion of a portion of them in the accumulated fluid; and to their imparting irritating properties to it; whereby it induces inflammatory action in the serous surfaces containing it, with rapid aggravation of all the phenomena, and occasionally a concentration of the malady in one or more of its usual seats. Thus, it is not uncommon to perceive symptoms of pleuritis or pericarditis, or even of peritonitis, to accompany, or even to precede, the more advanced periods of the effusion into the respective cavities; and, as the disease is increased in one or more of these, to observe the disappearance of the fluid from the extremities. In some instances, where the collection has formed rapidly in the cavities of the chest, either preceded or attended by acute symptoms referrible to this situation and its contained organs, not only the anasarca, but also the ascites, where one or both have previously existed, has partially or nearly altogether disappeared, the rapid effusion into these situations soon terminating existence. In other instances of this form of dropsy, effusion on the brain is superadded to these, and the patient dies comatose. Dr. Bright and Dr. Gregory remark, that there is great proneness to salivation from small doses of mercury in dropsy from diseased kidneys.

35. (*f*) *Dropsy from disease of the uterus and ovaria* may arise either from the pressure they produce, when enlarged, or containing tumours, on the veins and lymphatic glands and vessels; or from the extension of disease from them to their peritoneal covering. I met with a case, in which ascites was consequent upon chronic inflammation of the uterus, the peritoneum covering the fundus having become consecutively affected; and a nearly similar instance, in which the effusion into the peritoneum was owing to the suppression of leucorrhœa by astringent injections. In this latter case, I inferred that the discharge proceeded from inflammatory irritation of the internal surface of the womb, or of the os uteri, and that the treatment had suppressed the morbid action in these situations, and determined it to the fundus and peritoneal surface; whence it had extended further, and produced effusion into the abdominal cavity. But little anasarca was present in these cases, and that was confined chiefly to the feet and ancles. Ascites may probably likewise follow chronic inflammation of the ovaria, owing to a similar extension of the irritative vascular action to the peritoneum. Excessive hæmorrhage from the uterus, and abortions, may also produce dropsy, as stated above (§ 8.). Those diseases which have been generally described as ovarian and uterine dropsies, are purposely excluded from the present view of the subject.

36. *Of the Urine in Dropsies.* — Owing to the attention that has been paid to this topic in modern times, and particularly since the investigations of Wells, Blackall, Prout, and Bright, the state of this secretion has become an important source of information as to the pathological conditions giving rise to dropsical collections; although, when viewed alone, much less dependence can be placed upon it. Dr. Wells found that the urine was more or less coagulable in the dropsies consequent upon scarlatina, and even from the exhibition of mercury; and that this symptom was most frequent in anasarca, it having been remarked in twenty-four cases out of thirty-seven. Dr. Christison and Dr. I. Gregory also remarked it most commonly in this form of dropsy; and my experience accords with theirs. I have seldom seen it in ascites. Dr. Blackall considered it as an attendant upon the acute form of the malady; and Dr. Prout, as an indication of irritation. Dr. Bright's cases prove its connection with the more advanced states of the changes of the kidneys he has described, independently of the existence of acute or sthenic vascular action. Several physicians have remarked this state of the urine in other diseases, unconnected with lesions of the kidneys; but admit its frequency in such circumstances, as well as in acute dropsies. I have often observed it in acute diseases of children, where no alteration of the kidneys existed; and I believe it is not uncommon after the exanthemata. The above writers have also noticed a less specific gravity of albuminous than of healthy urine. As to the dark brown colour which this urine frequently presents in dropsy, the inference of Dr. Bright, that it arises from the red globules of the blood, seems to be correct. The presence of albumen may be ascertained either by boiling, or by the nitric or muriatic acids, alcohol, the ferro-prussiate of potash, or corrosive sublimate. The last re-agent is, upon the whole, the best. The opinion of Dr. Prout, as to the value of albuminous urine as a symptom, will be adopted with advantage; namely, that we ought always to be aware of its presence, as, taken along with the others, it may be

occasionally useful in directing our judgment of the nature of the disease; but that, in the present state of our knowledge, it does not indicate any particular remedy or mode of treatment.

37. v. PROGNOSIS.— The prognosis in dropsies will necessarily depend on their form and origin; on the extent and complication of the structural changes occasioning them, the state of vital manifestations, and the habits and age of the patient. — (*a*) *Acute* and *sub-acute* dropsies are generally much less dangerous than the symptomatic, particularly when occurring in young persons and in tolerably sound constitutions; but concomitant circumstances, more especially their association with pulmonary disease, and the nature and extent of that disease, will greatly modify the opinion to be formed of the immediate or ultimate result. The form of dropsy which occurs after scarlatina or measles is much more curable than any other. *Asthenic* dropsy, from excessive evacuations or hæmorrhages unconnected with structural change, or that from insufficient or unwholesome diet, generally admits of cure.

38. (*b*) *Consecutive* or symptomatic dropsies seldom are permanently removed. Those arising from organic change of the heart may be remedied for a time, but they generally recur again and again; judicious treatment frequently prolonging life, nevertheless, for several years. When the effusion proceeds from disease of the lungs, the prognosis will be formed with strict reference to it; and, on the whole, will be less favourable than in the foregoing. The same remark applies to dropsy from changes in the vessels. Accumulations of fluid from organic lesions of the liver are but little under the control of medicine, and generally terminate fatally sooner or later. Occasionally, however, exceptions occur; and much relief is often obtained for a considerable time. When the malady depends chiefly on enlargement of the spleen, a more favourable result has frequently been obtained. Dropsy from disease of the uterus and ovaria seldom terminates favourably. And it would appear that effusions from structural lesions of the kidneys are the most rapidly and certainly fatal.

39. II. TREATMENT.— It will be obvious to every experienced practitioner, that the distinctions made above are merely the more prominent features by which the malady may be recognised, where the acquaintance with it is imperfect; but that there are numerous other shades of character which deserve to be known, and by which he will be in some measure guided in practice, that scarcely admit of description. Of this kind more especially are those ever varying states of vital power, and grades of vascular action, which demand certain indications of cure, or different modifications of treatment, as imperatively as any well-ascertained alterations of structure. There are, perhaps, few diseases that require in the treatment a stricter reference to the conditions of vital power, in connection with changes of its organic alliances, than those now being considered. To ascertain these conditions, and to act strictly in accordance with them in dropsies, even as respects those slighter modifications that can neither be illustrated by examples, nor be made subjects of precept, will tend more to successful practice, than any other object of investigation.

40. i. OF PRIMARY OR IDIOPATHIC DROPSIES. — *A. Treatment of the Acute.*— The first object of investigation will be the state of the disease in relation to its remote and proximate causes, and of the constitutional powers of the patient, comprising every appreciable change in the vital functions, and in the appearance of the soft solids, as indicating modifications not merely in the grade, but also in the kind, of action. By the inferences derived from this source, the practitioner will be guided in the appropriation of the means of cure, and in the alterations he may conceive necessary of the measures about to be described.— In this form of the disease, especially if it be associated with congestion or inflammation of the lungs, if the constitutional powers be unbroken, and if it have appeared suddenly or advanced rapidly, a full *bloodletting* will be requisite, and may even be repeated. In most cases, however, local bleeding by cupping will be preferable to a repetition of the venæsection; and in more doubtful cases, the local depletion, if decidedly employed, will be sufficient. If cupping be prescribed, it should be performed on the part opposite to the seat of soreness or pain, or at a distance from it, particularly when the lungs or pleuræ are affected. Contemporaneously nearly with depletion, medicine should be taken to act upon the secretions, and equalise the circulation; and, for this purpose, there is, perhaps, nothing superior, in the first instance, to *calomel*, in a full dose, combined with *James's powder*, or with a moderate dose of *camphor*, or with both. In some cases, and particularly in persons who have been addicted to drinking, the calomel will be advantageously conjoined with *opium*. In this class of subjects, general bloodletting must be employed with caution. After one or two doses of calomel, in either of these states of combination, a *purgative* draught should be exhibited and repeated, and its operation promoted by a *terebinthinate enema* (F. 149, 151.). Having removed plethora and reduced the increased action, the good effects of *counter-irritation* will be more readily obtained. The tartarised antimonial ointment (F. 749.), or the pea issue, are upon the whole to be preferred; but they should be employed on the side opposite to that where uneasiness is complained of, or at some distance from the most affected part. Whatever external irritant may be adopted, should be long persisted in. In the course of treatment, calomel or blue pill, with either James's powder or *tartarised antimony*, should be repeated from time to time, until increased action disappear; or be regularly continued, particularly if the pleuræ or pericardium be affected, until the specific mercurial effects become manifest; when deobstruent and *saline purgatives* may be prescribed, and their effects promoted by the occasional exhibition of the enema already recommended. The more cooling *diuretics* only should be given at short intervals, in order to promote the functions of the kidneys. These will be advantageously associated with *diaphoretics*. For the former purpose, the supertartrate of potash with borax, the acetate of potass, and the nitrate of potash alone, or with nitric æther, may be used; and for the latter, the camphor julap with liq. ammoniæ acetatis, with vinum antimonii tartarizati, or acetum colchici, and small doses of opium. In this form of dropsy, I believe that all heating diuretics, as squills, juniper, seneka root, horseradish, with their com-

binations and preparations, are more or less injurious, unless vascular action has lapsed into a state different from the sthenic form with which it commenced. With this impression, I have usually preferred those that are the most sedative and refrigerating, especially foxglove, colchicum, the wine of tobacco in small doses, and the spiritus ætheris nitrici, as long as any evidence of increased action remains.

41. *B. Of Sub-acute Dropsy.*—Those intermediate states of the disease, between the acute and the passive — between the sthenic and asthenic forms — will necessarily require means appropriate to the grade of action they may evince. In the more acute cases, local depletions, and the rest of the treatment described above, will be most efficacious. In these, the judicious exhibition of derivatives and purgatives, followed by diaphoretics and diuretics, constitute the chief means of cure; and, when this state of the disease occurs after scarlatina or measles, or in connection with bronchitis, digitalis, the preparations of antimony with opium, and the warm or tepid bath, in addition to these medicines, and followed by change of air, will prove of essential benefit. In the more sthenic cases of the sub-acute, as well as in the acute, disease, when it arises from suppression of the perspiration, or of the exanthemata, the warm or tepid bath, or medicated baths consisting of emollient decoctions, &c., or containing the sulphuret of potash, or the sub-carbonate of soda or of potash, will be serviceable, when employed after sufficient sanguineous and alvine evacuations. In the less active states of the disease arising from the same causes, particularly from suppressed eruptions, the application, and, occasionally, the repetition, of a large blister, or of mustard poultices, or of warm terebinthinate epithems, at a distance from the seat of effusion, or of irritative action, where the existence of this latter is inferred, will frequently be productive of benefit. In those cases which approach the *passive* or asthenic character, or in such of the above which may lapse into it, owing to neglect of treatment, or to a too active treatment relatively to the nature of the case, or to constitutional fault, the means that will be advised for the form of the disease which is thus characterised (§ 42.) should be employed. It will sometimes occur, especially in the intermediate or more doubtful cases, and even also in the acute, that the more antiphlogistic means will be productive of little or no benefit, or will even appear to aggravate the symptoms, although their exhibition seemed clearly indicated. I have generally observed that the practitioner has been misled by the great frequency of the pulse, which he has mistaken for a sign of increased or sub-acute action, instead of viewing it, when it is at the same time soft, small, and easily compressed, and when it is connected with other signs of depression of vital power, as evidence of great weakness conjoined with increased irritability of the vascular system. In such circumstances, I have found *gentle tonics* and astringents, with *deobstruent laxatives*, or with alkaline sub-carbonates; and the moderately stimulating *diuretics*, more especially the *balsamic* and *terebinthinate* preparations, with camphorated *opiates*, &c.; and, if the pulse be languid, with *frictions*, actively, long, or frequently employed; prove very beneficial. Sub-acute or acute dropsies, appearing after the suppression of the hæmorrhoidal discharge, require, after moderate blood-letting, the active exhibition of *hydragogue purgatives*; and the same states of disease connected with suppressed menstruation are most benefited by a nearly similar treatment, with the addition of the *sub-borate of soda*, continued regularly for some time. In some cases of the less sthenic state of sub-acute dropsy, the internal and external use of the *nitro-muriatic acids*; or a well-regulated course of Bath waters, with frequent changes of air; and in others, the artificial waters of Carlsbad, Ems, or Marienbad; and where the bowels require frequent assistance, the Seidschutz waters; have proved very serviceable.

42. *C. Treatment of Asthenic or Passive Dropsies.*—In cases where the debility is general, at the same time that vascular action is either languid, or weak — notwithstanding that the pulse is frequent — and the vital cohesion of the cellular and serous tissues is diminished, *tonics* with the *mineral acids*, especially the infusion of cinchona or the sulphate of quinine, should be prescribed. Where a cachectic habit of body is manifest, quinine will probably occasion heat and feverishness. In such cases, it will be necessary to associate the vegetable tonics with *deobstruents* and *laxatives;* to exhibit the blue pill or PLUMMER's pill in small and frequent doses, with *taraxacum*, or the compound decoction of *sarsaparilla*, the mezereon having been left out. In many of those doubtful cases of this form of the disease, where it is difficult to determine whether it is primary, or associated with obscure lesion in the secreting substance of the liver or kidneys, some advantage will be derived from minute doses of the *oxymurias hydrargyri* in large quantities of the decoction of sarsaparilla, or of any of the species of the *smilax*. I have likewise, in such circumstances, found great service from *iodine*, particularly the hydriodate of potash, and the ioduretted solution of the hydriodate, in smaller and much more frequent doses than are usually directed.

43. When this form of dropsy has arisen from excessive losses of blood, or has supervened on chlorosis, the *chalybeate preparations*, with chalybeate mineral waters, or the artificial Pyrmont and Spa waters, will be of the utmost service. But care should be taken to ascertain the non-existence of visceral obstruction before they are resorted to, and to preserve the bowels freely open during their use. When passive dropsy occurs after delivery or abortion, bitter infusions, and vegetable tonics, the decoction of cinchona with mineral acids, occasional purgatives, and the terebinthinate enema, with frictions of the surface and bandages, will be requisite; and, if it be accompanied with hysterical symptoms, the preparations of juniper, spirit. ætheris nitrici, or other ætherial preparations, with tinct. camphoræ comp., or small doses of opium, will be of much service. In these cases, the combination of diuretics with bitter or tonic infusions, and small doses of the tinctura camphoræ Thebaïca (F. 708.), or the tinct. opii camph. (F. 728.) will generally be advantageous.

44. ii. TREATMENT OF CONSECUTIVE OR SYMPTOMATIC DROPSIES. — It is obvious that the intentions of cure in this class of dropsies should have strict reference to the nature of the organic lesions concerned in the production of effusion,

and to the state of vital energy and structural cohesion; and that they should comprise the following objects. — 1st. To remove these lesions, and if this cannot be accomplished, to retard their increase, as the chief means of diminishing the effusion; — 2d. To promote the absorption of the fluid accumulated; — and, 3d. To support the constitutional powers; as being necessary both to the due operation of remedies, and to the exertion of that vital resistance which guards the structures against the impression of hurtful agents, whether generated within the system, and acting intrinsically, or invading them from without.

45. *A. Of dropsy consequent on disease of the heart.* — It will be important to ascertain, as correctly as the rational and auscultatory signs will enable us, the nature and seat of the cardiac lesion, in connection with the seat of effusion, and its characters in respect of activity. If obstruction to the circulation be seated in the left side of the heart, there will very probably be associated with the effusion, congestion of the substance of the lungs, which will aggravate the hydropic symptoms, and render depletion the more necessary. Also, if the cardiac disease consist, either altogether, or in part, of active enlargement of the parietes of the cavities, the dropsy will present a sthenic character, and require antiphlogistic remedies; but if the lesions be chiefly passive, — if there be dilatation with thinning or softening of the parietes of the heart, — the constitutional symptoms will possess analogous features, and the disease require an opposite — a tonic, treatment. It will be evident from these facts merely, that, in symptomatic, as well as in idiopathic, dropsy, and even in that connected with impeded circulation through the heart, the strictest reference should be had to the state of vital power and vascular action, as the principal basis of our intentions of cure.

46. If a state of sthenic action exist, *local depletion* — preferably by cupping; hydragogue cathartics, as *elaterium* and the *croton oil*, repeated from time to time; or even these independently of depletion; and subsequently the use of *diuretics*, or these at an earlier period where the active and repeated exhibition of purgatives are not well borne; will frequently remove the accumulation of fluid. In this state of the disease, *digitalis* is the most efficacious diuretic, especially after local depletions and purgatives, in the more sthenic cases. Debility rather indicates, than contra-indicates, the propriety of resorting to it. The infusion is the most certain preparation of this medicine. Half an ounce of it two or three times a day, as usually directed, is a much larger dose than that recommended of its other preparations; hence the reason of its activity, its diuretic operation being heightened by the addition of small doses of opium. If a tensive pain in the forehead, with disturbance of the cerebral functions, come on early after its exhibition, it will rarely be of service, or it may even be injurious, as remarked by Dr. Blackall, and it, therefore, should be immediately relinquished. When there is much debility, it should also be discontinued upon the first appearance of an increase of the urine. But even great debility is no reason against the use of this medicine, as Dr. Withering has shown; only the more caution is required in its exhibition. In such cases I have usually combined it beneficially with camphor, a small quantity of opium, or with cinchona (F. 859.), and other vegetable tonics and cordials, or with F. 708. or 728. *Colchicum* is sometimes of service when this form of dropsy assumes a sthenic character, or appears in the rheumatic or gouty diathesis; but it requires much caution. It is most safe, and at the same time most serviceable, when combined with camphor or ammonia, or with the alkaline sub-carbonates, and infusion of cinchona.

47. When the cardiac disease and its consequent effusion are of a passive kind, and especially if the constitutional powers are much reduced, a tonic treatment, in conjunction with stimulating diuretics, is requisite. The remedies of this description already recommended (§ 43.), — the *infusion of quassia*, with the *muriated tincture of iron*, and tincture of digitalis; the compound infusion of *angelica*, (F. 219.); the decoction of *broom tops* (F. 75.), with the compound spirit of juniper; the compound decoction of *taraxacum* (F. 77.), with tincture of calumba or *tartarised iron*; and either Formulæ 570. 781. 859., or the following, will often be prescribed with benefit: —

No. 179. ℞ Potassæ Sub-carbon. ℈j.; Tinct. Cinnamom. Co. ʒj.; Spirit. Æther. Nit. ʒj.; Infus. Gentianæ Comp. ℥j.; Aquæ Anethi ℥iij. M. Fiat Haustus ter quotidiè sumendus.

No. 180. ℞ Potassæ Acetatis ʒss.—℈ij.; Tinct. Digitalis ♏viij.; Tinct. Opii ♏v.; Spirit. Junip. Comp. ʒj.; Infus. Quassiæ ℥ix.; Aquæ Pimentæ ℥iij. M. Fiat Haustus ter quaterve in die sumendus.

No. 181. ℞ Camphoræ subactæ, Guaiaci Resinæ, āā ʒj.; Pulv. Scillæ et Pulv. Digitalis āā gr. xv.; Opii Puri gr. v.; Olei Juniperi ♏xxij.; Mucilag. Acaciæ q. s. M. Contunde simul, et distribue massam in Pilulas æquales xlviii., quarum capiat binas ter in die.

No. 182. ℞ Tinct. Digitalis ♏x.—xv.; Liquor. Ammoniæ Acetatis ʒij.; Infus. Cinchonæ et Mist. Camphoræ āā ℥vj.; Tinct. Camphoræ Comp. ʒj.; et Spirit. Anisi ʒss. M. Fiat Haustus bis quotidiè sumendus.

48. *B. Dropsy from disease of the absorbing systems — veins and lymphatics.* — The difficulty of determining when the effusion is owing to these causes has been stated above, with such signs as sometimes indicate its existence (§ 25. *et seq.*). In the more limited states of anasarca, and even in ascites, *bandages* and *frictions*, assiduously employed, with the internal exhibition of the *hydriodate of potash*, or of the other preparations of iodine to be found in the *Appendix* (F. 234. 723.), have proved exceedingly beneficial in some cases in my practice. The decoction of *broom tops* with liquor potassæ, or this latter in the compound decoction of sarsaparilla; equal quantities of the sub-borate of soda and supertartrate of potass in the *decoctum cydoniæ*, or *decoctum guaiaci comp.*; the *diuretic drinks*, in the Appendix (F. 588. *et seq.*); and frictions with deobstruent *liniments* (F. 295. 297. 311.), will occasionally be of much service. The sub-carbonate of *soda*, or *nitrate of potash*, or both, exhibited in tonic infusions, to which small doses of digitalis are added; and the infusion of *berberis*, or the compound decoction of taraxacum (F. 76, 77.), with sub-carbonate of potash or of soda; or the same alkaline carbonates with the infusion or mixture of the *diosma crenata* (F. 231. 396.); may likewise be employed, with a prospect of advantage, from their deobstruent operation. In all cases of this kind, gentle exercise in the open air; the use of the artificial waters of Marienbad, and Eger, or of Seltzer or Seidschutz; and strict attention to a moderate, di-

gestible, and cooling diet; will prove of essential benefit.

49. *C. Dropsy connected with pulmonary diseases.*—The treatment in this complication should mainly depend upon the character of the vascular action, and vital power, and the nature of the existing pulmonary lesion. If active congestion or inflammatory action be present in the substance of the lungs, or in the pleuræ, general or local *depletions*, or both; the internal use of *antimonial* preparations with *diuretics*; and external derivation, as pointed out above (§ 40, 41.); constitute the principal means. The same treatment is required, with the addition of purgatives, if the effusion be associated with acute or sub-acute bronchitis. In these states of the disease, the heating diuretics, as squills, ammoniacum, senega, &c., ought not to be exhibited. The supertartrate of *potash* with *borax*, or with digitalis; or any of the neutral salts, with *liquor ammoniæ acetatis*, the spiritus ætheris nitrici, or the *acetic æther*; or the preparations of *colchicum* with the alkaline carbonates, or with camphor or ammonia; are the most appropriate. In the chronic and asthenic states of pulmonary disease connected with a similar condition of the system, a tonic treatment is indispensable; and the warmer diuretics (F. 552. 570. 893.) will generally be employed with benefit, more particularly the *balsamic* and *terebinthinate* preparations (F. 22. 169. 485. 487. 571. 681. 827.), and *ammoniacum*, with the tinct. camphoræ comp. (F. 708.), or the tinct. opii camphorata (F. 728.), or the preparations of *squills* with any of the neutral salts, given in the light bitter, or tonic, or diuretic infusions. (See BRONCHITIS — *Treatment of Chronic, &c.*)

50. *D. Treatment of dropsy from disease of the liver and spleen.*—(*a*) This form of dropsy is very commonly connected with general debility, and with a cachectic state of the frame. In some cases, the colour, consistence, and vital cohesion of the soft solids are more or less changed, particularly the cellular, serous, and mucous tissues. These circumstances should not be overlooked in framing plans of treatment. Cases of this complication are comparatively rare, that require general or even local depletion. However, when symptoms of inflammation of the liver are present, *general* and *local depletions* — the latter at least — should not be omitted. *Mercurials* should also be employed, especially when the surface of this organ is the part chiefly inflamed; and occasionally externally by friction, as well as internally; counter-irritation being kept up at the same time. But it is doubtful whether or not these preparations are beneficial in the chronic lesions of the substance of the liver. I have generally abstained from prescribing them in such cases, excepting the oxymuriate, in minute doses in the compound decoction of sarsaparilla, or in the preparations of cinchona. More service will accrue from the *nitro-muriatic acid bath*, or from sponging the surface of the hypochondria, night and morning, with a warm lotion containing these acids, or from the internal use of them. The *chlorate of soda* may also be taken with advantage; but I believe that greater benefit will be derived from the *hydriodate of potash*, or the other preparations of *iodine*, given in minute doses, and continued for a due period, than from any other medicine. Either the infusion of calumba or of quassia, or the infusion of pine tops; or the decoction of genista, or of taraxacum, with the alkaline sub-carbonates, or with the liquor ammoniæ acetatis, and spiritus ætheris nitrici; and the supertartrate of potash with sub-borate of soda, and *squills*, taken in the form of electuary, with the inspissated juice of the *sambucus nigra*, will be more appropriate when the liver is organically changed than in the other forms of the disease. The preparations of *colchicum* and *tobacco*, particularly the *tinctura tabaci composita* (F. 742.), may also be given in this complication, but with caution. They have seemed to me most beneficial when associated with large doses of the alkaline sub-carbonates, and taken in tonic infusions or decoctions; as those remedies which depress the vital powers too low are seldom productive of benefit in cases of this description. (See DROPSY — *of the Abdomen.*)

51. (*b*) A nearly similar treatment will be necessary when the *spleen* is enlarged, to that now recommended in cases of organic change of the liver. I believe, however, that tonics of an active kind, particularly cinchona, quinine, the preparations of iron, and the arsenical solution, either conjoined, or alternated with purgatives or diuretics, are much more necessary in this complication than in that last discussed. All the cases I have seen connected with enlargement of the spleen were consecutive of protracted agues; and in these, after exhibiting one or two full doses of calomel with camphor, and fully evacuating the bowels by means of the compound infusions of gentian and senna (F. 266.), the above tonics, prescribed as now mentioned, and assisted by frictions over the region of the spleen, were productive of great benefit. In the case of a patient from one of the most marshy parts of Essex, with this complication, the preparations of *iodine* were essentially efficacious. In this state of the disease, but little or no permanent benefit will be derived as long as the patient continues to reside in a miasmatous locality. In it, also, more than any other form, will advantage accrue from moderate exercise, change of air, sea-voyaging, and the use of the Carlsbad or Ems mineral waters, — which, with those of Marienbad, Eger, and Seidschutz, are often of service when the effusion arises from hepatic obstruction.

52. *E. Treatment of dropsy from disease of the kidneys.*— Attention has been so recently drawn to this complication, by the writings of Dr. BRIGHT, that sufficient experience of the means of treating it has not been yet acquired. I have had an opportunity of treating only three cases, in which these organs were found diseased after death, since the publication of Dr. BRIGHT's work. They were persons of broken-down constitutions, by drinking. In one of them the accumulation steadily increased, notwithstanding cupping over the loins, counter-irritation in this situation subsequently, friction with stimulating liniments, and various internal remedies, were employed. In the others, these means were of temporary benefit. The supertartrate of potash with jalap, and squills with opium or hyoscyamus, are mentioned by this pathologist as having been the most serviceable in the cases which occurred in his practice. I believe that, in a very great majority of instances where effusion proceeds from this cause, the irritating nature of the fluid poured out superinduces

inflammation of the membranes and cellular tissue containing it, and thereby aggravates the disease, and accelerates a fatal issue. That the fluid is possessed of these properties may be viewed as a postulatum; but if it be considered that, when the functions of the kidneys are interrupted, excrementitious or serous plethora (see Blood, § 19.) will be the result; and that the watery parts of the blood, which are effused from this cause, must necessarily contain a considerable quantity of the injurious matters usually eliminated by these organs; the irritating quality of the accumulating fluid here contended for will be admitted. In the cases seen by me, consecutive inflammatory action appeared in the seats of effusion; and a similar occurrence took place in most of those detailed by Dr. Bright. When this complication is attended by debility or diarrhœa, the propriety of employing tonics, with diuretics and opiates, as cinchona or quinine with the mineral acids or squills, cannot be doubted; and, when the bowels are constipated, or when diarrhœa is not present, free alvine evacuations by purgatives combined with bitter tonics, which increase their operation, will be productive of benefit. I believe that there are few cases of this form of dropsy that may not admit of the judicious exhibition of strengthening medicines, when a free action is exerted on the bowels; that the diarrhœa and tormina which sometimes accompany it, are seldom attended by copious evacuations, but require that they should be procured by medicine; that the *balsams* and *terebinthinates*, either conjoined with these, or trusted to chiefly alone, or with small doses of opium, will prove more beneficial than other diuretics; and that a lowering or antiphlogistic treatment has been too generally adopted, as well in cases of this description, as in others where coagulable urine is observed, owing to the mistaken notion that this symptom always indicates inflammatory or sthenic action.

53. *F. The treatment of dropsy from disease of the uterus or ovaria* will depend upon the state of vital power and vascular action. Although very generally evincing an inflammatory character, and connected with suppression of the sexual discharges, yet it is often associated with depressed vital or constitutional power, at least in those instances which have come before me. When, however, it supervenes on chlorosis, it is altogether a disease of debility. In the former class of cases, local depletions, cooling aperients and diuretics with gentle tonics; the nitrate of potash and sub-carbonate of soda, with the spiritus ætheris nitrici and hyoscyamus in the infusion of cinchona, or of calumba, or of juniper berries; the supertartrate of potash with sub-borate of soda; the expressed juice of the sambucus nigra and syrup of squills; and frictions with oleaginous or terebinthinated liniments (F. 297. 311.); may be severally employed; but the treatment should mainly depend upon the presumed state of the primary disease, of the consecutive effusion, and state of vital power. The object, in this form of the disease especially, should be to remove the primary lesion; for when this is accomplished, the effused fluid will soon be absorbed. When the disease follows *chlorosis*, the preparations of iron, the mistura ferri composita, the sub-carbonate of iron with electuary of senna and oxymel of squills; the preparations of juniper with cinchona, &c., with change of air; horse-exercise, the chalybeate mineral waters, and warm clothing, will generally be efficacious. I had recently a case of this description under treatment, both whilst it was simple chlorosis, and when water had collected in the abdomen and lower extremities. I was surprised at its resisting the free use of chalybeate and other tonics; when I found that the patient had entertained a dislike to salt, and to food which contained it, and had long avoided it. The cause of the general and extreme cachexia was now evident: the use of salt was enforced; the chlorate of potash was also prescribed alternately with the preparations of iron, and recovery soon took place.

54. ii. Notices of the Medicines recommended in Dropsies by Authors, with practical Remarks. — Having, in the foregoing sections, stated chiefly the results of my own experience, I now proceed to notice, under distinct heads, the means advised by respectable and original authorities for the treatment of this class of diseases. The remedies recommended in the cure of dropsies have usually been directed with the following *intentions*: — 1st. *To remove the state of vascular action, and vital power giving rise to effusion* — (*a*) by refrigerants, comprising vascular depletion and other antiphlogistic remedies; (*b*) by sedatives; (*c*) by external irritation; (*d*) by tonics and astringents; and (*e*) by a combination of two or more of these; — 2d. *To remove obstruction to the circulation, and to promote the absorption and discharge of the accumulated fluid* — (*a*) by deobstruents, frictions, and bandages; (*b*) by purgatives and hydragogue cathartics; (*c*) by diuretics; (*d*) by emetics; (*e*) by sudorifics; and (*f*) by various combinations of them; — and, 3d. *To evacuate the fluid by surgical aid* — (*a*) by blisters and scarifications; (*b*) by acupuncturation; (*c*) by paracentesis. Of these last means notice will be taken when the specific states of dropsy in which they have been employed come under consideration.

55. 1st. *To remove the State of Vascular Action and Vital Power giving rise to Effusion.* — *A. By refrigerants, &c.* — (*a*) *Vascular depletion*, general or local, or both, has been advised in the acute states of the disease from Hippocrates up to the present day; and has been more particularly insisted on by Mesué, Bonet, Aascheim, Schulze, Bruele, Juncker, Stoll, Tissot, Rush, Oberteuffer, Grapengiesser, Blackall, Abercrombie, Graham, Venables, and Ayre. The propriety of repeating it has been shown by J. P. Frank, Dr. Graham, and some later writers; although the number of cases that can admit of the repetition of general bloodletting will be comparatively small, and those only in the young or unbroken constitution. — (*b*) *Nitre* has been very generally prescribed, not merely as a refrigerant, but as a diuretic. Rush attached some importance to it after venæsection, directing it with *spare diet*; and Rosier and Oberteuffer, with squills. — (*c*) The *muriate of ammonia*, in doses of ten grains to a scruple, has been given by me in some cases consequent upon ague with benefit; and is appropriate not only to acute and sub-acute cases, but also to the more passive states of the disease, particularly when taken in tonic or warm diuretic infusions, and conjoined with ammoniacum. — (*d*) *Low diet* has been especially noticed by Tissot and Rush.

56. *B. By sedatives.* — (*a*) *Antimonials* may be more appropriately considered as sedatives than as diaphoretics, inasmuch as their operation in the latter capacity arises from their sedative influence on vascular action. *James's powder* and *tartar emetic* are the preparations of this class most to be depended upon, and are sometimes useful in the acute and sub-acute forms of the disease, conjoined with calomel, or with cream of tartar. They have been prescribed in such cases by VAN HELMONT, SYDENHAM, MYNSICHT, and RICHTER. With squills and saline diuretics, they have been employed by BRISBANE and WILLICH. — (*b*) The diuretic operation of *tobacco* is evidently owing chiefly to its *sedative* influence on the circulation. This active substance is indicated in the more acute states of the disease, but it may also be exhibited with tonics and stimulating diuretics, where the debility is more manifest. It has been recommended in the form of powder, infusion, wine, or tincture, by MAGNINUS, BARTHOLIN, FOWLER, NEANDER, GARNETT, and BALDINGER. Dr. FOWLER advises the *infusion* in gradually increased doses; GARDEN, its ashes with *rhubarb* and sulphate of iron; and some Continental writers with camphor in the form of *tincture* (see F. 742.), which may be added to other medicines. The *ashes* of tobacco are very frequently mentioned by the writers of the last century, but their operation can depend only on the quantity of vegetable alkali they furnish. — (*c*) Several of the *solanaceous* order of plants, besides tobacco, have been employed in dropsies, both as the principal means confided in, and in order to assist, by their sedative and diuretic operation, other medicines possessed of less equivocal diuretic properties. The *belladonna*, the *physalis alkekengi*, the *solanum dulcamara*, the *s. somniferum*, and the *s. nigrum*, have been employed by STOËRK, BALDINGER, STARK, and others, with this intention. The *hyoscyamus* has also been very frequently prescribed, with the view of diminishing irritation and promoting the action of other medicines; but it is inferior to — (*d*) *opium*, in this respect, the good effects of which in dropsies have been particularly noticed by WILLIS, ARNEMANN, BROCKLESBY, RITTER, BAKER, and MASON. Its influence in determining and heightening the effects of diuretics has been shown by LENTIN and PARIS. DOEMLING always added it to *squills*; and LEAKE, to this medicine and cream of tartar. — (*e*) The *lactuca virosa* has also been recommended to fulfil the same indications with the above by COLLIN, DURANDE, and RICHTER, particularly in conjunction with digitalis — two grains of the extract of the former, with half a grain of the dried leaves of the latter, finely triturated with white sugar, and taken three or four times a day. The foregoing sedatives, as well as the *colchicum* (§ 80.), will be found very useful adjuncts, and indeed not infrequently the chief means that should be resorted to when the disease is attended with much pain, or with spasms or cramps.

57. *C. By external irritation.* — It is but rarely that external irritants give issue to a quantity of serum sufficient to unload very considerably the vascular system: but in the acute, and especially in the sub-acute, states of the disease, after depletions, a judicious use of them is often productive of benefit, by transferring the irritation sometimes occasioning the effusion, from the internal parts. They are applicable chiefly to dropsies of the thoracic cavities, depending upon pulmonary disease, to those consequent on scarlatina, and to ascites. The means by which counter-irritation should be effected is an important consideration. In the states and species of the malady now alluded to, the *tartarised antimonial ointment*, or *issues*, may be preferred; or blisters may be applied in the more asthenic and rapidly progressive cases. When the effusion seems owing to obstruction of the liver, *blisters*, several times repeated, over the right hypochondrium, and below the right shoulder-blades, or *rubefacient plasters* in the same situation, are sometimes of much service. When the kidneys are apparently affected, they may be applied over the loins, after cupping in that situation; or the tartarised antimonial ointment may be used. In the more sthenic cases, or when the urine is very thick and scanty, it will be preferable to apply fine tissue paper between the skin and the blister, or to dip the plaster in boiling water before applying it, in order to prevent the absorption of the irritating principle of the flies. In some cases, scraped horseradish, or the inner bark of the mezereon, will prove excellent counter-irritants; or mustard poultices may be used for this purpose. I have, in several cases, however, seen more benefit arise from the application of a cloth moistened with either of Formulæ 296. 300. 311. in the Appendix, or with spirit of turpentine, over the seat of disease, than from any of the foregoing. The inflammatory irritation they occasion is never followed by unpleasant results, as in the case of blisters, which, in the old and debilitated especially, sometimes produce dangerous effects if not carefully watched.

58. *D. By tonics and astringents.* — These medicines are often necessary in some of their various combinations, even in cases where it is necessary to resort to vascular depletion, and not infrequently after this practice has been employed. Much, however, will depend upon the selection of these medicines, and the mode of exhibiting them, appropriately to the pathological states of the case. The observations already offered will assist the practitioner, with a due exercise of his own discretion, in this important matter. Tonics and astringents are indispensable in all the passive or asthenic states of the disease, associated either with diuretics or with purgatives; and in many of the sub-acute and even acute forms, after the antiphlogistic treatment has been prescribed, particularly when conjoined with cathartics. They are especially indicated where the effusion seems to depend chiefly upon an atonic state of the extreme vessels, and deficient vital cohesion of the cellular and serous tissues, with flaccidity of the soft solids generally. In cases of this description they have been directed by most writers, and even by J. P. FRANK and RICHTER, by whom the inflammatory and sthenic states of effusion have been so ably investigated.

59. (*a*) Of the particular tonics that may be employed, the preparations of *cinchona* and *sulphate of quinine* are the most generally applicable. They have been especially noticed by LENTIN, DE HAEN, BROUGHTON, and RING. The *infusion* or *decoction* of bark is an excellent vehicle for the alkaline and saline diuretics, as well as for several purgatives, the action of which

it tends to promote. LETTSOM gave cinchona with squills; LYSON, with serpentaria, either in tincture or infusion; J. P. FRANK, with juniper; HORN, with the balsams or turpentines; and VOGEL, with the neutral salts, or sub-carbonates of the alkalies. Where the sthenic diathesis may seem to contra-indicate its use, the infusion will be advantageously associated with the nitrate of potash and sub-carbonate of soda, and with appropriate diuretic tinctures or spirits. It may also be given with the mineral acids and æthers, especially the muriatic or sulphuric. The *sulphate of quinine* may also be taken in the compound infusion of roses, or of orange-peel, in conjunction with the sulphates of magnesia, or of potash, or of soda, and any diuretic spirit or tincture. — (*b*) The *infusion of calumba*, of *quassia*, and of *gentian*, have been exhibited in similar states of the disease, and combined with the same substances, as cinchona.

60. (*c*) The preparations of *iron* have been as generally prescribed in dropsies as those of cinchona; and, as in respect of them, with the object of imparting tone to the minute vessels, and thereby of diminishing effusion, and of preventing its recurrence after the fluid has been directly removed. This class of tonics was much employed by DOVER, BLACKMORE, BERGIUS, TISSOT, GRIEVE, FRANK, and RUSH. The combination of chalybeates with purgatives is advised by RIEDLIN and THOMANN. DOVER recommended an electuary consisting of the sulphuret of iron, scammony, and crude mercury; of which Dr. BLACKALL has made favourable mention. FOUQUET directed it with sulphur. The *ferrum tartarizatum* and the *muriated tincture* are the preferable preparations; but the sulphate or subcarbonate may likewise be used. An electuary containing the tartarised iron, the confection of senna, the inspissated juice of the sambucus nigra, and the syrup of squills, will often prove serviceable in asthenic states of the disease. — (*d*) The *absinthium*, in the form either of infusion, wine, or powder, was formerly much employed; and was praised by CELSUS, BONET, HARTMANN, and many others, particularly when given in conjunction with juniper, or other diuretics. It has now undeservedly fallen into disuse. — (*e*) Of the stimulating tonics, *phosphorus* has been prescribed, in minute doses, and usually dissolved in oil or æther, by LOEBEL, GAULTIER DE CLAUBRY, and others: it has likewise been used externally in oleaginous liniments. — (*f*) *Insolation*, or exposure to the sun's rays, has been recommended by CELSUS and PORTAL.

61. (*g*) Several of the astringent tonics have been directed in various combinations. The *sulphuric acid* was recommended by MONDSCHIEN, HALLER, TISSOT, BANG, and HARTMANN; and was frequently given with the infusion of the bark or of the flowers of the sambucus nigra, or the infusion of quassia, or of cinchona. The *muriatic acid* was also exhibited in similar states of combination by RIVERIUS and DIGBY. The *nitric acid*, either alone, or with the muriatic in equal proportions, has been very commonly employed, both internally and externally, by practitioners in the East Indies, in cases depending upon hepatic disease (§ 50.). — (*h*) The *sulphate of copper*, in doses of half a grain each, with opium, has been praised by WRIGHT. — (*i*) In addition to these, the *centaurium minus* and the *inula campana* have been noticed by GRÜLING and others, who have prescribed them in the form of wine or beer; and the *prinos verticillatus*, by BARTON. — (*k*) The mineral waters of *Pyrmont*, *Spa*, *Bath*, and *Tunbridge*, have been severally directed in cases for which tonics are appropriate. Dr. PERCIVAL recommended the natural and artificial waters which contain *fixed air*. SCHENCK, QUARIN, GILCHRIST, J. P. FRANK, and several other writers, mention in favourable terms *change of air* and *sea-voyaging*. — (*l*) Most of the ancients, with FULLER, RUSH, and some others of the moderns, have insisted on the good effects of active exercise in the open air. When the patient is able to adopt this advice, there can be no doubt of its great efficacy.

62. *D. By a combination of two or more of the foregoing plans of cure.* — I have already remarked that depletions are not infrequently requisite to a moderate extent, in order to remove relative or excrementitious plethora, even although vascular action may not be increased; and there is often a necessity for the exhibition of tonics at the same time, generally with purgatives or diuretics. The propriety, however, of associating sedatives with the various antiphlogistic measures noticed above, and counter-irritation with both, in the inflammatory or acute states of the disease, is still more manifest. The combination, also, of some one of the sedatives with the tonics or astringents, whether these latter be given alone, or conjoined with one or more diuretics or deobstruents, is generally found useful, not merely in promoting their operation, but also in relieving the more uneasy sensations which frequently occur during the progress of the disease.

63. 2d. *To remove Obstructions to the Circulation, and to promote the Absorption and Discharge of the accumulated Fluid.* — This indication comprises three objects, — the removal of *obstruction*, the promotion of *absorption*, and the augmentation of the urinary *discharge*. These, however, are so intimately connected, that the attainment of the first is generally followed by the second and third. — *A. By deobstruents, and the use of frictions and bandages.* — These means are obviously appropriate to cases of dropsy depending chiefly on congestion of the large veins, or to obstruction either of them or of the lymphatic system (§ 48.). Many of the remedies which are supposed to act upon the kidneys, operate in some respects by removing obstructions to the venous and lymphatic circulation, and increasing the action of the absorbents. Those substances which have been very commonly termed *deobstruents*, pass into the blood by the veins or lymphatics, where they either modify its condition, or excite the extreme vessels when they are congested, thereby accelerating the circulation through them and the veins, and removing the state that favours increased exhalation. — (*a*) *Mercurial* preparations are amongst the most common medicines employed as deobstruents. But they are not always applicable; for when the dropsy is connected with organic change in the substance of the liver, they should be given with circumspection. When the obstruction exists chiefly in the venous and lymphatic systems, or depends upon disease of the heart; or when

the effusion is caused by increased action in the serous membranes; they are valuable medicines. The scrofulous diathesis and weak vital energy are not always satisfactory reasons against their use, although these states of system require a peculiar mode of exhibiting and combining them. In acute cases, *calomel*, with antimony or camphor and opium, is the preferable medicine. In this and similar states of preparation, it has been employed by Lysons, Langguth, Hamilton, Becker, and others. Where active disease exists in the pleuræ, pericardium, peritoneum, or surface of the liver, this is the best mode of exhibiting mercurials; but where there is much *debility*, this medicine should be given in small doses with soap, and guaiacum, as advised by Riepenhausen; or in the form of Plummer's pill, with soap and taraxacum. In an atonic or asthenic state of vital action, as well as in the scrofulous diathesis, small doses of blue pill, similarly combined; or of the *sublimate*, dissolved in the compound decoction of sarsaparilla, or tincture of cinchona, with diuretics; will be found both safe and beneficial medicines. Mercurials have been directed to be pushed to salivation by many authors; and in cases where the disease is connected with inflammatory action in the serous membranes, and when vascular depletion has been previously instituted and carried sufficiently far, the practice is beneficial. It is likewise applicable when there is evidence of inflammation of the surface of the liver, as indicated by pain, soreness, and tenderness of its region, &c. In the more chronic and asthenic states of disease, mercurials have been directed to be given with squills, by Fischer and other writers; and with tonics, by Wright.

64. (*b*) *Iodine*, variously combined, has proved, in several cases of dropsy in which I have employed it, a most valuable deobstruent and diuretic. It is not applicable to the cases arising from disease of the serous membranes, and heart; but when the effusion proceeds from obstruction in the liver, or in the spleen, or in the veins and absorbents (§ 26, 27. 31.), it seems to me more to be depended upon than any other medicine. I have prescribed it in the form of *tincture*, *hydriodate*, *idiorutted solution of the hydriodate*, and of *ioduret of mercury*, both internally and externally, according to the circumstances of the case; and have more frequently preferred the second and third of these preparations; but when the debility is great, the tincture is, perhaps, more to be depended upon than the others. — (*c*) The fixed *alkalies* and their sub-carbonates have had much repute in dropsies, and were very commonly employed by Sydenham, Quarin, J. P. Frank, and most recent writers. Although generally used as diuretics, they act chiefly as deobstruents, particularly when combined with taraxacum, small doses of antimony, or of mercury. In cases of debility, they are extremely useful with the tonic or warm diuretic infusions or decoctions, — as the infusion of cinchona, of juniper berries or pine tops; and they may be also associated with the nitrate of potash and diuretic spirits or tinctures. Or they may be prescribed with myrrh, or guaiacum, or sulphur, or ammoniacum, or squills, or camboge, or the extract of black hellebore, according to the peculiarities of the case. — (*d*) The *sub-borate of soda* is a very useful adjunct to other deobstruents, and to diuretics (see F. 57. 397. 599.). I believe that its deobstruent action is greater than that of the alkaline carbonates. — (*e*) *Ammoniacum* has also been exhibited, chiefly on account of its deobstruent operation, and is indicated in the atonic states of the disease, and in the complications with organic change in the liver, spleen, or kidneys; and in cases of venous, absorbent, or glandular congestion or obstruction. In these it may be conjoined with alkalies, extract of taraxacum and squills (see F. 552. 893, 894.). Fordyce gave it with antimony and nitre, — a form in which it may be safely prescribed in the acute and sub-acute cases, after vascular depletion and purgatives; and Richter, with the muriate of ammonia and squills. — (*f*) *Sulphur*, when judiciously associated with other deobstruents and aperients, or with diuretics, possesses no mean deobstruent properties, more particularly when given with cream of tartar, as Hufeland advises; or with this substance, the sambucus nigra, and the sub-borate of soda; or with the nitrate of potash, and squills; or with the balsams, as directed by Mondschein.

65. (*g*) The *external deobstruents* consist of certain of the substances already noticed, kept constantly applied over the chest, or the loins, or hypochondria, in the form of *plaster*; or assiduously rubbed into the same places, in the form of *liniment* or *ointment*. The *Appendix* will furnish, under these heads respectively, several preparations, consisting chiefly of ammoniacum (F. 109. 117. 891.), the preparations of iodine (F. 302. 768. 775.), of the terebinthinates (F. 120. 296, 297.), of mercury (F. 511. 761.), of camphor (F. 115. 306. 758.), and of the sulphurets (F. 309. 776.), with other substances; calculated to promote their operation, and allay internal pain and vascular irritation. Besides those now indicated, will be found arranged along with them, several preparations which may also be used according to circumstances. — (*h*) *Frictions* are of more benefit in dropsies, particularly in those which depend upon obstruction and atony of the vessels and tissues, than is usually imagined; and were commonly employed by Stoërck, Stoll, Rush, Wright, and others. They will be advantageously used with the *liniments* or *ointments* already noticed employed in weaker forms. Frictions with the weak *mercurial ointment* were advised by Broughton, Frank, and Knight; the addition of camphor to this liniment, as recommended by Lentin, or the linimentum hydrargyri reduced by the addition of olive oil, or of the linimentum saponis compositum, will be found superior to the mercurial ointment alone. Frictions *with olive oil* were much confided in by Stoll, Oliver, Chamberlaine, Lange, Gardane, Rush, and Wright, particularly in ascites and anasarca; and are certainly often beneficial in favouring a free transpiration from the surface, and do not merit the disuse into which they have fallen. — (*i*) The good effects of *bandaging*, not merely in anasarca, but also in ascites, were insisted on by Rush; and have lately been shown, in the latter form of the disease, by some French practitioners.

66. *B. By purgative and hydragogue cathartics.* — Purgatives are very generally applicable in dropsies — (*a*) on account either of their *eco-*

protic action, or of their deobstruent operation when uninterruptedly continued, or of their influence in deriving from the seat of effusion, in draining the fluid parts of the blood from that circulating in the intestinal tube, in thereby lessening excrementitious or serous plethora and favouring the absorption of the effused fluid. They constitute a most important part of the treatment of every form and state of the disease, according to the selection of them and the manner of combining them. Thus, calomel and antimonials, subsequently to bloodletting, are most appropriate to the inflammatory, the pulmonary, and cardiac complications; the hydragogue cathartics in ascites and anasarca; and the milder purgatives associated with tonics and diuretics in the atonic or passive forms. The advantages to be derived from conjoining the saline purgatives with bitter infusions and with diuretics, even in the acute states of the disease, after the antiphlogistic treatment has been directed, should not be overlooked (§ 59.) The combination of purgatives and cathartics with tonics and diuretics, was adopted by Scribonius Largus, Forestus, Riedlin, Sydenham, Thilenius, Bacher, Wincler, Ritter, Grieve, and most recent writers: the chief difference being as to the choice of substances, and the appropriation of them to the various states and forms of dropsy.—(*b*) The *deobstruent* effect of purgatives is most certainly obtained from moderate doses of *jalap* with cream of tartar; or from the extract of *black hellebore*, with myrrh, ammoniacum, and soap; or from *Plummer's* pill, with camboge, soap, and taraxacum, given in moderate doses daily, and long persisted in.

67. (*c*) A *hydragogue* operation is produced chiefly by elaterium, croton oil, camboge, the inner bark of the common or dwarf elder, the rhamnus catharticus, hellebore, and the neutral salts. — *a*. *Elaterium* is often productive of benefit. It was much employed by Sydenham and Demiani, and is still very generally prescribed. It is given with soap or any tonic extract, in doses of half a grain every hour, until copious watery evacuations are procured. The following pills will be found the most certain in their operations:—

No. 183. ℞ Extr. Elaterii gr. vj.; Potassæ Sulphatis gr. x.: tere benè simul, dein contunde cum Pulv. Radicis Zingiberis ℈j.; Saponis Duri gr. xvj., et forma in massam cum Olei Anisi ♏ vj. vel q. s. Divide in Pilulas xviij., quarum capiat unam, duas, vel tres, omni horâ.

68. *β*. *Croton oil* is one of the most certain hydragogue cathartics that can be employed. It may be given with soap and compound extract of colocynth (F. 543.), or with the aloes and myrrh pill, in doses of about half a drop every two or three hours, until it operates copiously. Dr. Nimmo and Dr. Good prefer the alcoholic solution of this oil, but of that I have had no experience; I have found the mode in which I have directed it answer my expectations.—*γ*. The *extract of black hellebore* has been much used in all dropsical cases. This plant was very commonly employed by the ancients, and by Avicenna, Riedlin, Mondschein, Van Swieten, and Quarin. The *extract* as prepared (F. 156), and combined, by Bacher, is, upon the whole, the best mode of exhibiting it. It should be fresh, and its effects carefully watched. If it produce restlessness and anxiety, it ought to be relinquished. The following is Bacher's recipe for the pills known by his name: —

No. 184. ℞ Extr. Hellebori Nigri, Myrrhæ, āā ʒ ss.; Pulv. Cardui Benedict. ʒ jss. Contunde secundum artem in massam æqualem. Capiat gr. ij. ad vj. ter quaterve quotidiè.

69. *δ*. The *sambucus nigra and s. ebulus* — the common and dwarf elder—were praised by Forestus, Sydenham, Schroeder, Fouquet, Brocklesby, Quarin, Chesneau, and Lange. The inner bark is cathartic, and the flowers both purgative and diuretic. The infusion, inspissated juice, and powder, may be used. It has been almost entirely neglected by recent writers, but I have prescribed it with much benefit. — *ζ*. The *rhamnus catharticus* was likewise employed by Sydenham, and is still used in the form of syrup. *Camboge* is often very efficacious when triturated with supertartrate or sulphate of potash. Hoffmann prescribed it in an alkaline solution; Richter, dissolved in oil; and Ackermann, finely levigated with white sugar or cream of tartar.— *Jalap*, either its powder or its extract, has been very generally used. Grieve gave it with nitre, and Van Swieten with turbith mineral.

70. *ε*. Dr. Horne and Dr. Ferriar placed great reliance on the *supertartrate of potash*. I have employed it more than any other medicine in the acute forms of the disease, after the exhibition of mercurials, sometimes in very large doses, in the form of electuary, and variously associated. In these, as well as in other states of the disease, it often proves more efficacious than its purgative or diuretic operation indicates. Either alone, or with the sub-borate of soda, it often succeeds in removing obstructions from the liver, and accumulations of bile from the hepatic ducts, after other medicines had been directed with this intention to no purpose. It may be given in as large doses as Dr. Thomson and Dr. Good have stated (ʒvj. and ℥j.); but two or three drachms twice or thrice in the day, and persisted in for several days, is preferable. It is apt to be nauseated by the patient; in which case the electuary should be prepared with syrup of ginger, to which the oleum anisi, and a little tincture or powder of capsicum, may be added in addition to the other substances with which it may be requisite to conjoin it. In some cases, sulphur will be added to it with advantage; in others, guaiacum, ammoniacum, or squills; and in some the inspissated juice of the sambucus nigra, and extract of taraxacum. Its association with *sulphur* was much confided in by Piderit; with *borax*, by Grant, Quarin, and most Continental writers; with *camboge*, intimately triturated together, by Sala and others; with *squills*, by Bang; and with *jalap*, by Demiani. Of other purgatives it is unnecessary to take any particular notice. The *neutral salts*, particularly the *sulphates*, are often of great benefit, both as laxatives and as diuretics, when prescribed with other preparations possessed of the latter properties. The *iris florentina*, *i. pseudacorus*, *i. vulgaris*, *i. versicolor*, and *i. fœtidissima*, have severally been employed as hydragogue cathartics in dropsies, in the form of the expressed juice, or powder, infusion and decoction of the roots, and have received the commendations of Plater, Eller, Duverney, and Spindler.

71. *C*. *By diuretics*.—This class of medicines is, perhaps, more than any other, empirically prescribed in dropsies, owing chiefly to the imperfect state of our knowledge of, and in some m

to want of attention to, the mode of their operation. From researches into this subject, in which I was engaged during the years 1819, 1820, and 1821,—part of the results of which, particularly in respect of diuretics*, was published in the *Medical and Physical Journal* for July and August, 1821, p. 112—115.—it was there shown, that these substances act — i. *Upon the digestive canal, and on the nerves of organic life, exciting or otherwise modifying, according to the nature of their impression, the functions of these viscera, and by sympathy the functions of those intimately related to them:* —ii. *By absorption, and by their action on the lymphatic, capillary, and venous systems, both during and subsequently to their passage into the blood,*—*a.* in exciting the extreme vessels, or restoring their tone, and thereby promoting their circulating functions; *b.* in exciting the absorbent system, and gradually removing impediments in the way of the lymphatic and venous circulation, or in producing a deobstruent operation; *c.* in developing constitutional power, increasing the vital cohesion of the soft solids, and enabling them to yield the requisite support to the capillaries and to the exhaling vessels and pores: —iii. *By their action on the kidneys, and other secreting and excreting viscera, through the medium of the circulating fluid,* —*a.* in directly stimulating the kidneys, by one or more of their constituents, during their presence in the blood and elimination with the urine, and in exciting them to excrete the watery parts of the blood; *b.* in thereby diminishing the quantity of the watery parts of the blood, and promoting the absorption of fluid from the cavities or tissues in which it superabounds. It will be seen from the above, that substances which have had a diuretic action ascribed to them, operate — 1st, in a more or less *indirect manner*, whether their influence be mainly exerted upon the *primæ viæ*, or upon the circulating systems and tissues by means of absorption; and, 2d, in a *direct manner*, during their circulation through these organs, and elimination from the blood by their agency. Conformably with these views, I proceed to notice the use of this class of medicines in dropsies.

72. 1st. *Indirect diuretics.—(a) Those which act chiefly upon the digestive canal.* Under this head may be comprised most of the tonic and stimulating medicines already noticed, and which, by increasing the organic nervous energy, and promoting the digestive and assimilating functions, also assist the circulating and eliminating actions, particularly in the indirect manner already noticed.—(*b*) These effects are both accelerated and heightened by associating these medicines with *substances which, being absorbed into the circulation, excite the extreme vessels, restore their tone, and promote a healthy circulation through them.* Of these last, some mention has been already made under the head of *deobstruents* (§ 63—66.). *Mercurials*, when used as diuretics, operate chiefly in this manner, unless carried to the extent of injuring the constitutional powers, and of hazarding the production of their peculiar cachexia. *Foxglove* seems to act chiefly in this way, as well as in lowering the frequency and strength of the heart's action, thereby diminishing effusion, and determining the balance of action in favour of the absorbing vessels. Its effects are promoted by combining it with substances which, being received into the circulation, act in a similar manner with it, or in one of the modes mentioned in the second order of the above classification (§ 71.); more particularly with the blue pill, or minute doses of the oxymuriate of mercury; with the nitric or nitro-muriatic acids, in broken-down constitutions, or where mercury has been already employed; with the spiritus ætheris nitrici, or liquor ammoniæ acetatis; with the supertartrate of potash and borax; or with colchicum and the tinctura camphoræ composita (F. 195. 395. 400. 599. 627. 859.). The diuretic operation of digitalis is most certain after depletions and alvine evacuations in the more acute states of dropsy, in the atonic forms of the disease, and in the complications with lesions of the heart and lungs. The preparations of this plant necessarily depend for their efficacy upon the period at which they are gathered, and the manner of drying them. As soon as the leaves or powder lose the green colour, they also lose their active properties. Digitalis was much recommended by Schiemann, Withering, Darwin, I. Warren, Dick, Odier, Heusinger, and many others; and it still retains its reputation, particularly in hydrothorax. Ferriar prescribed it with cream of tartar; Langenbeck, with opium; and Beddoes, Ackermann, Knaus, and Lettsom, with calomel and opium. The addition of small doses of this last promotes its operation, and partially counteracts any unpleasant effect it may produce,—a fact which I have heard confirmed by the extensive and discriminating experience of Sir H. Halford. The tinctura opii composita (F. 729.) is perhaps the most eligible preparation for this purpose. The *decoctum senegæ* has also a diuretic effect, and evidently from its influence on the capillary circulation. It was used by Millman; but is applicable chiefly to the atonic states of the disease. Oberteuffer conjoined it with cream of tartar, which is, I believe, the best way of giving it. *Squills* and *ammoniacum* (§ 78.) seem to act, partly at least, in the present mode; but, of the former, more particular notice will be taken in the sequel.

73. (*c*) Diuretics which *excite the absorbing vessels, and remove impediments to the lymphatic and venous circulation*, are manifestly few in number. It is probable that several of those already noticed, and usually termed deobstruents, operate partly in this manner; but we have no satisfactory proofs that they do so act, as to any of them, excepting the *preparations of iodine*, of which mention has already been made (§ 64.). These evidently excite the absorbing vessels, and produce a diuretic action in this way, particularly when given in full doses. The sub-carbonates of the *alkalies*, the pure fixed alkalies, ammoniacum, mercurials, &c. may probably also act partly in the same manner.

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* The former of these memoirs contained the first attempt that had been made to determine the precise way in which diuretics operate, and to arrange their effects. In that article, as well as in the *London Medical Repository* for May, 1822, p. 380, 381., will be found the arrangement of the action of diuretics given above, drawn in a more precise and detailed manner than my limits will here allow me. I state this, because similar arrangements have been put forth at much later periods than the last of these, but without reference to the original sources now referred to.

74. (*d*) There are various substances which exert a diuretic operation through the medium of the circulation, *by developing constitutional power, increasing the vital cohesion of the soft solids, and thereby restraining morbid exhalation or effusion.* In this manner, all the tonic and *astringent mineral salts* may indirectly increase the secretion of urine, as well as the mineral and some of the vegetable acids. LENTIN, TISSOT, WINTRINGHAM, and others, prescribed the *mineral acids*; REUSNER directed the sulphuric acid, with infusion of the bark or flowers of the sambucus nigra: and BANG, the *tartaric acid* with squills. *Citric acid* and lime juice have been found efficacious in the complication of dropsy with scurvy; and I have seen benefit derived from *pyroligneous acid. Sulphate of iron*, and *sulphate of quinine* with sulphuric acid, will also prove of service in the asthenic states of the disease, by operating in this manner. But these are, upon the whole, inferior to the *ferrum tartarizatum*, which, whilst it increases the tonicity of the extreme vessels and soft solids, produces a very manifest diuretic action.

75. 2d. *Direct diuretics.* — *Substances which stimulate the kidneys through the medium of the circulating fluid* are the only direct diuretics. But there are very few of them which act in this way solely; nearly all of them producing more or less effect upon the organic nervous system, on the vascular systems, and on the vital cohesion of the tissues, during their presence in the blood. It will be found that such of them as excite the kidneys most remarkably are eliminated from the blood by these organs, and it may be therefore presumed that their influence is principally or specifically exerted upon them. It will be manifest, that substances which increase the proper function of the kidneys will produce the double effect above stated (§ iii. *a. b.*), of excreting the watery parts of the blood, of diminishing excrementitious plethora, and thereby increasing the absorption of fluid from the situations where it superabounds. I have long since shown (*Lond. Med. and Phys. Journ.* for July, 1821.) that certain diuretics, and these the most active, are conveyed into the circulation, and to the kidneys, unchanged; and Dr. PARIS has contended that various other diuretics are decomposed or digested, and operate by means of certain of their active constituents. This seems very probable as to some, but does not admit of proof in respect of many of them. That the balsams, juniper berries, and cubebs, excite the kidneys by means chiefly of their essential oil, is very evident; but that colchicum and squills are diuretic, owing to the separation of veratria and scillitina, is merely a matter of opinion.

76. (*a*) *α. Oil of turpentine*, and substances containing it, as the Canadian, the Chian, the Venetian, and the common turpentines, are the most energetic and direct diuretics that can be prescribed; and, in the endless forms of combining and exhibiting them, admit, in the hands of the practitioner who is acquainted with their properties and effects, of very general application: as they excite the tonicity of the extreme vessels and soft solids, during their presence in the circulation; stimulate the kidneys, in the asthenic states; lower inflammatory action, and prevent the consecutive effusion, in the acute forms of the disease. The oil, the active principle, may be taken as prescribed in the Appendix (F. 149. 169. 681.), may be exhibited in clysters, and employed externally in the form of liniment or epithem. Its smell may be covered by the *cajeput* or *lemon* oils, which also are direct diuretics; and the unpleasant eructations it occasions, in great measure prevented by giving it with magnesia, or by taking this substance immediately after it. In the asthenic states of dropsy, MONDSCHEIN and RULAND combined it with *sulphur*, in the form of balsamum sulphuris (F. 22.). The former of these writers also recommended the infusion of *pine tops* (F. 51.), which is an excellent diuretic vehicle for the saline substances and spirituous tinctures belonging to this class of remedies (F. 827.). — *β.* The various *balsams* (F. 485 – 487. 570.) are especially indicated in the more passive states of dropsy, and when the kidneys seem to be diseased. The Peruvian balsam was much praised by DE HAEN; but *copaiba* is equally efficacious. These, as well as the terebinthinates, may be given in the form of pill with magnesia, or with the alkalies. — *γ.* The preparations of *juniper berries* also act directly upon the kidneys, by means of their essential oil. They are most appropriate in the sub-acute and asthenic cases, and are excellent adjuncts to other diuretics (F. 194.). The infusion (F. 235, 236.) is a suitable vehicle for various substances appertaining to this class (F. 397. 399.). RIVERIUS prescribed it with small doses of sulphuric acid; BANG, with cinchona; and PERCIVAL, with camphor. — *δ. Cajeput* oil, *oil of aniseed*, and others of the essential oils, possess diuretic properties, and may be used both internally and externally, as adjuvants of other substances belonging to this class of medicines, especially in the more asthenic states of the disease. The oil of aniseed is very serviceable in effusion connected with asthma, bronchitis, or lesions of the lungs, and with affections of the heart; and is a useful adjunct to colchicum, digitalis, camphor, &c.

77. (*b*) The *alkalies and their salts* are diuretic in small or moderate doses, and are appropriate to most cases of the disease. *Liquor potassæ* has been already noticed as serviceable in conjunction with other deobstruents and diuretics (§ 64.). It evidently neutralises the acid in the stomach, and is absorbed into the circulation. The *sub-carbonates* and *carbonates* of both potash and soda are more generally useful, especially in the complication with lesions of the liver, kidneys, and uterus, and when judiciously combined. They are also absorbed, and are decomposed by the acid (the muriatic, as shown by Dr. PROUT) of the stomach. But as the quantity of this acid which the stomach contains at any time is but small, the change can be effected only on a portion of the salt, if it be given in full doses. A similar change is most probably produced upon some of the vegetable acid salts in the stomach by the same agent, as Dr. PARIS has contended. The *citrates* or *tartrates* are useful and pleasant. They may be taken in bitter or diuretic infusions, whilst the fixed air is being disengaged by the action of the acid on the bicarbonates. The most certain, however, is the *cream of tartar*, in doses that act not energetically on the bowels. When prescribed in order to obtain its purgative eff

(§ 70.), it frequently also excites the kidneys; and, with borax, it is sufficiently soluble to be given in the form of draught or mixture, with diuretic infusions. It is also advantageously conjoined with the ferrum tartarizatum and other tonics in the asthenic states of the disease; and is most serviceable in ascites and anasarca. Formulæ 57. 397. 588. 590. 599. 628. are the best modes of exhibiting it as a diuretic. *Acetate of potassa* and *acetate of ammonia* may also be exhibited with tonic or bitter infusions (F. 196. 386.), and with either the decoction, spirit, or infusion of the various diuretics about to be noticed (F. 194. 358. 395. 400.). The *decoction* and the *extract* of *taraxacum* are excellent adjuvants of all the foregoing salts, as well as of the carbonates. They have been much praised by Bonet, Bang, and J. P. Frank, for their deobstruent and diuretic operation (F. 390–392.). *Nitrate of potash* has already been noticed among antiphlogistic remedies (§ 55.). It is readily absorbed into the circulation; and during its presence in the blood and elimination by the kidneys, it excites the capillary vessels, and stimulates these organs. It is indicated in all the acute states of the disease; and in these, after depletions, as well as in the atonic forms, it may be given in tonic infusions and decoctions, with diuretic tinctures or spirits (F. 399. 401. 406. 588. 591. 599.). All the *neutral salts*, particularly the *sulphates*, and the *super-sulphate of potash*, are absorbed, and excite the kidneys and extreme vessels, when taken in small doses, or much diluted. They are indicated chiefly in the acute or sub-acute varieties of dropsy, and in their complication with organic change in the liver. They admit of the same forms of exhibition as those more particularly mentioned, and are assisted in their operation by the same adjuncts.

78. (*c*) The action of the foregoing on the kidneys is well ascertained; but there are several other substances which are as energetic as they, but whose mode of operation is not so well understood. That the diuretics now about to be noticed excite the kidneys by means either of one or more of their constituent principles, seems very probable; but they also act in a similar manner upon the tissues to which they are immediately applied; and, when taken in small or moderate doses, so as to be absorbed into the circulation, they manifestly stimulate the capillary vessels, or impart more or less tone to them. Hence they are most beneficial in the atonic forms of the disease; or in the sthenic and plethoric states, after evacuations. Of this class of diuretics, *squill* is the most generally used. Frize, Stoll, and Zeviani, advise it to be prescribed with caution. It is commonly given with calomel and blue pill, in doses of a grain, gradually increased to five or six; or with the neutral salts, in the form of vinegar, tincture, or oxymel. Cullen prescribed it with the oxymuriate of mercury; Langhaus, Home, Lange, and Broughton, with nitre, rhubarb, cream of tartar, &c.; Tissot, with camphor; Willich, with tartar emetic; Bertrand, with the Æthiops mineral; and Knebel and Leake, with opium. When it irritates the stomach or bowels, in conjunction with mercurials or saline substances, the addition of opium is requisite, if the propriety of continuing the combination be still manifest; but, under such circumstances, it is seldom productive of benefit; and, in cases where vascular plethora or sthenic action is present, it is more injurious than beneficial. The preparations of it in the British Pharmacopœias are the best modes of exhibiting it; and these may be combined as directed in the Appendix (F. 196. 399. 533. 552. 627. 781. 893.). This substance is indicated principally in the atonic states of effusion, when the urine is high-coloured and scanty (Blackall), and it acts more energetically upon the extreme vessels than on the kidneys.

79. *Genista*, or *spartium scoparium*, the common broom, in the form of decoction, has been prescribed by most writers on dropsies (F. 95.); as well as the *sarsaparilla*, various species of the *smilax* evidently possessing diuretic properties. *Gratiola officinalis*, or *hedge hyssop*, in the form of inspissated juice or decoction, was recommended by Duverney and Stoerck in dropsy consequent upon scarlatina, both as a purge and as a diuretic, in small doses. The *pyrola umbellata* has been employed by Rudolph and Somerville. The former combined it with tartar emetic and opium. Dr. Somerville, Dr. Beatty, and Dr. Bigelow have adduced strong evidence in favour of its diuretic operation. The decoction is the most active form of exhibiting it. It seems most efficacious in the hepatic complications of dropsy. In addition to these, the infusions of the *ballota lanata* and of the *b. suaveolens* have been prescribed by Rehmann; the decoction of the *petroselinum*, or parsley, by Richter; the inspissated juice of the *rhaphanus rhaphanistrum*, by Gruling and others; the expressed juice or infusion of *chærefolium*, or *musk chervil*, with nitre; the *chenopodium anthelminticum* and *c. ambrosioides*, by Lentin; the *cichorium verrucarium* and *chondrilla juncea* (species of *succory*), by Spindler. Several species of *saponaria*, the *angelica archangelica*, the *levisticum*, or lovage, the *sium berula*, sassafras, sweet-fennel, asparagus, and various other plants, have been recommended by authors, in the form either of infusion, decoction, or of the expressed juice.

80. *Colchicum* was much used by Stoërck, Boehmer, Erhmann, De Meza, and Oberteuffer, as a diuretic. It possesses much of this property, when it does not irritate the stomach or bowels. Hautesierk justly considers it inferior to squills. In the acute states of dropsy, it is best given with mercurials in powder; but, in asthenic cases, it is most advantageously conjoined with the warmer diuretics, with tonic infusions, or with preparations containing camphor or ammonia (see F. 194. 395.), or with large doses of the alkaline sub-carbonates, particularly in the gouty or rheumatic diathesis. Stoerck combined it with the infusion of rhubarb; and Oberteuffer, with cream of tartar, juniper, and guaiacum. The diuretic action of *rhubarb* is deserving of notice. When given either in small doses, or in infusion as a vehicle for other substances of this nature,— as the saline diuretics and the preparations of squills, of juniper, or of colchicum,— it is a useful medicine in dropsies. It was employed in this way by Werlhof, Fordyce, Bang, and Rush. The *diosma crenata* also acts upon the kidneys. Its infusion may be used in similar cases and states of

combination to those in which rhubarb is appropriate (see F. 231. 396.). The *marchantia hemispherica*, or liverwort, has been recently employed with much benefit by Dr. Shortt, in cases where other remedies had been employed without advantage. He has, however, found but little service from its internal use, and has employed it chiefly externally as a poultice. For this purpose it is first boiled, afterwards beat into a pulp, and mixed with as much linseed meal as will bring it to the consistence of a poultice, which is spread upon flannel, and applied warm over the seat of the effusion, repeating the poultice every twelve hours, until the accumulation of water is removed. It produces " copious perspiration, and at the same time acts powerfully on the kidneys." The sinking sensation it sometimes occasions is relieved by the spiritus ætheris nitrici. The effects of this application are stated to be increased by allowing the patient warm and nourishing diluents, and beef tea, &c. Dr. Shortt believes that this application will be found to succeed in many cases where the kidneys are affected. The bark of the root of *cichorea racemosa anquifolia* has been lately employed by M. Lemasson. This bark furnishes a crystallisable principle, of a bitter and astringent taste, soluble in water and alcohol, in which the virtues of the plant reside. A decoction of two drachms of the bark in eight ounces of water is divided into two doses, which are taken with an interval of two hours. This generally affects the kidneys, and the action continues for some days. As soon as its action begins to diminish, the same doses are repeated. It is suitable only to the asthenic states of the disease.

81. *Cantharides* have been recommended in dropsies, on account of their diuretic action, by Hippocrates, Galen, Dioscorides, and others among the ancients; and by Brisbane, Farr, and several modern writers. Hoffmann, Werlhoff, and Hufeland, gave them with cream of tartar, the tartaric acid, or nitrate of potash, and with camphor; and Tulpius in the form of tincture with spiritus ætheris nitrici, cardamoms, &c. They should be exhibited with great caution, and only in the most asthenic forms of the disease. Dr. Groenevelt, a licentiate of the college of physicians, was committed to Newgate in 1693, by the president and censors, on the plea of *mala praxis* for prescribing them in diseases of the urinary organs, although numerous authorities in support of the practice could have been adduced. Cantharides act upon the kidneys, and upon the capillary system, chiefly from the absorption of their active principle, which has been termed canthariden.

82. The *æthers* also act upon the kidneys, especially the *spiritus ætheris nitrici*, and *spiritus ætheris sulphurici*. They are useful chiefly as adjuvants of other diuretics. The sweet spirit of nitre is, however, an active diuretic when judiciously combined, or when given while the patient can take exercise in the open air (see F. 169. 195, 196. 397.). It may be remarked generally respecting the use of diuretics, that the addition of small doses of opium, or of the tinctura opii comp. (F. 728.) as advised by Hufeland and Paris; and of out-door exercise, as directed by Tissot; will much augment their operation. Many of the Continental writers advise them to be taken in *malt liquors* — a vehicle which certainly promotes their action, and is not inappropriate in the asthenic forms of the disease. It is in these forms principally that Dr. Rush conceived that any advantage was derived from this class of medicines; and Deckers, Frize, Mursinna, and Magennis, seem to have been of nearly the same opinion, they having recommended them to be given with tonics.

83. *D. Emetics* have been employed by several authors, particularly by Sydenham, Lillie, J. P. Frank, and Percival, chiefly after other medicines had failed; and some advantage has been said to have accrued from them. Squills are the emetic most commonly employed, which probably are partially absorbed, and act also as a diuretic. Several writers have mentioned instances of the disappearance of dropsy after spontaneous vomiting; and have looked upon this circumstance as an indication for exhibiting emetics. They are scarcely ever used in modern practice, and probably the cases are few in which they are indicated. I have seen, however, instances wherein obstinate vomiting supervened apparently upon the medicines which had been exhibited as diuretics, particularly digitalis, squills, and colchicum; but the good effect that appeared in these cases was attributable to the preceding course of medicine, and to the accumulated effects of these substances upon the system.

84. *E. Diaphoretics* and *sudorifics* have been recommended by most writers. But in the majority of cases, particularly in the acute and plethoric, there is great difficulty in producing perspiration; the means which are employed, unless they be of a contra-stimulant or relaxing nature, tending rather to excite the vascular system, and to increase the morbid exhalation, than to relax the surface, and produce diaphoresis. *Tartarised antimony*, *Dover's powder*, and *spiritus ætheris nitrici*, are, perhaps, the best sudorifics that can be employed; but the former should be given, in the acute cases, so as to occasion some degree of nausea; and the last named, in asthenic cases. Dover's powder was much confided in by Mudge, and *guaiacum* by Chamberlaine and Brückmann. As to the propriety of resorting to *warm bathing*, in order to induce perspiration, much difference of opinion has existed. Tepid baths were recommended by Stoll and Frank, in the acute states of the disease, and *vapour baths* by Darbey and others.

85. *F. Mineral waters*, if judiciously directed and brought in aid of medicine, are often productive of much benefit. Zacutus Lusitanus recommends the internal use of *sea water*; and there can be no doubt that it will prove beneficial if persisted in, particularly in the sub-acute and atonic states of the disease. In the more asthenic forms of dropsy, the *Bath waters*, the mineral waters of *Carlsbad*, *Ems*, *Marienbad*, and *Vichy*, and those of *Seltzer*, are often serviceable. In cases depending chiefly upon obstruction, and where an aperient action is desired, the waters of *Harrogate*, *Moffat*, and *Leamington* [*] may be tried.

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[*] Dr. Loudon, of Leamington, favoured the author with the results of an extensive series of experiments made to ascertain the composition of these waters. There are eleven springs of mineral water, seven of which are purely saline, three sulphureous, and one chalybeate. The saline contains ·098 cubic inches of oxygen, ·763 of azote, 3·156 of carbonic acid, 34·435 grains of sulphate of

86. *G. The combination of two or more of the plans* now mentioned is often necessary. But this must depend entirely upon the nature of the case in respect of vital energy, and of visceral complication. Certain, however, of the above classes of measures are incompatible one with the other; as purgatives with diaphoretics, and cathartics with diuretics. But a moderate purgative action will often not materially prevent the operation of medicines on either the skin or kidneys; and some purgatives will even act sensibly upon both the bowels and urinary organs, particularly cream of tartar. Deobstruents, emetics, and external applications, often aid the operation of both diaphoretics and diuretics. Various substances, especially those of vegetable origin, are even more diuretic when applied in the form of poultice, or fomentation, or liniment, to the cutaneous surface, than when taken into the stomach, probably owing to the alteration or digestion they undergo in the alimentary canal, by which they partially lose their activity. Several of the older writers insisted much upon the external use of medicines in this disease, evidently from having witnessed instances of the success of the practice.

87. *Diet.* — In respect of diet, little need be added. It should entirely depend upon the form of the disease — be spare and cooling in the acute cases, and light and nourishing in the chronic or asthenic; and directed with reference to the visceral complication. The patient should not be restricted from drink. Under the head "Potus," in the *Appendix*, will be found formulæ for several beverages, which may be reduced, modified, or rendered agreeable, as circumstances may require such changes. Weak Hollands or gin-punch, or cyder, perry, or soda water, may also be allowed, according to the habits of the patient. Spruce beer is, perhaps, the best.

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soda, 14·534 of chloride of sodium, 17·570 of chloride of calcium, and 26·050 grains of chloride of magnesium, in the Imperial pint. The sulphureous wells, besides these ingredients, contain 3·620 inches of sulphuretted hydrogen. The chalybeate differs in no way from the saline, but in containing 8·580 grains of bisilicate of iron. They are all, therefore, purgative waters. The dose is a pint daily or every other day; and a course of six weeks is generally directed. Small portions of iodine and brome, also, have been discovered by Professor Daubeny in these waters.

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III. Dropsy of the Abdomen. — Syn. *Ἀσκίτης* (*from ἀσκὸς, a leather bottle*); *Ascites*, Auct. var; *Hydrocœlia, Hydrops Abdominis, Hydro-abdomen, Dropsy of the Peritoneal Cavity*; *Die Bauchwassersucht*, Germ.; *Ascite, Hydropisie Ascite*, Fr.; *Idropisia Ascite*, Ital.

88. Defin. *Heavy, tense, and fluctuating swelling of the whole abdomen, arising from a collection of watery fluid in the cavity of the peritoneum.*

89. i. Causes, &c. (*a*) The great extent of the peritoneum, the number and importance of the viscera with which it is connected, and of the absorbent glands it incloses, the numerous sources of disorder to which these organs are exposed, the great number and weakness of the veins which transmit their blood to the portal vessels, and the absence of valves from them, in some measure account for the frequent accumulation of fluid in this cavity. Ascites may arise from any of the causes enumerated above (§ 8, 9.), and at any age. Camper, Lee, and others, have seen it in new-born infants; but it is most common in women and aged persons. I have observed it in children at all ages. It occurs more frequently in married than in unmarried females and girls; and is often the consequence of the distention and pressure attending pregnancy, of difficult or instrumental labours, and of suppression of the puerperal secretions, or of the perspiration or catamenia, or of the disappearance of this last evacuation. It appears in both sexes from the usual causes of inflammatory diseases, and the morbific agents to which the abdominal organs are liable, particularly the ingestion of cold fluids when the body is perspiring, the use of spirituous liquors, cold, and moisture, and both, or moisture merely, conjoined with marsh effluvia, a poor, watery, or unwholesome diet, or errors in diet, the drastic operation of purgatives, external injuries of the abdomen, and the suppression of accustomed secretions and discharges.

90. (*b*) *Pre-existent disease*, particularly diarrhœa or dysentery, and sudden interruptions of these discharges; intestinal worms; organic lesions of the liver and spleen, especially obstructions of their venous circulation; inflammation of the vena porta, and obliteration of one or more of its principal branches; the suppression of chronic eruptions, or of the exanthemata, — as scarlet fever, erysipelas, &c. — or the premature disappearance of the cutaneous affection in this latter class of disorders; acute or sub-acute peritonitis; organic change of the structure of the kidneys; the rupture of cysts into the abdomen; uterine or ovarian disease (§ 35.); intermittent or remittent fevers; excessive evacuation and hæmorrhages; are all occasionally productive of effusion in this situation.

91. ii. Pathological States. — Ascites is, 1st, *In respect of its structural relations* — (*a*) idiopathic, or primary; (*b*) consecutive, or metastatic; and (*c*) symptomatic, or complicated; — 2d, *As regards the state of vital energy and vascular action*; (*a*) acute, or sthenic; (*b*) sub-acute; and (*c*) chronic, passive, or asthenic.

92. *A. The idiopathic form* constitutes but a small proportion of the number of cases of ascites met with in practice. Lepois and Morgagni have adduced several instances in which it appeared soon after drinking large quantities of cold water; and many more may be found in the works of other authors. — (*a*) The *acute, or active, or even the inflammatory state*, is that in which idiopathic ascites is most frequently observed. It usually occurs either in the young, the robust, or the well fed, and presents all the symptoms of the phlogistic diathesis: — the pulse is hard, thirst increased, the urine scanty; the skin is warm, hot, or coloured, and resists more or less the pressure of the finger. It commonly proceeds directly from the external af

tioned above, or from the suppression of an accustomed discharge, or of some eruption; and often advances rapidly, with symptoms of inflammatory or excited action in the peritoneum, — with pain, tenderness, and sometimes tension of the abdomen; a quick, small, hard, or wiry pulse, and suppression or diminution of all the secretions and excretions. Either consecutively on, or concomitantly with, these symptoms, fulness of the abdomen is observed, which usually augments rapidly. At first the increase is most remarkable in the lower part of the abdomen and iliac regions when the patient is sitting up, and the liver is not enlarged; but it is always diffused when the patient is in the supine posture, and without any limitation or tumour. Upon examining the abdomen by percussion, a somewhat dull sound is emitted, and the examination occasions pain. The surface of this cavity is generally dry or harsh, warmer than natural, and more tender to the touch; and fluctuation is very easily perceived by placing one hand, or the index finger, upon the anterior part of either iliac region whilst the patient is erect or sitting up, and striking gently, at a little distance, with one of the fingers of the other hand. According to M. **Tarral**, a slight effusion will be detected, and the nature of the disease made evident by this means, long before it reaches the height that can be recognised in the usual way. (See **Abdomen**, § 16.) As the accumulation augments, all the abdominal functions are more and more disturbed; and at last respiration becomes difficult, from the pressure of the water upon the liver and stomach, and the impeded descent of the diaphragm; and the patient is unable to lie down. The abdomen is now large and prominent in its upper regions, and pushes, particularly in young subjects, the ribs and cartilages upwards. Irritability of stomach, anxiety, restlessness, want of sleep, great quickness of pulse, sometimes delirium, and ultimately coma and death, supervene, if temporary or more prolonged relief be not obtained from treatment.

93. (*b*) The *sub-acute form* of ascites is milder in its character and slower in progress than the foregoing; and, as well as the acute, is not an infrequent sequela of scarlet fever, and more rarely of measles; but is, in such cases, always attended by more or less anasarca. When it thus occurs, it usually appears gradually, and commences from seven to fourteen days from the disappearance of the eruption, commonly with a recurrence of the febrile symptoms, quickness of pulse, dryness of skin, thirst; loaded, white, or furred tongue; and diminution or interruption of the secretions. All the phenomena increase more gradually, however, than in the acute; and are more readily controlled by treatment. In both these forms of ascites, the urine is scanty, often pale, and always contains more or less albumen. The face is generally œdematous in the morning, and the ancles in the evening. In other cases of the sub-acute variety, the effusion takes place upon the disappearance of some acute disease, either attended by free discharges, or treated by copious depletions; frequently with febrile symptoms, and always with interruption or diminution of the natural secretions, the fluid parts of the blood being discharged by the increased determination to the peritoneum. In both the *acute* and *sub-acute idiopathic forms* of ascites, the accumulation of fluid arises from increased exhalation — *hypercrinea* of the peritoneum, according to the phraseology of M. **Andral** — the result either of morbidly excited vascular action, or of increased determination of blood, conjoined with a relaxed or weakened state of the exhaling vessels and pores.

94. (*c*) The *asthenic, or passive*, state of idiopathic ascites is the most rare. It occurs chiefly after profuse hæmorrhages and evacuations; in chlorotic females, or shortly before puberty; in ill-fed persons, living in cold, low, or damp localities; and in those who are excluded from the solar light, or are under the influence of the depressing passions, and are employed in sedentary occupations. It usually commences with, or is preceded by, œdema of the ancles, feet, and legs. It proceeds very slowly; and is attended by general debility; cold extremities; a pale and sickly countenance; a cold or cool skin; a weak, small, quick, or fluttering pulse; pale or loaded tongue; diminished or vitiated appetite; various dyspeptic symptoms; and by chlorosis or hysteria in females, amongst whom this variety is most frequent. The urinary secretion is more copious, and the bowels more irregular, and more readily acted on by purgatives, in this than in the other forms. Whilst lowering measures benefit the two preceding, they aggravate this variety of the disease (see § 102.).

95. *B. Consecutive*, or *metastatic*, *ascites* occurs in either of the *acute* or *sub-acute* states described above; more frequently the latter (§ 93.), when there has been no suppression of the disease on which it is consequent: but, when any of the febrile exanthemata have been prematurely driven from the surface; or when the patient has been exposed to cold or moisture, or both, during convalescence; or if it have supervened upon erysipelas, rheumatism, or gout; the acute or sthenic condition is most common. It is much less acute, if it have supervened upon inflammation of some parenchymatous or adjoining organ; or if it accompany pregnancy. In other respects the characters and progress of the disease are the same as those stated in respect of the idiopathic varieties.

96. *C.* The *symptomatic, or complicated*, *states* of ascites are the most common; and, like the primary or idiopathic, present every grade of activity and acuteness. But whilst, in the latter, the acute and sub-acute are most frequent, in the symptomatic, the asthenic state predominates; although an irritative form of inflammation is sometimes observed to occur in the course of the disease, often, probably, owing to the irritating properties of the effused fluid, as shown above (§ 34.). Complicated ascites presents many of the organic lesions that occasion symptomatic dropsy (§ 12.); most commonly structural changes in the liver, or vena porta; in the spleen; in the mesentery and its glands; in the kidneys; in the uterine organs; and in the veins and lymphatics. The dropsical collection appears after a longer or shorter period of disease referrible to these organs; commences imperceptibly, and proceeds slowly; and generally without febrile symptoms until towards the fatal close of the disease. Frequently œdema begins in the feet, and extends upwards to the knees, thighs, scrotum, or hips,

and as high as the iliac regions and loins. But ascites often reaches its acmé without any anasarca or œdema. As the accumulation increases and rises up into the epigastric region, the symptoms become more urgent,— the respiration more quick, short, and difficult; the pulse more rapid; the functions of the stomach more disordered; the alvine evacuations longer retained; the urine more scanty, higher coloured, and more turbid — often brown and fœtid; the skin drier; and the face, and other parts which are not œdematous, more emaciated. In this form of the disease, the veins of the abdominal parietes often enlarge and become very apparent; a symptom which M. Reyneaud found dependent, in several cases, upon obstruction or obliteration of the vena porta; the sub-cutaneous veins of the abdomen having been enormously dilated. When the effusion arises from disease of the substance of the liver, it is not infrequently associated with some degree of jaundice. With great distention of the abdomen, distressing borborygmi occur, and aggravate the symptoms. The anxiety debility, restlessness, and inability to sleep increase; and in some instances, hydrothorax or anasarca, or both, either with or without a diminution of the abdominal accumulation, supervene in this stage of the malady. The fatal close of the disease is generally ushered in by somnolence, or by delirium followed by somnolency; by urgent thirst and dryness of the mouth and throat; by vomitings or retchings; by leipothymia; small, frequent, and irregular or fluttering pulse. The *duration* of this form of ascites is extremely various: it may continue for years, or it may run its course in a few days. In this latter case, either the kidneys are very seriously diseased, or the circulation through the vena porta is obstructed. The complication of ascites with *pregnancy* will be considered in the sequel.

97. iii. Appearances in Fatal Cases.— (*a*) The *effused* fluid varies greatly in quantity and appearances. It is usually of a pale citron or yellowish tint; sometimes greenish, or even brown. When it has arisen from obstruction in some adjoining viscus, as in the passive states, it is generally limpid and nearly transparent; but when it has proceeded from disease of the peritoneum, as in the acute forms, or from sub-acute inflammation, it is turbid, whey-like, contains albuminous flocculi, or pieces of filamentous lymph, or even thin or partial adhesions. In some cases the fluid exhales a fœtid or urinous odour, and it is occasionally of a brown, or nearly blackish hue, from the exhalation of some of the colouring particles of the blood. — (*b*) The *peritoneum* presents, in different cases, all the changes already described (§ 10.). Sometimes it is covered by a thin albuminous or muco-albuminous coating, or is adherent in parts. In other cases it is softened, thickened, blanched, and as if macerated; and in some granulated, or tuberculated (Bichat, Barron, Andral). The *omentum* has occasionally nearly disappeared (Morgagni, Pezold, De Haen, &c.); or it is pushed up towards the stomach (Osiander, myself, and others); or adherent in parts to the intestines, or to the abdominal parietes (Ribe, Andral, &c.); or suppurated, thickened, and indurated (Stoërck, Osiander, &c.). It has likewise contained steatomatous or other tumours. The *mesentery* is sometimes also diseased. Its glands are very frequently enlarged; and tumours of various kinds have been found in it by Tulpius, Harder, J. P. Frank, Von Berger, Alix, Andral, myself, and others. The *pancreas* has been seen enlarged and scirrhous, but it is not often altered in structure. The *liver* is most generally diseased. The vena porta has been found obstructed by coagulable lymph, the product of inflammatory action, and even altogether obliterated, by Reyneaud; or pressed upon by tumours, or its circulation impeded or interrupted by atrophy, or by enlargement, or by induration of the substance of the organ; or by scirrhous, granular, or tubercular degenerations of its structure (see Liver). The *gall-bladder* and hepatic ducts have been found containing biliary concretions, by Morgagni, Hoffmann, Stoërck, Marteau, and others; and in some instances distended by a black and thick bile; or containing a small quantity of pale mucous bile, by the same authors, as well as by Ridley, Pezold, Duverney, Yonge, and several recent writers. The *kidneys* have also been often seen diseased as described above (§ 13.); and the *spleen* is very frequently enlarged, indurated, and otherwise changed (Selle, Schmucker, Horn, Grottanelli, and myself), as described in that article, especially in the abdominal dropsies that occur in low, moist, warm, and miasmatous localities.

98. iv. Diagnosis.— *A*. Ascites may be mistaken for tympanites, for the various kinds of encysted dropsy, and for pregnancy. — (*a*) *Tympanites* is readily recognised by the clear resonance furnished on percussion; by the absence of fluctuation, and of œdema of the lower extremities; and by the history of the case. — (*b*) *Ovarian dropsy* is generally preceded by pain, tenderness, and tumefaction, or distinct tumour in the regions of the ovaria; and the enlargement proceeds from one or both these parts. It is never general or uniform in its earlier stages, as in ascites; and fluctuation is usually very obscure, and to be detected only in the situation of the tumours, the circumscribed form of which may be determined until a very advanced period of the disease. Instances, however, occur, in which the ovarian tumour induces effusion into the peritoneal cavity: in this case, the exact nature of the disease can be ascertained only from a knowledge of the phenomena attending its early stages, or of those consequent upon tapping; the letting out of the ascitic fluid generally allowing the ovarian disease to be readily detected. The same remarks apply to dropsy of the *Fallopian tubes*, which are attended with nearly the same phenomena as the ovarian disease. — (*c*) In *hydrometra*, or *dropsy of the uterus*, fluctuation is with difficulty ascertained; and cannot be detected in the iliac regions, by the means described above (§ 92.); besides, the form of the uterus may be defined upon a careful examination; the progress of the affection is usually much slower than in ascites, and there is much less disturbance of the general health. There are, moreover, entire obstruction of the catamenia, and a sense of heavy pressure on the rectum, bladder, and adjoining parts. — (*d*) *Cysts* containing a watery fluid, and of great size, are sometimes attached to the liver or to the spleen, giving rise to appearances in their advanced states closely resembling ascites. But they always present a circumscribed tumour

curate examination, the swelling commencing on one side, generally in the upper regions of the abdomen, whilst ascites begins, when the patient is up, in the lower, and is equally diffused when he is supine. — Of *encysted dropsies*, generally, it may be remarked, that a heavy weight, sometimes with dragging pain, is commonly felt when the patient turns in bed, particularly to the opposite side to that to which the cyst is attached; and that he usually lies on the latter side. When only one large cyst, containing a watery fluid, exists, the diagnosis is sometimes very difficult, unless the history of the case is known, particularly in respect of the last stages of some kinds of ovarian dropsy. In rare instances, several cysts are attached to different parts of the same viscus, or even to different organs, or to the abdominal parietes. But very much more frequently the dropsical ovarium, or ovaria, is very irregular and lobular, owing to its division into several distinct cysts. In all such cases, the abdomen, upon an accurate manual examination, will feel more or less irregular and unequal, and the nature of the disease be nearly manifest. M. Piorry states that a duller sound is emitted upon percussion in encysted dropsies than in ascites; and that the parts around the cysts furnish the same sound as in health. The progress also of encysted dropsies is always slow, and their duration frequently very long. They are commonly unattended by much constitutional disturbance until they reach a very great height, so as to press injuriously upon the stomach, and to impede the functions of respiration, when hectic fever is often developed: the secretions and excretions, and even the quantity of the urine, not being much diminished or disordered until then (see Dropsy — *Encysted*). — (*e*) *Pregnancy* is distinguished from ascites by the state of the *os uteri* upon examination, by the progress of the enlargement, and the defined form of the uterus, when the patient is supine, and the abdominal muscles relaxed; by her unbroken health and clear complexion, — the countenance of dropsical persons being pale, sickly, and cachectic; by the enlargement and firmness of the breasts, and the deep colour of the areolæ, — these organs being soft and flaccid in ascites. (See Pregnancy.)

99. *B.* It is not enough that we should satisfy ourselves as to the exact situation of the effused fluid, but we should *determine as correctly as possible the pathological condition giving origin to it.* In order to do this, we should endeavour to connect it with its exciting causes, and to enquire into the external agencies concerned in its appearance, and the conditions of the various secreting and excreting organs. The manner of its accession, the rapidity of its early progress, the sensations of the patient previously to this event, and the several phenomena furnished by an accurate manual examination, as well as a rational consideration of all the natural functions, in connection with external signs, must be our main guides in coming to a conclusion relative to the alteration or alterations, functional and organic, upon which it chiefly depends. The rapid increase of the swelling after exposure to cold or any of the usual causes of inflammatory disorder, or after the suppression of discharges or of eruptions; a sense of tension or pain in any of its regions; increased sensibility upon examination by percussion, or in any other way, especially in the hypochondria, in the loins and uterine region, demand particular attention; and the urine should be daily examined, and its coagulability noted. The size of the abdomen should also be observed daily, and the decrease and increase marked by a tape measure.

100. v. Prognosis. — The prognosis in ascites must necessarily depend upon its form and complications, upon the habit of body, and constitutional powers of the patient, and the effects of remedies. A much more favourable opinion of the result may be formed when the disease is primary, occurs in young and previously healthy persons, or follows scarlet fever or measles, than when it proceeds from organic change either in the liver, kidneys, ovaria, or other abdominal viscera. In cases of this latter description, very few recover permanently. Swelling of the hands; emaciation of the arms; frequent cough; very scanty fœtid and thick urine; colicky pains; the presence of jaundice; and the occurrence of hiccup, vomitings or diarrhœa; are very dangerous symptoms. The appearance of aphthæ, of convulsions, of livid blotches on the extremities, particularly on the hands and forearms, are commonly fatal signs, as justly insisted on by Hippocrates, Forestus, Frank, and others. Somnolency, great irritability of stomach, a pulse above 120 or intermittent and small, and delirium, are not less unfavourable (see § 37.). The characters of the fluid let out by tapping also indicate the result. If it be thick, fœtid, brown, glutinous, or albuminous, no permanent advantage will be derived from the operation.

101. vi. Treatment. — But little in addition to what I have already stated may be said of the treatment of ascites. — *A.* Its *acute* or *sub-acute idiopathic states* require vascular depletions, general or local, or both, and the rest of the antiphlogistic regimen, to an extent which the pulse and symptoms, and circumstances of the case, will indicate. In ascites occurring in *children* after the exanthemata, local depletions will be sufficient, but if leeches be applied, their punctures should be carefully watched; for there is often great difficulty in arresting the hæmorrhage from them after these diseases. Mercurials and antimonials, at first so as to act upon the bowels, and subsequently as alteratives, or with opium, and pushed as far as to affect the mouth; external irritants and derivatives; deobstruent diuretics, and digitalis — this last particularly in the ascites consequent on scarlet fever; diaphoretics and warm or vapour baths, followed by oleaginous frictions of the skin, in order to restore its perspiratory functions; and, lastly, gentle tonics conjoined with purgatives, or with diuretics, and assisted by warm iodine or medicated baths, will frequently succeed in removing disorder, if early employed, and if a vital organ have not experienced serious structural change. Upon the whole, these forms of ascites should be treated as described at length in a preceding chapter (§ 40.).

102. *B.* The *asthenic form* of primary ascites (§ 94.) is most readily removed by the tincture, or other preparations, of iodine; by the ferrum tartarizatum with cream of tartar; by the combination of purgatives with tonics, as Bacher's pills; or of tonics with diuretics; by warm salt-water bathing; warm medicated baths, particularly

those with iodine or aromatic herbs; and frictions of the surface with stimulating liniments. The gentler vegetable tonics should be first employed, and subsequently chalybeates and the more active tonics, as bark, gentian, &c.; and these may be conjoined with acids, particularly the sulphuric with spiritus ætheris sulphurici, or the nitro-muriatic with spiritus ætheris nitrici, and other diuretics; and alternated or associated with the rest of the treatment recommended above (§ 42.). In this, and other forms of asthenic ascites, J. P. Frank advises the exhibition of full doses of *opium*,—a practice from which I have seen much benefit obtained after morbid secretions had been evacuated by purgatives as now prescribed. I have, however, usually combined the opium with diuretics and tonics. Dr. Graves, whilst he adopts this part of Frank's practice, recommends, in addition, the free use of animal food, which is doubtless requisite in many instances, particularly when the effusion has arisen chiefly from a poor or thin diet, and other depressing causes.

103. *C.* The *metastatic form* of ascites requires a similar treatment to that directed for the acute and sub-acute states (§ 40, 41.), together with means to restore the primary affection. Counter-irritation of an active kind, and long persisted in, as well as appropriate to the nature of the disease on which it has supervened, will often prove beneficial. The repeated application of moxas has been for ages commonly resorted to in ascites in the eastern countries of Asia, and has more recently been found useful by some Continental physicians. Several moxas are usually directed to be placed around the umbilicus, or over the hypochondria, or upon the loins, according as the functions of the liver or kidneys appear to be most obstructed. Sulphureous, vapour, iodine, and other medicated baths, seem calculated to prove beneficial in this, more than any other form of the disease. In this variety, also, the oxymurias hydrargyri may be taken in the compound decoction of sarsaparilla, with colchicum or squills; or the ioduret of mercury may be cautiously exhibited, in small doses, with digitalis and extract of conium. When the disease has followed the suppression of the catamenia, the preparations of iodine*, much diluted, or the supertartrate of potash, with an equal quantity of borax, and sulphur, have succeeded in restoring the suppressed evacuation, as well as in removing the disease.

104. *D.* The *symptomatic, or complicated, form* of ascites must be treated according to the principles laid down (§ 44. *et seq.*), and with strict reference to the original lesion or malady, as far as that can be ascertained. The remedies, perhaps, the most to be depended upon, are *purgatives*, *alteratives*, and *diuretics*;—calomel, elaterium, croton oil, camboge, jalap, &c., variously combined; the nitro-muriatic acids, internally with the compound decoction of sarsaparilla, and externally in the form of bath or lotion; saline substances, with taraxacum; the preparations of iodine in small but frequent doses, much diluted, long persisted in, and associated with narcotics, particularly opium, or lactucarium, or conium; cream of tartar or acetate of potash, variously combined, especially with squills; and, subsequently, the decoction of broom tops (F. 75.), or of pine tops (F. 51.), or the decoctum cydoniæ compositum (F. 57.) or the decoct. inulæ comp. (F. 67.), or the infusum berberis (F. 225.), with one or more diuretic medicines. *Cream of tartar* was found most successful by Dr. Home; and, if given in sufficiently large doses, conjoined with substances suitable to the complications of the case, and continued sufficiently long, is the most certain remedy that can be prescribed. I have usually exhibited it, in this state of the disease, in doses of from two drachms to half an ounce, in the form of electuary, with an aromatic powder and diuretic medicine. In this form it generally acts freely on the bowels, and sometimes, also, increases the flow of urine. Terebinthinate injections, and oleaginous frictions, as already directed (§ 65.), are also useful adjuvants. In some states of ascites, advantage may be derived from the internal exhibition of *cantharides*. J. P. Frank has seen cases where it has effected a cure; yet he considers it the most uncertain medicine that can be prescribed. *Graduated compression* of the abdomen, by means of the belt recommended for ascites by the first Munro, has been employed successfully by Professor Speranza and M. Godelle; and, when it can be borne, may prove serviceable in some asthenic and chronic states of the disease. Riverius recommends poultices of the bruised *charlock*, the *raphanus raphanistrum*, to be placed over the loins or upon the abdomen, and to be frequently renewed. Bran poultices are also in common use. The warm *medicated baths*, already noticed, are calculated to be of service, when assisted by *sudorifics*. But these last cannot be depended upon unless they be combined with opium. Hence the occasional good effects of Dover's powder. In some cases, an increased proportion of the ipecacuanha will be useful. I have seen benefit derived from the following, when the stomach was

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* I was consulted, some years ago, respecting a case of ascites consequent upon profuse and frequent menstruation. This discharge had been suppressed by exposure to cold; and, soon afterwards, symptoms of inflammation of the serous covering of the liver, with effusion, were observed. These were combated by local depletions, which were repeated; by external irritants, by mercurials, and, subsequently, by cream of tartar with borax and diuretics, and other means in various forms of combination; but without any permanent benefit. I directed at last a weak solution of the hydriodate of potash with iodine; and caused it to be persisted in for seven or eight weeks, when good effects began to appear. This medicine was continued for five or six months; at the end of which time the catamenia had become regular, and the effusion had entirely disappeared. I was more recently consulted as to a similar case, in the care of Mr. Grabham, of Rochford; which had, likewise, been preceded by profuse catamenia, suppression of this discharge followed by pulmonary disease, and extension of tenderness and fulness from the thorax, over the region of the liver and abdomen; with effusion of fluid into the abdominal cavity. The pulmonary affection and the more acute symptoms subsided under the very judicious practice of this gentleman; but the means successively adopted in consultation failed of removing the dropsical collection, and of arresting the progressive emaciation. There was also, in this case, scrofulous disease of one or two of the metacarpal bones of the left hand. This was left to itself, in hopes that the discharge from it would have had a salutary effect on the principal seat of disease. In summer, 1832, this young lady came to London, where various remedies were prescribed, without relief. I then put her upon a course of iodine; and, directing her to persist in its use, advised her return to the country. I have since understood that, during the use of this medicine, the effusion disappeared, and the catamenia returned; that she recovered her looks, and is now married.

not irritable, or when its contingent effect of causing vomiting would not be injurious.

No. 185. ℞ Pulv. Ipecacuanhæ gr. ij. ad iij.; Camphoræ Subactæ gr. j.; Pulv. Opii Puri gr. j.; Potassæ Nitratis et Pulv. Radic. Glycyrrh. āā gr. x. M. Fiat Pulvis quovis in vehiculo idoneo sumendus; vel sit bolus cum Conserv. Ros., et bis terve in die capiendus.

105. *Paracentesis* is the last means to which recourse should be had. I took occasion, many years ago, in the *London Medical Repository*, to differ from those who advise either an early or an indiscriminate recourse to this operation, and for reasons about to be stated. It has, however, had many advocates, from the earliest period of the art, and probably originated in the benefit, in some cases, derived from the spontaneous rupture of the umbilicus and discharge of the fluid. The empirical manner in which it was resorted to during the fifteenth and sixteenth centuries had brought it into disrepute, when Mead, Delius, Banyer, Stoërck, Schmucker, and some others, wrote in favour of it, and endeavoured to establish it on a more rational basis. Hautesierk expressed himself favourably of it, and advised purgatives and tonics to be perseveringly prescribed after its performance. Fothergill conceived that its want of success arose from its being too long delayed, and directed it to be resorted to early. In the present day it is certainly more frequently performed than circumstances appear to me to warrant; and although it should not be proscribed from practice, I believe that the cases are few that will be benefited, and still fewer that will be cured, by it. The chief objections to it are founded on its being inappropriate in a large number of cases, on its liability to induce inflammatory irritation in the peritoneum, and on the facility with which air may enter the abdominal cavity during the usual mode of performing it. On these topics I will add a few words.

106. 1st. Paracentesis seems calculated to increase the mischief, and to diminish the chances of a complete cure, in acute and idiopathic ascites, either by increasing inflammatory irritation, where this already exists, or risking its supervention in the asthenic forms of the malady. When ascites depends upon altered structure of the kidneys, it will seldom do more than give temporary relief; and a similar remark applies to the complication with disease of the liver. This advantage is, however, worth procuring, and is sometimes considerable, especially when a more decided effect is produced by medicines, as is sometimes the case, after the abdominal distention has been removed by it. But unfortunately this result is not always obtained; for inflammatory irritation often extends from the punctured part, owing to the readiness with which an asthenic or erysipelatous form of inflammation follows punctures of serous surfaces, in a cachectic habit of body, and particularly when the functions of either the liver or the kidneys are obstructed; and thus, in addition to the original structural lesions, disease is superinduced in the peritoneum, and the effusion is renewed with greatly increased rapidity. This complication is, moreover, favoured by the effects of the fluid upon the wound in the peritoneum; for, as I have already shown, this fluid, owing to interruption of the depurating functions, is often possessed of properties which induce inflammatory irritation in the healthy peritoneum, and which are more likely to have a similar effect when this membrane is punctured or otherwise divided.

107. 2d. The introduction of air into the abdominal cavity, although frequently unattended by any inconvenience in a healthy state of the frame, and particularly when the peritoneum and adjoining viscera are not in a morbid or irritable condition, is certainly sometimes productive of very serious and even fatal effects, especially in that state of the constitution and of the abdominal organs, in which ascites commonly presents itself. I believe that this inference is conformable to the experience of the most enlightened pathologists. The instrument, also, with which paracentesis is usually performed, although calculated to facilitate the removal of the fluid, favours the introduction of air. The wound it inflicts is such as to prevent the immediate closure of the aperture in the peritoneum; and in some instances this membrane is pushed before its point so far as to detach it to some extent from the abdominal parietes,—circumstances which, when viewed in connection with the cachectic habit of body, weak powers of restoration, and morbid state of the accumulated fluid, are certainly favourable to the occurrence of asthenic inflammatory action, and its consequent effusion, after the operation. On this account, therefore, paracentesis may be preferably performed by the lancet, as recommended by J. P. Frank; or, after the abdominal parietes are divided by the scalpel, the lancet may be pushed through the peritoneum, a bandage placed around the abdomen being tightened as the fluid passes off, and care being taken to close the aperture with accuracy as soon as the stream begins to cease. But even in this manner the operation is not likely to prove of much service, where there is tenderness of the abdomen. Many of the cases of recovery imputed to paracentesis, I am convinced would have taken place without it, under an appropriate treatment; whilst, doubtless, benefit has been derived from it, both of a temporary and permanent kind. Instances certainly sometimes present themselves, in which the symptoms are so urgent that it would be culpable to neglect having recourse to it. It should, however, be the last resource. In ascites appearing during pregnancy, it, or puncturing the fœtal membranes, is both requisite and successful; although in two such cases, in which I was consulted, the means hereafter to be noticed prevented the necessity of performing either. It is unnecessary to state the number of times the operation has been performed, and the quantity of water removed either at once or altogether. Extreme instances are comparatively rare, and convey no useful information. On this subject I will only add further, that tapping through the umbilicus has been recommended by Dr. Sims, and several other writers; that it has also been advised to perform the operation through the vagina; and through the bladder, by Dr. Buchannan. The objections to the second and third of these are very obvious; and, as respects the last, the risk of urine escaping into the peritoneum must put it out of the question. The recommendation of conveying astringent fluids, or vapours, into the cavity of the abdomen, advocated by a few writers, both British and Continental, about the end of the seventeenth and beginning of the

eighteenth centuries, merely shows that medical and surgical temerity is not a result of science, but of its earliest dawn.

108. The *diet* and *regimen* in ascites is the same as that briefly noticed above. In the more asthenic states, a liberal diet of animal food of a light and nutritious kind is requisite, in addition to a tonic treatment; and much benefit will sometimes accrue from allowing the patient the use of malt liquor, or gin-punch, in moderate quantity, and from making either of them the vehicles for the exhibition of diuretics, with gentle tonics, or adding them to some one of the diuretic drinks in the Appendix (F. 588. *et seq.*). In cases of this description, Recipe 781., or the following, recommended by Richter, may likewise be used: —

No. 186. ℞ Rad. Scillæ Recent. ℥ j.; Cort. Aurantii, Radicis Calami Arom., āā ʒ iij.; Juniper. Baccar. contus. ʒ ij.; Vini Albi Hispan. ℔ iv. Digere per dies tres, cola, et adde Oxymel. Scillæ ℥ ij. M.

109. IV. Puerperal Ascites.—i. Pathology. —The more frequent occurrence of ascites in the female sex has been partly attributed to the influence of the female organs in giving rise to it (§ 35. 89.), independently of the puerperal states. But effusion into the peritoneum may occur either (*a*) during pregnancy, or (*b*) after delivery.—*A. The association of ascites with pregnancy* has been noticed by several of the older writers, and by many of the moderns, and is not an infrequent occurrence. Either impregnation may take place during the dropsical disease, which is very rarely the case; or the effusion may be excited by pregnancy, being favoured by pre-existing obstruction in the liver, or a plethoric state of the system. This latter is the common mode of its appearance. It is generally of a sthenic or plethoric character, and is often associated with impeded circulation through the liver, or the right side of the heart; although it may be occasioned solely by changes induced by utero-gestation, and independently of visceral disease. In this latter case, the ascites seldom commences until about the third month. When it exists, the form or even the body of the uterus often cannot be ascertained by a careful examination of the abdomen, unless with difficulty, when the patient is quite supine, with the hips elevated. The hypochondria become enormously distended and elevated as the effusion and pregnancy proceed. The urine is lateritious, scanty, and of a high colour; and there is much thirst, and pains in the back, loins, and thighs. Scarpa states, that fluctuation is obscure in the hypogastric region and flanks, but distinct in the hypochondria, particularly in the left. The state of the os uteri, the patient's sensations, and the history of the case, will generally enable the practitioner to decide as to the nature of the complication and the period of pregnancy. This state of disease becomes remarkably distressing. The patient is afflicted by dyspnœa; and by cramps, pains, and œdematous swellings of the lower limbs, from pressure on the nerves and vessels supplying them, and by sickness and vomitings. She is unable to ascend the stairs, or to lie down in bed. The bowels are very constipated, and the breathing short and difficult; to these often are superadded great anxiety, lividity of the lips and countenance, heavy and somnolent headach, leipothymia, palpitations, and other symptoms indicating the propriety of having immediate recourse either to paracentesis, or to the rupturing of the membranes. When the disease is dependent upon obstruction or structural lesion of the substance of the liver, a *fatal issue* often takes place soon after delivery, whether that have been premature or at the full time. But when it is occasioned chiefly by the changes in the nervous and vascular systems, and state of the circulation connected with pregnancy, a favourable termination may be expected. Scarpa, Desormeaux, and Lee, record cases, in which this disease was still further complicated with dropsy of the amnion (§ 115.).

110. *B.* Ascites more frequently occurs *subsequently to delivery*, but at no definite time; either in a very few days, or not until some weeks, or even months, afterwards. It may either be a sequela of the adynamic form of puerperal fever, of which I have observed two cases; or of peritonitis; or of inflammation of the uterus, ovaria, or of their veins, occurring at this period. It may likewise be induced by suppression of the lochia; or by a diarrhœa which has been suddenly arrested before disordered secretions and accumulated fæces have been evacuated; or which has been long neglected, or injudiciously treated. It is generally acute or sub-acute, when it appears in this manner; but if it occur in females who have been ill-fed, or who have experienced large losses of blood about the period of labour, it possesses very different features.

111. ii. Treatment.—(*a*) Ascites *associated with pregnancy* is seldom benefited by diuretics. In two cases which came under my care, and presented the symptoms described above, early, repeated, and moderate venæsection; a gentle and constant action upon the bowels by cream of tartar and confection of senna; and full doses of opium, assisted by various other means directed according to the symptoms; carried both patients to about the full period of gestation; and both bore living children. After delivery, the rapidity with which the water passed off by the kidneys was surprising. In one of the cases, three large chamber utensils were filled in twenty-four hours. Paracentesis was urged by the ordinary medical attendant in one of these, but was delayed as a last resource: it was not performed in either. Utero-gestation very seldom reaches the full time, when fluid is effused into the abdomen, whether the operation be resorted to or not. Scarpa advises its early performance, and adduces a case in which this complication was aggravated by dropsy of the amnion, and in which it was performed under the left false ribs, and the patient recovered. It was also resorted to successfully in the one recorded by Mr. Langstaff. In M. Desormeaux's case there were ascites, dropsy of the amnion, and anasarca. He punctured the membranes, and brought on labour. The instance adduced by Dr. R. Lee resembled that mentioned by Scarpa. The *cervix uteri* being obliterated as in the ninth month of pregnancy, he ruptured the membranes, and brought on labour; after this the patient slowly recovered.

112. (*b*) As to the treatment of *ascites occurring soon after delivery*, the same means, appropriately to the circumstances of the case, as have been already described, are to be put in

practice. The great majority of such cases will recover under judicious management, if the liver or uterine organs be not very seriously diseased. Paracentesis is very seldom required; and I believe the risk of performing it to be greater in this state of the disease, than in any other, from its liability to induce asthenic inflammatory action in the peritoneum, and to increase it if it be already present. I may add, that instances have occurred in which air has been extricated from the decomposition of the animal matter in the fluid effused, particularly when the disease has depended upon atonic inflammatory action in this membrane, and thus the ascites has become complicated with true tympanitis. This is more likely to occur, after paracentesis has been employed in a case of this description. (See *Author*, in *Lond. Med. Repos.* vol. xvii. p. 378.)

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V. **Dropsy of the Amnion.** — *Hydrops Amniosis*, Mercier; *Hydrops Amnii; Hydrometra of Pregnant Women*, Desormeaux.

113. Defin. ***The preternatural distention of the uterus, by an excessive secretion of liquor amnii, giving rise to symptoms of ascites, sometimes with obscure fluctuation.***

114. i. Pathology. — A morbidly increased secretion may take place, 1st, within the amnion; and, 2d, between the membranes and uterus. The former usually occurs during advanced utero-gestation; the latter in the early months, and generally passes off without occasioning any disturbance as pregnancy proceeds. The excessive accumulation of fluid in the cavity of the amnion was first accurately described by M. Mercier; and it was imputed by him to inflammatory action in this membrane. It has more recently been noticed by MM. Maunoir, Duclos, and Desormeaux; but the researches of this last physician have not confirmed this view of its origin. Dr. R. Lee has recorded five cases, in none of which were any inflammatory appearances in the amnion, and only in two were there inflammatory or dropsical symptoms in the mother. But in all of them, some malformation or diseased condition of the involucra, or of the fœtus, existed, and rendered it incapable of supporting life subsequently to birth. It is sometimes connected with a dropsical diathesis in the mother; but is more frequently entirely dependent upon disease of the fœtus and its envelopes. It possibly may also depend upon an affection of the uterus itself, as hinted by M. Desormeaux.

115. The *Diagnosis* of dropsy of the amnion in its *simple* form, and where the quantity of fluid is not very great, is difficult. Fluctuation is obscure, deep seated, or wholly imperceptible. On examination, however, *per vaginam*, the body of the uterus is prematurely enlarged; the cervix is almost entirely obliterated; and there is a sense of fluctuation in the vagina upon percussion of the abdomen. The rapid increase of the uterus, the gravative pain in its region, the feeling of weight and pressure in the pelvis, the frequent calls to evacuate the bladder, and scanty secretion of urine, will further guide the practitioner. The diagnosis, however, will be rendered more difficult if it be complicated with ascites, as in the instances recorded by Scarpa, Desormeaux, and Dr. Lee. In this case there will be fluctuation on percussion, but this will be no sure information as to the situation of the effusion. The progress of the enlargement of the uterus, and the result of vaginal examination, in connection with an attentive manual investigation of the abdomen, alone can furnish correct indications as to the nature of the disease.

116. ii. Treatment. — The chief intentions are to relieve urgent symptoms, and to carry the patient safely, if possible, on to the period of delivery (Desormeaux and Lee). These objects may be attained by the treatment I have already advised (§ 111.), when the constitutional powers will admit of it. But if the symptoms become urgent, and the functions of the stomach entirely overturned, the advice of Desormeaux to puncture the membranes and induce delivery should be followed; when the disease will be remedied, if not complicated with ascites; in which case, the means already described must be practised.

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VI. Dropsy of the Cellular Tissue.—Syn. *Anasarca* (from *ἀνα*, through; and *σαρξ*, the flesh), *Ὑποσάρκα*, Auct. Vet.; *Ἀνασάρκα*, Lossius; *Leucophlegmatia*, of Carthuser, and several of the older writers; *Hydrosarca*, *Hydrops Anasarca*, Auct.; *Hydrops Cellularis*, M. Good; *Die Hautwassersucht*, *Zellgewebe-wassersucht*, *Die Wassersucht des Zellegewebe*, Germ.; *Anasarque*, Fr.; *Anassarca*, Ital.

117. Defin. *Diffused swelling, pitting beneath the pressure of the fingers, arising from an unnatural accumulation of serous fluid in the cellular tissue.*

118. *Dropsy of the cellular tissue* occurs in various forms and states: 1st. In respect of its *form*, it may be—(*a*) *partial* (*Œdema*); or (*b*) more or less *general*, affecting either the tegumental cellular tissue chiefly (*Anasarca*), or the whole cellular substance (*Leucophlegmatia*). 2d. As to its *state*, it may be the result of increased action, or of obstructed circulation, or of vascular oppletion (see Cellular Tissue, § 6.) I shall, therefore, treat of dropsy of the cellular structure, *first*, in its partial, and *secondly*, in its general, forms; and with strict reference to the states of vascular action and vital powers.

119. i. Partial cellular Dropsy,—*Œdema* (*οἴδημα*, from *οἰδέω*, I swell). *A. Limited infiltration of the cellular* tissue is characterized by more or less swelling, which retains the impression of the finger for a short time. It is very common both as a symptom of general debility, or of disease of some adjoining or remote part, or in connection with the dropsical diathesis, of which it may be the earliest manifestation. It often accompanies inflammatory action of the other structures—as the mucous, the fibrous, &c. the contiguous cellular tissue being then infiltrated with serum, owing to its participation in the excited vascular action. Bronchitis, pneumonia, œdema glottidis, rheumatic or gouty affections, are illustrations of this occurrence. In cases of phlegmonous or sthenic inflammation of any part, especially of the cellular tissue itself, or of parenchymatous organs, the parts surrounding its seat are also often œdematous from the same cause. It may also arise from obstructed natural evacuations, as suppressed catamenia, the disappearance of this discharge at the decline of life, constipated bowels, imperfect action of the kidneys, &c. and, in such circumstances, it usually appears in the feet and ancles. It accompanies several affections of the skin, especially erysipelas; and various structural and malignant diseases, particularly those implicating the venous or lymphatic circulation. It frequently follows the inoculation of animal poisons, as the bites of serpents, &c.; and it is always attendant upon *diffusive inflammation* of the cellular tissue, and *induration* of this structure (see Cellular Tissue, § 9. *et seq.*). Its dependence upon pressure or disease of the *veins*, or of the *nerves*, especially in the *puerperal states*, has been satisfactorily illustrated by the researches of several modern pathologists, and is fully shown in these articles. It may also arise from extreme fatigue, from exhausted vital powers, the result of previous disease or of old age; it then being generally limited to the lower extremities, and unconnected with any change in the urinary secretion.

120. *B.* The states of organic action and circulation, from which partial cellular dropsy often proceeds, may be resolved into the following:—(*a*) Increased determination of the circulation, sometimes with diminished power of the exhalants, the œdematous part being firm, resisting pressure, pitting very slightly, and without any diminution, or sometimes with increase of temperature; this constitutes *sthenic* or *active* œdema.—(*b*) Inflammatory action in the nerves of the part, occasioning augmented determination of blood, and effusion of serum, with elevated temperature, and firm swelling, resisting or admitting only of slight and evanescent pitting, and forming an *acute* or sthenic œdema of rare occurrence.—(*c*) Obstructed circulation through either the veins or lymphatics, the part being less firm, pitting more easily, and the temperature lower than in the former: in this case, the obstruction may be either internal or external as respects the vessels, or it may exist in the glands; the œdema being either *acute* or *chronic* as to its duration, and *active* or *passive*, generally the latter, as to its grade of action.—(*d*) Vascular plethora, or relative increase of the watery parts of the blood, owing to diminished exhalation or elimination by the skin, pulmonary surface, or kidneys, or to the stoppage of accustomed evacuations, giving rise generally to *sub-acute* œdema, chiefly in the feet and ancles.—(*e*) Diminished tone of the extreme vessels or exhaling pores, attended by a laxity or lessened vital cohesion of the cellular tissue, producing *passive* or *asthenic* œdema, the part being soft, pitting easily and deeply, its temperature very much lowered. Attention to the foregoing pathological conditions and distinguishing characters will readily suggest an appropriate treatment (§ 132.).

121. ii. General cellular Dropsy, *or Anasarca*, affects chiefly the sub-cutaneous cellular tissue, usually in a great degree, and very frequently in an acute or sub-acute manner. The cellular tissue throughout the body may possibly become dropsical; but this must be a very rare occurrence, and manifestly incompatible with the duration of life; although probably it may exist slightly, and constitute the *Leucophlegmatia* of Cœlius Aurelianus, in which he conceives that this tissue resembles wetted bibulous paper, or a charged sponge. Indeed, a state nearly approaching to this very general or leucophlegmatial form sometimes appears in the *dark races* of the species. The anarsarca described by Mr. W. Hunter, as occurring in Lascars, seems to have been of this kind; the lungs being especially affected, giving rise to severe and often fatal dyspnœa. Anasarca presents every grade of organic action and duration; and hence it may be divided into the *acute* or *sub-acute* or *sthenic*; and the *chronic*, *passive* or *asthenic*. It may be either *primary*, as when it proceeds from cold or moisture; or *consecutive*, when it follows some one of the exanthemata;

or *symptomatic*, when it depends upon obstructed circulation about the heart or other viscera. I shall consider it accordingly.

122. *A. Primary acute and sub-acute anasarca* has been well described by STOLL, J. P. FRANK, WELLS, ABERCROMBIE, and others. It commonly occurs from exposure to cold and moisture, or from drinking cold fluids, when the body has been perspiring; and chiefly in the young, or in persons not much past the vigour of life. Oppression and uneasiness of breathing are first complained of; occasionally only tightness about the chest, without cough or pain, is felt; and sometimes cough with pain, aggravated by a full inspiration, and inability to lie down, from increased oppression of breathing, are experienced. In a few hours, seldom beyond twenty-four, the dropsical swelling makes its appearance — commonly in the face, and descending downwards to the trunk and lower limbs; sometimes in the legs; and often in both the face and lower extremities, nearly at the same time. The pulse is either a little accelerated, or of natural frequency; but generally weak or unequal, or even irregular. The urine is scanty, high-coloured, and in some cases coagulable, but in others without traces of albumen. The bowels are usually constipated, and the tongue loaded. There are also headach and thirst. If the effusion be not arrested by treatment, the swelling increases, and respiration becomes more oppressed, or even difficult; and the disease may terminate fatally in a few days, or be protracted to several weeks, or even months. This form of anasarca frequently attacks individuals belonging to the *dark races*, upon removing to a cold climate, or when the perspiratory functions, which are extremely active in them, are suddenly checked; and is generally attended with extreme dyspnœa, owing to a sub-inflammatory and œdematous state of the parenchyma of the lungs, which often become affected to the extent of producing asphyxia.

123. The *Diagnosis* of this variety of anasarca requires attention, as the swelling of the face, and oppression of breathing, with the other symptoms referred to the chest, often existing without fever or acute pain, may cause it to be mistaken for effusion into the pericardium, or into the pleural cavities. But the nature of the affection will be manifest on auscultation. These symptoms generally proceed from active congestion of the substance of the lungs, and in some cases from a state of vascular action intermediate between congestion and inflammatory action, attended by more or less serous infiltration of the parenchyma of the organ. That such conditions actually exist, to a greater or less extent, when the respiratory functions are disordered, is shown both by the stethoscopic and the rational signs, and by the appearances of inflammatory action or congestion observed in fatal cases.

124. *B.* The *consecutive form* of anasarca was noticed by several writers previously to J. P. FRANK, more especially by STOLL and PLENCIZ. But this celebrated physician first accurately described it, about 1790, and subsequently his pupil, GRAPENGIESSER and Dr. WELLS. It has more recently been illustrated by the observations of several writers. It may occur after any of the exanthemata, but most frequently after scarlatina, of which it is rather a common sequela, than a consequence of suppression of either the eruption or the perspiration. It should not, however, be supposed that anasarca is the only form of dropsy that appears after the exanthemata; ascites, or hydrothorax, or even hydrocephalus, may likewise occur, and either of them may be complicated with anasarca. From a number of cases that have come before me, I conclude — (*a*) that it is dependent on excrementitial plethora, arising out of the suppressed or imperfectly restored functions of the skin, and other eliminating or depurating organs; (*b*) that an incomplete or suppressed eruption will not occasion it, unless the internal secretions and excretions be also impeded; (*c*) that exposure to cold, or to a cold and humid air, or even to humidity alone, will favour its occurrence, although it frequently appears without those aids, and even in very different states of the atmosphere; (*d*) that it is more immediately induced by febrile or generally excited vascular action, arising out of an impeded or interrupted secretion and excretion, and a consequent morbid state of the blood (*a*), and increase of its fluid parts, accompanied by deficient power or tone of the extreme vessels and exhaling pores, either absolutely or relatively to the action of the heart and arteries.

125. PLENCIZ describes the anasarca consequent upon scarlatina as having been more fatal in Vienna, about the middle of the last century, than the original disease; whilst Dr. CULLEN states it to be a mild and manageable affection. Its severity, probably, varies with the state of the prevailing epidemic. It is often the most severe when the cutaneous eruption and angina have been slight. There is some difference observed in the period at which it supervenes. FRANK often met with it as early as fourteen days from the commencement of the fever; whilst, in other cases, it has not come on until twenty-eight or thirty-one days from that time. It commonly appears in from sixteen to twenty-four days, and is preceded by slight fever and languor. The sore throat and fever of the primary malady generally have partially or nearly altogether disappeared, and the appetite begins to return; but the bowels continue costive, the urine scanty and high-coloured, and the skin dry and harsh. Slight increase of the fever in the evening, the patient being morose and restless, thirst, and sometimes pain about the throat, capricious appetite, and sickness, come on, and are soon followed by œdema of the face, particularly of the eyelids, which is greatest early in the morning, extending rapidly over the body. With this extension of the anasarca, there are often symptoms of vascular fulness in the head, the patient becoming somnolent, torpid, and the pulse less frequent. In other cases, symptoms of effusion into the peritoneum, or into the pleuræ, or upon the brain, or of an œdema of the lungs, are superadded, the two latter affections being attended by evidence of danger, occasionally as early as the third or fourth day. As the anasarca becomes general, or thus complicated, or even previously, the urine, which had been long scanty, assumes a still higher colour; is turbid after standing, depositing slight albuminous flocculi, or resembling whey; is voided frequently, and in very small quantity, and often with pain in the region of the bladder or in the loins, and vomitings. In some

instances, the urine has a brown appearance, from the presence in it of some of the red particles of the blood. **FRANK** likens it to the washings of flesh, owing to this circumstance. It generally coagulates more or less on the application of the usual re-agents.

126. In the less favourable cases, *symptoms of danger* appear from the third to the ninth day from the commencement of the œdema of the face; but after twelve or fourteen days, they very seldom occur; convalescence often, under a judicious treatment, having commenced or proceeded far by this time. The danger in this form of anasarca depends upon its complications.— 1st. Upon active congestion, inflammatory action, or serous infiltration of the substance of the lungs, as in the primary form of the disease (§ 122.); dyspnœa, sense of oppression, constriction and anxiety in the chest, with dry cough and inability to lie down supervening, and indicating the nature of the complication:—2d. On effusion on the brain, ushered in by headach, sickness, and vomiting; and evinced by dilated pupils, slow pulse, convulsions, strabismus, loss of sight, and other signs of acute dropsy of the brain:—3d. On effusion into the pericardium, indicated by swellings of the face, neck, and hands, fulness of the veins of the neck, bloated countenance, irregular pulse, leipothymia, and fulness and tenderness of the intercostal spaces, chiefly of the left side:—4th. On effusion into the pleuræ, sometimes also associated with some effusion into the pericardium, and the symptoms of hydrothorax:—and, 5th. On disease of one or more of the abdominal viscera, either with or without effusion into the peritoneum; severe diarrhœa or dysentery occurring, and, whilst it carries off the dropsy, causing a chronic disease of the digestive mucous surface, occasionally with ulceration and its consequences; or suppression of urine from congestion or inflammation of the kidneys taking place, and aggravating all the dropsical symptoms; or obstruction of the liver superinducing an obstinate and dangerous form of ascites.

127. Anasarca consecutive of scarlatina is most frequent in children, and is rare in adults. Other eruptive diseases, beside this, give rise to dropsy of the cellular tissue, especially measles, erysipelas, urticaria, miliary fever, and many chronic diseases of the skin; owing not only to their *suppression* or retrocession, but also to impeded secretion, and to the consequent excrementitial plethora often attendant, or consequent, upon them. When it is consecutive of these diseases, it possesses either the sub-acute character common in that following scarlatina, or the more acute symptoms of the primary form.

128. *C. Primary asthenic anasarca* is not so frequent as the preceding. It is even questionable whether or not the asthenic cases, usually considered as idiopathic, are not depending either on structural change in an important emunctory, as the kidneys, or on obstruction about the right side of the heart, or congestion of the large veins and of the lungs. There can be little doubt that many of them are thus connected; yet some instances will present themselves, in which the asthenic state is primary, as far as can be ascertained. These are most likely to occur in persons living in cold, miasmatous, moist, low, imperfectly ventilated, and dark places; particularly in those of a lymphatic or phlegmatic temperament, or who lead sedentary lives, and are insufficiently nourished; in those who have experienced copious losses of blood, or are reduced by chronic or repeated discharges, as by hæmorrhagia, diarrhœa, dysentery, &c., or who, whilst convalescent from severe exanthematous or other fevers, have been exposed to cold and humidity; and in persons under the influence of depressing emotions, or who have suffered some sudden alarm. This form of the disease may accompany retention of the menses, or chlorosis; and it may supervene also, in debilitated states of the frame, upon obstructions of the catamenial or hæmorrhoidal evacuations. Many of such cases, however, will approach very nearly to the sub-acute form, and derive benefit from evacuations. The cases of anasarca produced by terror, disappointment, surprise, mental distress, &c., and termed spasmodic by **LANDRÉ BEAUVAIS**, and some other writers, appear to belong chiefly to this variety. That these and similar causes are sometimes followed by anasarca, cannot be disputed; but I question the dependence of the disease on spasm. Even granting the existence of spasm, what are the parts affected by it, and how does it act? Convulsions will sometimes occasion œdema of cellular parts; but they will also, during their continuance, sometimes remove the effusion, as observed by Dr. **WELLS**. The causes which are supposed to act by spasm, merely derange or impede the circulation through the heart and lungs, occasionally also rendering the hepatic circulation more languid or difficult than natural, whilst they lower the vital tone of the extreme vessels, particularly in weak and irritable constitutions, and interrupt the excretory functions, thereby inducing the conditions of the vascular system most favourable to the occurrence of serous effusion. Cases rapidly produced by fright have been recorded by **TISSOT**, **DESESSART**, **BEAUCHÊNE**, **BRESCHET**, **BATEMAN**, and others; and numerous instances connected with disordered or delayed menstruation, and the exhausting diseases mentioned above, have been adduced by **PLATER**, **RIEDLIN**, **FORESTUS PISO**, **WILLIS**, **ELLER**, **HOFFMANN**, **SAUVAGES**, **LEIB**, **MELITSCH**, and later writers.

129. Asthenic anasarca generally appears slowly, and with all the signs of debility and laxity of the soft solids; whilst the sthenic disease often forms rapidly, and with many of the symptoms of fever, or increased action. The infiltration usually commences in the lower extremities; sometimes in the face, or in both; slowly extends over more or less of the body; and is most remarkable, as well as most early, in those parts of the cellular tissue which are the most lax, as the eyelids, genitals, &c. The pulse is small, soft, and occasionally slow; the skin becomes paler, whiter, and colder than usual. The surface pits much more easily on pressure, and retains the impression longer, than in the acute or sub-acute forms. At first, the infiltration of the lower extremities is most remarkable at night, and nearly disappears in the morning; but it subsequently returns earlier in the day, and to a greater extent, and is incompletely or partially dispersed by the horizontal posture; the reverse taking place as to the œdema of the face. Ultimately it becomes much more con-

siderable, more general, and more permanent, sometimes with signs of coincident or consecutive effusion into one or more of the serous cavities. But the collection is very rarely so great, or so complicated, in primary asthenic anasarca as in the symptomatic. The urine is in small quantity, and seldom contains albumen. The bowels are either sluggish or irregular, more commonly the former.

130. *D. Symptomatic anasarca* may present either acute, sub-acute, or chronic characters. But it is most frequently chronic, passive, and asthenic, and nearly resembles the primary asthenic variety now described, as respects the constitutional powers. When, however, anasarca is complicated with, or consecutive on, *acute diseases of the lungs* (§ 29.), it is also acute or sub-acute; but it is rather, in this case, a concomitant effect of the exciting causes of the pulmonary disease, than a symptomatic affection. Organic changes of the heart and kidneys are the most frequent sources of symptomatic anasarca. I shall, therefore, notice this complication more closely than the others. — (*a*) Anasarca generally supervenes on *chronic lesions of the heart*, and especially towards the close of life; usually commencing in the face, particularly in the eyelids, and upon rising in the morning. Sometimes the ancles begin first to swell, and occasionally both the face and ancles — the former in the morning, and the latter in the evening. The infiltration gradually increases and extends; effusion into the pleuræ, or into the pericardium, or into both, also taking place either simultaneously or subsequently.

131. (*b*) Anasarca caused by *disease of the kidneys* is very seldom seen unassociated with effusion into one or more of the serous cavities. It is, when thus complicated, attended by pain in the loins, by sickness, vomiting and diarrhœa: it usually commences in the lower extremities; and is commonly in consequence of irregular and drunken habits, or of the scrofulous diathesis. It is very liable to recur, and is seldom permanently removed (§ 34.). Anasarca is also sometimes a consequence of chronic disease of the lungs, particularly *chronic bronchitis*, *bronchorrhœa*, *chronic pleuritis*, and *tubercular phthisis*. In these cases, the infiltration commences either in the face or in the lower extremities, only occasionally extends as high as the thighs or hips, and seldom becomes general; but is often associated with effusion into the cavities of the chest. Organic changes of the *liver* and uterine organs but rarely occasion anasarca, until after effusion into the cavity of the peritoneum. The observations already offered respecting the connection of dropsy with *disease of the blood-vessels and lymphatics* (§ 27.) are entirely applicable to this species of the disease. Although complete obliteration of one even of the largest venous trunks has taken place, serous effusion will not necessarily follow, especially if a collateral circulation be established. A remarkable instance of this is recorded by Mr. Wilson, where the *vena cava* was entirely obstructed, but no vestige of serous effusion existed, — evidently proving that other pathological conditions, beside venous obstruction, are requisite to the occurrence of effusion; whilst in the case of obliterated cava published by Laennec, ascites and anasarca of the lower limbs existed. Of the agency of disease of the vascular systems in causing local or partial anasarca, sufficient notice has been taken (§ 25. *et seq.*). The *causes*, *morbid appearances*, and *prognosis*, in anasarca, have been described under these heads in the early part of this article (§ 8. 14. 37.).

132. iii. Treatment. — 1st. *Of partial or local Anasarca.* — After removing the remote causes (§ 8.), the next object that we have to attain, is to restore the natural secretions and excretions, when any of these are in fault, and to remove the pathological state on which the affection depends. The restoration of the secretions will be attempted by the means appropriate to those chiefly disordered, — by purgatives, diuretics, diaphoretics, deobstruents, &c., as the intestinal, the renal, the perspiratory, and the biliary secretions, may indicate more or less of disorder or of interruption. If the œdema depend upon the *arthritic* or *rheumatic* diathesis, after the use of these means, colchicum internally, and iodine externally, may be prescribed, and aided by the support of bandages: if it proceed from *amenorrhœa*, or the final disappearance of the catamenia, a moderate bloodletting, general or local, should precede the means directed to act on the secretions. In many of such cases, as well as in others where there is no obstruction to the catamenia, particularly in females who have had children, or who are subject to constipation, and fæcal accumulations in the large bowels, the *femoral veins* are either chronically inflamed, obstructed, or varicose. Their course should, therefore, be carefully examined; and if any hardness or tenderness exist, leeches ought to be applied. In old or chronic cases, however, the veins will either feel hard and obstructed, without much pain, or they will be nearly obliterated, the superficial vessels being distended and varicose, and the surface of the limb sometimes purplish or dotted with dark red spots, cold, tumid, and unyielding to the touch; pain and stiffness being referred chiefly to the lower part of the leg and ancle. In several such cases, I have prescribed, with marked benefit, deobstruent purgatives, the sub-borate of soda, and iodine; causing the patient to wear a laced stocking, and to have frequent recourse to frictions. Benefit will be derived also from frictions with mercurial liniments, united to one of those about to be referred to; and from a course of bitter aperient medicines. When the disease of the veins is connected with marked debility and weak powers of digestion and assimilation, gentle tonics, chalybeates, frictions with stimulating and deobstruent liniments (§ 65.), will accelerate a cure. (See Phlegmatia Dolens and Veins; — *Diseases of.*)

133. The connection of œdema with *amenorrhœa, independently of obstruction in the veins*, requires a persevering internal use of iodine, or of the sub-borate of soda, with tonic aperients, or the compound decoction of aloes, &c., preceded by general or local depletion when signs of plethora or internal congestion are present. But when there are a chlorotic appearance of the countenance and surface, or irregular manifestations of hysteria, with great mobility of the muscular, and susceptibility of the nervous, system; a weak, soft, open, or undulating pulse; and

especially if the catamenia have not appeared, or, having imperfectly commenced, have disappeared; the disorder may have been induced or perpetuated by manustupratio, and require from the commencement a tonic and stimulating treatment, and the liberal use of the preparations of iron. When aperients are necessary, the compound decoction of aloes with the compound mixture of iron; and the pil. ferri comp. with the aloes and myrrh pill, or with aloes only; are amongst the best.

134. When œdema of the lower limbs depends on the pressure of the gravid uterus, cooling aperients, especially the confection of senna with cream of tartar, small bloodlettings if there be vascular oppletion, a light diet, the recumbent posture, pure air, and patience, are the chief remedies. When the local anasarca is caused by the pressure of enlarged or diseased glands, mercurial deobstruents, internally and externally, the preparations of iodine, or the ioduret of mercury, may be used, and the secretions and excretions promoted and duly evacuated by deobstruent purgatives; or with a combination of tonics and aperients. The taraxacum with the alkaline carbonates, and either the liquor potassæ, or the oxymuriate of mercury in very minute doses, taken in the compound decoction of sarsaparilla, or in the concentrated preparation of Messrs. Savory and Moore, have been of essential service in several cases in which I have prescribed them.

135. 2d. *Of general Anasarca.* — *A. Of primary acute and sub-acute anasarca*, little beyond what has been advanced respecting the treatment of acute dropsies (§ 40, 41.) need be here stated. If any difference in the measures is at all admissible, it respects merely a more energetic adoption of depletion, and a greater necessity for repeating it, in this than in any other species of dropsy, especially in its acute states, occurring in young, plethoric, and robust subjects. The instructive case published by Dr. Graham is an excellent illustration of this practice. When the patient complains of pain in the loins, and the urine is very scanty, or nearly suppressed, general bleeding will often be advantageously followed by cupping on the region of the kidneys. In addition to vascular depletions, the same remedies, especially purgatives or *cathartics*, directed in nearly the same succession and manner, as described at the places referred to, and at § 55., should be employed; and lastly, *diuretics*, associated in the way there advised, may be resorted to. It is obvious, however, that the extent to which the antiphlogistic treatment should be carried, must depend upon the nature of the case, and the acumen of the physician in detecting those latent states of active congestion, or of increased organic action, to which acute dropsies so often are owing.

136. *B. In consecutive acute anasarca*, appearing in the manner described (§ 124, *et seq.*), a nearly similar treatment to the above, in a less active form, however, in many cases, will be required. The sources of danger in this form of the disease, particularly when it follows scarlatina or measles, should always receive attention; and the remedies ought to be so directed as to prevent their accession. The directions already given (§ 40.) respecting general or local bleedings, should be strictly followed; and active counter-irritation and external derivation,— as the application of a large blister upon the nape of the neck, or between the shoulders,— be afterwards resorted to, especially if symptoms of cerebral oppression, or of affection of the thoracic organs, manifest themselves. If tenderness on pressure be felt in any part of the parietes of the chest or abdomen, or of the region of the heart, inflammatory irritation in the pleuræ, peritoneum, or pericardium, should be dreaded, and local depletions at some distance from the seat of pain, followed by external irritants and derivatives (§ 57.), be prescribed. If sickness and vomiting come on, an inflammatory affection of the head should be suspected, and be treated by active depletion and cathartics. In some cases, however, the vomiting depends upon disease of the kidneys; attention, therefore, should be paid to this circumstance. When *diarrhœa* is present, the supervention of ascites, or the existence of lesions of the kidneys, is to be feared. Without suddenly checking this discharge, means should be used to moderate it if it be caused by inflammatory action, and to evacuate offending matters if it seem to proceed from this cause. Leeches should be applied to the abdomen or its vicinity — to the anus or sacrum, if there be tenesmus — and be followed by hot fomentations, especially the terebinthinate; and, if the evacuations be offensive, scybalous, knotty, &c. a full dose of castor oil, or any other purgative, as calomel and jalap, &c. should be taken, and a full effect be promoted by purgative or laxative and emollient enemata. Afterwards *digitalis* may be exhibited, with liquor ammoniæ acetatis, infus. taraxaci, and syrupus scillæ; or the ammoniated spirit of *colchicum* may be given in a similar form.

137. In all cases, of both the *primary* and *consecutive* disease, the propriety of acting upon the secretions and excretions should be kept in view. In the former state especially, the cathartics, particularly those which act as hydragogues, as *elaterium*, *croton oil*, the *euphorbia lathyris*, and others enumerated above (§ 66.), may be prescribed with due caution; but, in the latter form, the common purgatives, as calomel and jalap, or the infusion of senna with some neutral salt, will be sufficient. The restoration of the cutaneous functions should be a chief object in the treatment of consecutive anasarca. With this intention, tepid bathing in acute cases, when the temperature of the surface is increased; and warm bathing (Aaskow) in the sub-acute; and the various medicated baths already noticed; may be directed, and be followed by gentle friction of the surface with warm oil, as advised by Schmidtmann; or with sweet oil, as used by Oliver, &c.; or with almond oil. I have adopted this treatment in several cases of anasarca following scarlatina, and seen benefit derived from it. As to the use of *diuretics*, it is unnecessary to add to what is stated in other places (§ 71.) respecting them.

138. 3d. *In Primary Asthenic Anasarca*, the preparations of iodine, the ferrum tartarizatum, with cream of tartar; the balsams and terebinthinates; sulphur; the association of tonics with purgatives and the warmer diuretics; chalybeates; and the rest of the tonic treatment recommended above (§ 42, 43.); are chiefly to be depended upon. In many cases of this description, the preparations of *digitalis* or of *squill* may be added to bitter vegetable infusior

decoctions, and some one of the neutral salts; and *cantharides* may be tried, as advised by Chalmers, Alix, &c. The following also may be employed; the first of which has been recommended by M. Dumas, the latter by Mr. Sprague: —

No. 187. ℞ Antimonii Pulver. gr. xx.; Croci Martis Aperit. gr. xxv.; Pulv. Scillæ gr. xij.; Gum. Ammoniaci ʒj.; Extr. Dulcamaræ ʒij.; Olei Juniperi q. s. M. Contunde in massam æqualem, et divide in Pilulas lx., quarum capiat binas vel tres bis terve in die.

No. 188. ℞ Decocti Spartii Cacum. (F. 75.) ℥x.; Potassæ Acet. ℈ij.; Spirit. Æther. Nit. et Spir. Lavand. Comp. āā ʒj. M. Fiat Haustus ter in die sumendus.

No. 189. ℞ Decoct. Spart. Cac. ℥x.; Liq. Ammoniæ Acetatis ℥ss.; Spirit. Æther. Nit. ʒss.; Tinct. Scillæ ʒss.; Tinct. Capsici ♏x. M. Fiat Haustus ter die capiendus.

139. 4th. *The Symptomatic, Chronic, or Passive states of Anasarca*, require the same intentions and means of cure as have been already stated (§ 44. *et seq.*), but with a strict reference to the nature of the organic change with which it is connected, as far as that may be ascertained. Anasarca dependent upon disease of the *lungs* is sometimes benefited by local bloodletting, but the practice requires the utmost discrimination. It is seldom admissible in aged patients; but in the younger and more robust, and when the pulmonary disease consists of active congestion or inflammatory action in the substance of the organ, or if the congestion be associated with obstructed circulation through the heart, moderate local depletions, repeated in the more acute cases, will be of service: when anasarca follows chronic bronchitis, or tubercular phthisis, it will seldom be productive of benefit, and in the former may be injurious. External derivation, actively and perseveringly employed, is more generally appropriate. In this form of the disease, the preparations of colchicum or of digitalis cautiously exhibited, and the rest of the treatment directed in the manner described above (§ 49.), will afford more or less relief.

140. When the disease of the *heart*, associated with anasarca, is of an active kind, and the patient is plethoric or robust, local depletions, followed by hydragogue purgatives and digitalis, are requisite. But, if it be of a passive or atonic kind, an opposite practice is indicated. The particular remedies that may be used in these cases have been fully stated (§ 45. *et seq.*). If the *liver* be diseased as well as the heart, the prolonged and daily use of deobstruent purgatives (§ 66. *et seq.*) and diuretics; the alkaline carbonates, with extract or decoction of taraxacum; a discriminating use of mercurial purgatives; calomel with digitalis, as advised by Wiedemann; cream of tartar with sulphur and sub-borate of soda, as recommended by Piderit; and the ammoniated preparation of colchicum, with the sub-carbonates and bitter infusions, and some diuretic tincture or spirit; will be productive of advantage. When the effusion seems to arise from disease of the *kidneys*, the treatment already recommended (§ 52.) may be tried. The effects of remedies on the urine, and on the symptoms referrible to the kidneys, ought to be carefully watched. Cream of tartar with borax, the alkalies with the uva ursi, the acetum scillæ saturated with potash (Sackenreuter), the balsams with magnesia or the carbonates, and external derivatives, or counter-irritation, may be employed. Dr. Venables recommends cupping on the loins, and the insertion of issues in that situation; and I have seen benefit derived from the practice. But when these organs are manifestly diseased, no permanent good effect can be expected from medicine. The connection of anasarca with *uterine disease* requires but little additional remark. The means already described (§ 53.) are quite appropriate to this species of dropsy. When, however, hysteria is present, the more cooling tonics, as the decoction of cinchona with the liquor ammoniæ acetatis, nitre, and the nitric æther; or vegetable bitters, with alum and opium, as advised by Leib; tonic infusions with an alkaline carbonate, nitrate of potash and squills, &c.; will generally be serviceable.

141. The treatment now described will require constant modification, in respect both of the association of different classes of medicines, and in the combination of those possessed of analogous properties — as regards conjoining tonics with purgatives, or various diuretics one with another. The remarks offered above, as to the numerous medicines which have been employed in dropsies (§ 54. *et seq.*), will assist the practitioner in selecting from amongst them for the removal of anasarca, whether this species exist simply, or in conjunction with effusion into one or more of the serous cavities. The *pyrola umbella*, recommended by Dr. Somerville, and more recently by Dr. Beatty and Dr. Seymour; and the *liverwort*, employed in the manner pointed out by Dr. Shortt, should be duly tried.

142. The propriety of having recourse to *scarifications and punctures* has been much questioned. But it entirely depends upon the circumstances of the case, and the manner of making them. When the limb is cold, pits deeply, and retains the impression long; when the patient is old, and, from the irregularity of the pulse, &c., probably has ossified arteries; and when livid or dark spots appear in the extremities; scarifications will be attended by much risk of being followed by sloughing sores, although *acupuncturation* may be substituted with advantage, as recommended and employed successfully by Mr. Churchill. Indeed, this seems to be the preferable mode of attempting to evacuate the collected fluid. Dr. Koenig advises the use of *electro-puncturation*. It is a question whether or not acupuncturation may not be preferable to any other mode of puncturing in this disease. Several practitioners direct small punctures with the point of a lancet, as the safest and best mode of directly evacuating the infiltrated fluid. This practice was praised by Col de Villars, Guenault, Adet, Thilenius, and some later writers. In several instances of sloughing sores consequent upon the rupture of the skin, and upon scarification, I have seen the most decided benefit derived from the application of a cloth moistened with spirits of turpentine over them. This medicine causes a rapid subsidence of the swelling, and restores the cohesion of the rarified and weakened tissue surrounding the divided or destroyed parts.

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VII. DROPSY OF THE CAVITIES OF THE CHEST.

143. DEFIN.—*Sense of oppression in the chest; urgent dyspnœa on exercise or in the horizontal posture; livid lips; œdematous countenance and extremities; weak, small, and irregular pulse; disturbed sleep, with sudden startings, &c.*

144. As dropsy of the pericardium is so very generally connected with more or less effusion into the cavities of the pleuræ, that we seldom find the one without the other, although in varying grades and relative proportions; and as the former, as well as the latter, is a very frequent consequence of structural change in the substance of the lungs, or in the pleuræ, or in the heart itself and its valves; I shall, therefore, describe them as species of the same genus. The difficulty, also, of determining whether the fluid is chiefly, or altogether, in the pericardium, or in the pleuræ, even in cases where it is limited to one only, is an additional reason for considering hydro-pericardium and hydrothorax in connection with each other. It is principally, however, when the effusion is symptomatic of structural lesions of the thoracic viscera, or of a more generally morbid state of the frame, that we find them co-existent, and without any remarkable preponderance in favour of either the one or the other. But when effusion is the more immediate result, or the sequela, of inflammatory action, or of a state of organic action closely allied to inflammation, in either the pericardium or pleuræ, it is generally limited accordingly, and it often accumulates to a very great extent.

i. DROPSY OF THE PERICARDIUM.

SYN. *Hydrops Pericardii, Hydro-pericardii, Hydro-pericardia, Hydro-pericardium* (from ὕδωρ, water, and περικάρδιον, pericardium) of Authors; *Herzbeutelwassersucht*, Germ.; *Hydro-péricarde*, Fr.; *Dropsy of the Heart*, Eng.

145. DEFIN.—*Oppressive dyspnœa, with a sense of weight and tremor referred to the region of the heart; anxiety; inability to retain the supine posture; weak, irregular, or intermitting pulse; livid and œdematous countenance; distension of the jugular veins; leipothymia; fulness of the epigastrium, and of the anterior intercostal spaces; percussion emitting a dull sound, and auscultation furnishing a faint and diffused sound, over all the cardiac region.*

146. *A.* It is obvious that pathologists ought to agree as to the least quantity of fluid in the pericardium that should be considered to constitute dropsy of its cavity. VESALIUS states, that it always contains a small quantity of water in health, and that he had observed it in criminals who had been quartered while alive. LOWER entertains a similar opinion. F. HOFFMANN, however, comes to a different conclusion; he having observed no fluid in the pericardium of healthy animals: whilst LITTRE found some in the animals on which he experimented. HALLER believes that this cavity contains a fluid destined to facilitate the functions of the heart, but gives no opinion as to its quantity, in health. He remarks, that it may be greatly increased in various diseases, and that it may be absorbed (*Elementa Physiol. &c.* 4to. vol. i. p. 292.). SENAC infers that, in the natural state, the pericardium contains no fluid; he having found none in several cases in which this membrane and the heart were both healthy. CORVISART, TESTA, J. P. FRANK, KREYSIG, BERTIN, LOUIS, ELLIOTSON, HOPE, &c. appear to have adopted the opinion of HALLER, in considering that this cavity always contains a little fluid; but they differ in some respects as to the amount which should be viewed as constituting dropsy of it. M. CORVISART believes that, when it reaches six or seven ounces, hydro-pericardium exists. This inference has been adopted by PINEL, BERTIN, ELLIOTSON, and HOPE, who think that this quantity will give rise to symptoms indicating, although with great uncertainty, the seat of effusion; whilst LAENNEC concludes that double or triple this quantity may not admit of a correct diagnosis. Much, however, will depend upon the rapidity of its collection, and the nature of the pathological states either causing it, or connected with it. A larger quantity than that now named, has sometimes accumulated without having induced such symptoms as could enable the practitioner to decide as to the exact nature and seat of the disease, particularly when chronic affections of the lungs or heart have accompanied it.

147. From one to five or six ounces of fluid are sometimes found in the pericardium, in several maladies either of adjoining or of remote organs, especially in persons who have died of phthisis. This collection, obviously greater — at least, the higher amount — than exists in health, seldom gives rise to specific symptoms, although the larger quantity may occasion much disorder. It may, indeed, form very shortly before death, and may merely be contingent on the changes immediately preceding dissolution, particularly when the malady destroys life by asphyxia, or when congestion of the lungs and disorder of the respiratory actions have been present for a short time previously; and its amount may even be increased subsequently to the fatal issue. When fluid collects

in the pericardium to an extent obviously constituting dropsy, and calculated, from its influence on the functions of the heart and lungs, to be the chief lesion by which life may be abridged, it will give rise to a certain train of symptoms, generally indicative of the presence of water within the chest, although not always of its precise situation. The quantity that may admit of detection, in this situation, cannot be stated absolutely. The existence of eight or ten ounces, or even of a smaller quantity, may be ascertained, in some instances; whilst in others, nearly double the amount may not be recognised with precision, as Frank and Laennec have truly contended.

148. *B.* It is important to know *the pathological states on which effusion of fluid in this situation depends, and the conditions of life and of organisation with which it is connected.* These points have been but imperfectly ascertained; but, from some attention I have paid to the subject, I believe that they may be referred to the following: — 1st. The effusion may be one of the more immediate results of inflammatory action (see Pericardium — *Inflammation of*), in some instances; and, in others, a remote sequela of this disease. — *a.* In this case it generally forms more or less rapidly; may not be attended by any or much effusion or inflammatory appearances in the pleural cavities, although it very frequently is so associated; and it may accumulate to a great extent. The instances referred to by Corvisart, Frank, and others, in which several pounds of fluid were found in the pericardium, seem to have been of this kind. The nature of the disease, in this variety, may generally be inferred with some accuracy, when the effused fluid amounts to more than six or eight ounces, — from antecedent symptoms of inflammatory or acute disease referrible to the region of the heart, either previously to, or attending, the effusion; from urgent anxiety at the præcordia, with continued jactitation; from a dull sound being emitted, by percussion, to a greater or less extent over the cardiac region, and a faint and diffused sound being furnished by auscultation; from the motions of the heart being perceptible beyond their ordinary limits, the impulse being undulatory, unequal, and felt at various points; and, when the accumulation is great, from a marked fulness in the epigastric region, occasionally with a vibratory pulsation, and with fulness of the anterior intercostal spaces of the left side, or with some degree of external œdema in this situation. In some instances of this form of the disease, these symptoms suddenly supervene, and are attended by orthopnœa; small, frequent, irregular, intermitting, and weak pulse; syncope or leipothymia, followed by slight fits of obscure palpitations, distension of the jugular veins, bloated livid countenance, and cold extremities. — *b. On dissection* in these cases, marks of inflammation are observed in the pericardium, with thickening and sometimes with lymph adhering to its surface, or floating in the fluid in filaments or in the state of albuminous flocculi. Occasionally the fluid is serous and turbid, resembling whey; or albuminous, or sero-puriform, or nearly purulent, or even sanguineous. In these, the rapid effusion of fluid appears to be owing to the sudden loss of the tone of the extreme capillaries and exhalants; the increased and morbid action of the vessels supplying them still continuing, sometimes connected with an unhealthy state of the system. — *c.* This form of pericardiac dropsy may exist either *alone*, or it may be *complicated* with, or consequent upon, pleuritis, or pneumonia, or acute bronchitis; or may be connected with the rheumatic or gouty diathesis, and be even a metastasis of these maladies.

149. 2d. Fluid may be effused in the pericardium, as in other serous cavites, by a slower process than that generally accompanying or following inflammatory action; and be attended by a very different state of this membrane. — *a.* In this class of cases, the effusion commonly depends upon impeded or disordered circulation through the heart or lungs, arising from a variety of organic changes of a chronic kind in these organs; or upon structural lesions of the pleura; or upon disease seated in the mediastinum, or in the large vessels. It is, in such instances, often connected with a leucophlegmatic, lymphatic, or dropsical diathesis, and debilitated frame. The fluid collects slowly, is accompanied by no local or constitutional symptoms of an inflammatory kind; and the attendant disorder is aggravated by an anti-inflammatory treatment. When it reaches a very considerable amount, the patient feels a weight in the cardiac region, with pain in the back and loins: and if he be emaciated or thin, the impulse given to the fluid by the dilatations of the heart may be felt and seen between the third and fifth ribs. The sensation of the organ floating in a fluid, said, by some writers, to be felt by the patient, has not been confirmed by my observation; but the feeling communicated to the hand of the physician, by the stethoscope, is frequently that of an impulse transmitted through a fluid, and an undulation is sometimes felt. In addition to these, and the preceding symptoms (§ 148.), there are often a dry cough, leipothymia, sometimes followed by palpitation, which is occasionally violent; inability to use any exertion; a necessity of sitting up, and of leaning forward; a cold, leucophlegmatic, or œdematous countenance, with lividity of the lips; cold and anasarcous extremities; lowness of spirits; emaciation, particularly of the trunk; scanty, red, and lateritious urine. Inability to lie in the supine posture is often an early sign; although the patient may lie on either side. But this, like several of the other symptoms, is uncertain; for some persons in health are incapable of retaining the supine posture even for a short time. The above phenomena are also inconstant, owing to the nature of the primary or co-existent lesions; and, when present, they are often obscured by the more prominent symptoms directly depending upon these lesions. — *b. On dissection*, the pericardium is not reddened or injected; it is somewhat paler, or whiter, than natural — occasionally of even a satiny whiteness; but it is generally opaque, slightly thickened, and sometimes softened, and appearing as having been macerated in the liquid it contained, — an appearance which has been doubted by Laennec. The *fluid* itself is usually colourless and limpid; sometimes of a citron tint, or yellow; and occasionally turbid, of a brownish, or of a greenish hue. — *c.* This form of the disease is seldom or ever met with unconnected with the lesions already alluded to; and is frequently

merely a part of a more general effusion of fluid, either into other serous cavities — particularly the pleural — or into the cellular tissue. J. P. Frank could adduce only four cases from authors and his own experience, in which hydro-pericardium was not accompanied by some other change in the membrane or related organs; and even one or more of these might have been thus associated. Whilst this variety of the disease is *chronic*, and manifestly *symptomatic*, the preceding is *acute*, at least in its early stages, but sometimes assuming a more chronic and passive character; and, although it cannot be said strictly to be idiopathic or primary, it may be viewed as a consequence of a morbid state of vascular action not altogether identical with the sthenic inflammation which takes place in a healthy constitution. I have seen several instances of it arising from metastasis of rheumatism to the pericardium, occurring in weak and unhealthy constitutions.

150. 3d. Fluid may be effused in the pericardium in a third form, but seldom to the extent of constituting the principal morbid change. It has been shown that the lesion giving rise to the *first* variety is chiefly seated in the pericardium, and is nearly allied to, although it is probably seldom identical with, the true inflammatory action, or phlogosis, of the internal surface of that membrane; and that the *second* variety is caused by impeded circulation from organic change of the more immediately related organs, the effusion taking place in a similar manner to other symptomatic dropsies.—*a*. But the variety now about to be described, is an attendant upon a very different and a more universal state of disease; usually comes on not long before death; is a consequence of the generally perverted or alienated conditions of life, occasioning deficient vital cohesion of this membrane, and lost tone of the extreme vessels and exhaling pores, in which changes the rest of the organisation more or less participates; and is frequently unattended by any prominent symptom.—*b*. It supervenes on the latter stages of some malignant or adynamic diseases, in the course of which the blood becomes contaminated by morbid matters, either absorbed from without, or generated in some part of the body. Thus, I have observed it in several cases of phlebitis, particularly in uterine phlebitis; in the true malignant puerperal fever; and in fatal cases of erysipelas, small-pox, and scarlatina. It likewise takes place after wounds from dissection, and in carcinomatous and some other maladies. In all these, the pericardium only participates more or less in a similar alteration taking place in other shut cavities, most frequently in the pleuræ, excepting in adynamic puerperal diseases, when the peritoneum is also the seat of effusion to a much greater extent.— *c*. On *dissection*, the tissues are found soft, flabby, easily torn, and of a dirty or dusky hue. In these morbid states, the heart and pericardium participate, but they are not inflamed. The blood is often dark, fluid or semifluid, or grumous; and the liquid effused is turbid, greenish brown, or brown, or sero-sanguineous, and seldom amounting to more than ten or twelve ounces.— *d*. In this variety of hydro-pericardium, the characters of the fluid, the state of the textures, and the manifestations of life, indicate that the vital cohesion, or the organic contractility, and tone, of the membrane, and particularly of the extreme exhaling vessels or pores, are lost; and that the more watery parts of the blood, with a portion of the smaller globules, and even of the colouring particles, are thereby enabled to pass through them. It is evidently one of the ultimate lesions produced by contamination of the circulating fluids, and of the soft solids, in the manner pointed out in the articles Blood (§ 132—152.), and Disease (§ 148.). (See also Heart, and Pericardium.)

151. *C*. Diagnosis.—The difficulty of distinguishing dropsy of the pericardium from that of the pleuræ has been insisted on by every writer since Morgagni. This has arisen from the circumstances already alluded to; from the very frequent co-existence of effusion into both these situations; and from the extent to which the symptoms accompanying organic lesions of the lungs, heart, and large vessels, producing the effusion into the pericardium, obscure the phenomena caused by it. No opinion, therefore, can be formed from any one symptom; and even that founded on a careful investigation of the history of the case, and of the *tout ensemble* of the phenomena, must still be viewed with some distrust. Early disturbance of the actions of the heart, and irregularity of the pulse; a lesser degree of dyspnœa relatively to such disturbance (Morgagni); the sounds heard on percussion and auscultation; the sensations depending on the motions and impulse of the heart, felt either by the patient or by the examiner, as that of the heart swimming in water (Reimann and Saxonia), and that of an impulse transmitted through a fluid; a fluctuating tremor (Senac) and fulness either felt or seen at the epigastrium and anterior parts of the left intercostal spaces; a sense of weight and oppression in the cardiac region (Lancisi); absence of the fluctuation upon concussion or succussion of the trunk observed in hydrothorax (Morgagni); an irregularity in the situation of the heart's pulse, it being felt, at different times, in different parts of an extensive circle; œdema, or fulness towards the left side of the chest (Corvisart); coldness and œdema of the feet, legs, and hands; and leipothymia and palpitations; have been severally insisted on, and are the signs most to be depended upon; but there is not one of them that is constantly present, or, when present, that is caused by hydro-pericardium only. When effusion is limited to the left pleural cavity, as in the cases recorded by Mr. Henderson and M. Desault, and in which paracentesis was performed, a correct diagnosis is most difficult.

152. *D*. Causes.—These have been noticed in the description of the different states of the disease, and are nearly the same as those giving rise to other forms of dropsy. The connection of hydro-pericardium with debility, especially of the vascular system, and with a softened and flabby state of the substance of the heart, is deserving of attention. I have seen it thus related, both in children and grown-up persons of all ages, living in cold, low, and damp places, or cellars, especially after the eruptive fevers and rheumatism; and, according to Testa, it is most frequent in females, particularly after delivery (§ 150.). In the third form which I have described, it very often supervenes in the

last stages of the more fatal diseases of the puerperal state.

153. E. The PROGNOSIS must necessarily be very unfavourable. Yet it should not preclude the having recourse to a protracted treatment, as life may be prolonged by judicious measures perseveringly employed, and a cure may eventually be effected, particularly when the effusion has been consequent upon inflammatory action, or the metastasis of rheumatism to the pericardium. The prognosis should entirely depend upon the form of the disease: it is unfavourable in the first variety I have described; much more so in the second; and the worst in the third.

154. *F.* TREATMENT.—(*a*) The means of cure in the 1st *variety* should be the same as are advised for inflammation of the pericardium, as long as signs of phlogistic action exist. But as soon as this lapses into a passive or an asthenic form, no benefit will result from lowering measures. Energetic derivation and external counter-irritation ought then to be directed. In most of such cases, however, unless the vital energies are very greatly reduced, calomel with camphor, and small doses of opium, or the sublimate with sarsaparilla,—the former carried the length of salivation, the latter of affecting the gums,—and a seton, or issue, or open blister, kept discharging over the margin of the left false ribs, will be productive of benefit. Whilst these are being employed, the constitutional powers should be supported; and, if they be much depressed, medicines of a tonic and astringent operation, with light nutritious diet, ought to be prescribed. Care must, however, be taken that inflammatory disorder is subdued in the lungs and pleura, when the effusion into the pericardium is thus complicated, before tonics or stimulants of a heating kind are administered. In such cases, the infusion of roses, with small doses of the sulphate of zinc, and sulphuric acid, with digitalis, will be found the most appropriate. But the main reliance must be placed upon external derivation. When the effusion has been consequent upon the metastasis of rheumatism, or of gout, active counter-irritation, the combination of colchicum with camphor or ammonia or with both, the alkaline carbonates or subcarbonates in full doses, and tonic purgatives, with the rest of treatment already recommended, may be employed.

155. (*b*) In the 2d *variety*, or that depending upon organic change in the heart, lungs, or large vessels, but little benefit will be derived from diuretics or, perhaps, from any treatment that can be adopted. I believe that lowering measures, too generally resorted to in cases of this description, will only hasten a fatal issue. Much more advantage will be obtained from means which increase the secretions and excretions—the assimilating and eliminating processes. Very small and frequent doses of blue pill, with a tonic extract, or the soap and opium pill; bitter or tonic infusions and decoctions, with an alkaline subcarbonate, hyoscyamus, and extract of taraxacum; an issue in the side, kept freely and long discharging; and due attention to the developement of vital power, by appropriate medicines, diet, and regimen, and a pure air, without heating or exciting the vascular system; are the most to be relied upon. The bowels and biliary secretions ought to be moderately acted on by medicines of a tonic, deobstruent, and laxative operation, which will promote vital power, while they exert a derivative action on these viscera. With this view, diuretics of an analogous kind may be added to the other remedies. The treatment of the 3d *variety* must entirely depend upon the nature of the primary disease, of which it is merely a remote consequence. The indications of cure, in these maladies, and a review of the most efficient measures, will be found in the articles BLOOD (§ 156. *et seq.*), and DEBILITY (§ 37, 38.).

156. (*c*) *Paracentesis pericardii.*—The proposal of tapping the pericardium, made long since by RIOLAN and SENAC, and sometimes practised, is deserving of notice. It was attempted in the case published by Mr. HENDERSON, and in one of a similar kind by M. DESAULT; the existence of hydro-pericardium having been inferred in both. But it was found, in both instances, that the fluid had been effused into the left pleura, from partial pleuritis, and that the pericardium adhered to the heart. An opening, however, has been made into the pericardium by LARREY, RICHERAND, and ROMERO. The last named physician punctured the pericardium, and drew off the accumulated fluid, in three cases; and in two with success. (See *Dict. des Sciences Méd.* t. xl. p. 371., and *Medico-Chirurgical Review*, vol. i. p. 477.) He made an incision between the fifth and sixth ribs (but between the fourth and fifth in a short person), and carried it through the pleura. He then introduced his finger, and, having thereby ascertained the presence of the fluid in the pericardium, he made an opening into it with small crooked scissors; through this the fluid escaped into the left pleural cavity, whence it was discharged by placing the patient in a proper position. By this procedure, if the fluid be in this latter cavity, instead of the pericardium, as in the cases of HENDERSON and DESAULT, the first opening gives it exit, and nothing further is requisite. The plan of Dr. ROMERO possesses undoubted advantages, even in this last respect; and he has accordingly practised it in five cases of hydrothorax, and in three successfully.

157. It is evident that this operation can be productive of benefit only in those cases that belong to the *first* variety, or that consequent on inflammatory action, when effusion frequently is limited to the pericardiac cavity. In states of the disease depending upon organic lesions of the adjoining viscera and parts, when the effusion is rarely or never so limited, no advantage can be hoped from an operation. In itself, paracentesis, whether restricted to a simple opening into the thorax, or extended to the pericardium in the manner practised by Dr. ROMERO, is attended by no greater risk than when it is performed on the abdomen. The chief dangers from it are entirely the same as those pointed out above (§ 105.), when discussing the propriety of it in this latter situation. The fears of danger from the introduction of the external air causing the collapse of the lungs, is not well founded. If the wound be carefully closed after a deep expiration, the resiliency of this organ, and the absorption of the air, will overcome the difficulty. The mischief is occasioned in a different manner,—by the

action of the air upon the inflamed or otherwise diseased membrane; and hence the impropriety (and probable cause of failure in several cases) of leaving a canula in the opening, or of introducing a tent sponge. I state this from having seen this practice adopted in cases of paracentesis, and carefully observed the antecedent and consequent states of diseased action. I would, therefore, submit, when the last resource of an operation is attempted, that it should be performed with the utmost precautions against the introduction of the external air; and that the opening should be carefully and accurately closed, and kept closed, instantly upon the discharge of the fluid; and that, instead of preserving an opening for its continued flow, the operation should be repeated when it becomes really necessary. (See PERICARDIUM.)

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ii. DROPSY OF THE PLEURAL CAVITIES. — SYN. *Hydrothorax* (ὕδωρ, water; ϑώραξ, the chest), *Hydrops Saccorum Pleuræ*, Auct. var.; *Dropsy of the Pleuræ*; *Hydropisie de la Poitrine*, Fr.; *Brustwassersucht*, Germ.; *Idropisia di Petto*, Ital.; *Water in the Chest*.

158. DEFIN.—*Dyspnœa and oppression in the chest, increased by the horizontal posture and exercise, with œdema commencing in the eyelids and ancles; startings from sleep; the sounds on percussion being dull, and the respiratory murmur not heard on auscultation.*

159. Hydrothorax has been divided into *idiopathic* or primary, and *symptomatic*. It is very rarely primary, as M. LAENNEC has observed — that is, without pre-existing disease of the pleuræ, lungs, heart, or large vessels. But it is often *consecutive* of increased vascular action, or inflammatory irritation of the pleuræ, without any lesion of other parts, particularly when it follows the eruptive fevers; and it may be a termination of pleuritis, especially in the lymphatic or phlegmatic temperament, and in the cachectic habit of body. Its *symptomatic* or *complicated* states are the most common. As the *consecutive* hydrothorax, in all its forms, is generally acute or sub-acute, or possesses more or less of the sthenic characters, it will be considered as such; whilst the *symptomatic* will be viewed as a passive, chronic, or asthenic disease.

160. *A.* ACUTE AND SUB-ACUTE HYDROTHORAX; *Inflammatory Hydrothorax*, *Hydro-pleuritis*, or *Hydro-pleurisy*, of RAYER. — That this form of pleural dropsy consists of increased exhalation from the pleuræ, depending upon increased vascular action and determination to this surface, will be admitted; but that it is identical with inflammation, of an acute and healthy kind, may be questioned. The symptoms, local and constitutional, in hydrothorax of the most acute kind, and in pleuritis — either the pulmonary or costal — are certainly not identical, particularly in respect of severity. Hence, although much similarity exists, as far as mere vascular injection, or determination of the circulation, is concerned; and although pleurisy may terminate in, or give rise to, serous effusion in many instances; yet the kind of organic action affecting the pleuræ, and the attendant constitutional disturbance, are not the same in both. The difference has already been alluded to (§ 18.); but I may here add, that the formative processes — the kind and grade of organic vascular action — characterising pleuritis, are not observed either in the local lesions or in the constitutional affection of acute hydrothorax, unless when the effusion supervenes on external injuries and inflammation, or is an earlier attendant on a modified condition of such disease. The consecutive states of acute pleural dropsy, as it may be studied after scarlatina, either during life, or in the morbid appearances, illustrate this view, and prove, that there is, as respects both the conditions of the effused fluid, and the changes in the pleuræ, a difference in the kind of organic action whence they have proceeded, from true inflammation, and that such difference is evidently connected with constitutional causes. It is very common to observe that, when an attack or attacks of either pneumonia or pleuritis have been removed by treatment, a slight exposure to their exciting causes, or irregularities on the part of the patient, before the diseased vessels have regained their healthy tone and action, will give rise to a less acute, or a smothering, state of disease, either attended by, or quickly terminating in, effusion; the reduced powers of the constitution, the lost tone of the exhaling pores, and the general or local excited action, favouring this particular malady — this morbidly increased serous exhalation — in preference to any other. In this way acute or sub-acute hydrothorax supervenes on a state of the frame which has not recovered from previous disease — more particularly from eruptive fevers — or which has been impaired by age, excesses, or irregularities; the powers of life, and the organic action thereon depending, being insufficient to develope sthenic or phlogistic inflammation. The *inferences*, then, from the causes, accession, phenomena, and concomitant changes observed in the *acute* or *sub-*

acute disease, are, that it is not identical with healthy inflammation, although frequently so nearly allied to it as to appear either as a termination, or as a lower grade, or as a modification of it; and that it is often connected with, even although it may not be dependent upon, the nature of the preceding malady, in which the secretions and excretions have been interrupted, and not sufficiently restored.

161. That inflammation of the bronchi, or of the substance of the lungs, will sometimes be propagated to the pleuræ, generally in consequence of constitutional fault or injudicious management, and give rise to effusion into their cavities, is well known; that inflammation of the surface of the liver, or of the peritoneum, or of both, will occasionally extend to the pleuræ, particularly in debilitated or cachectic subjects, and, having reached this situation, terminate in effusion, I have often remarked; and that the state of vascular action, whose similarity or connection with true inflammation has been noticed, but whose identity with it has been denied, will occur in the pleuræ in various states of sequence and of complication, has been a matter of daily observation, and may be readily illustrated from the pages of Bonet, Morgagni, Stoll, Lepois, Lieutaud, Leroux, and many other of the writers referred to. In some localities, also, and during certain epidemics, it has been remarked that peripneumony has evinced a remarkable tendency to terminate in this manner. Dr. Romero states, that, on the coast of Andalusia, hydrothorax and hydro-pericardium are endemic, owing chiefly to the prevalence of hot and humid winds, and sudden atmospheric vicissitudes, particularly among those who are ill fed, or live on unwholesome food, and are given to intoxication or irregularities; and M. Pariset observed this form of hydrothorax prevalent in Geneva, in 1803,—the symptoms being so slight that the patient's appetite and ability of attending to his affairs continued until the pleural collection induced violent oppression. He states, that the number who died among the French conscripts was very considerable, — the effused fluid being limpid and inodorous, and the pleura grayish and thickened, and the lung compressed, or condensed.

162. The *morbid appearances* in the acute form of hydrothorax, whether it has been connected with inflammation, or active congestion of the substance of the lungs; or has proceeded from a modified form of pleuritis, either occurring primarily, or consecutively on an eruptive fever, or after the suppression of some chronic disease of the skin, or of an accustomed discharge; are usually the following: — The *fluid* presents every shade of colour already remarked (§ 11.) — is sometimes turbid, muddy, reddish, sanguineous, whey-like, or sero-purulent; but more frequently transparent, of a citron tint, with filaments or numerous albuminous flocculi floating in it. The *membrane* is internally reddened, or injected, thickened and somewhat softened, and occasionally covered by an albuminous, granulated, or tuberculous exudation. The *lungs* are generally compressed, condensed hepatised, or tuberculated; and present appearances of chronic inflammation. The *causes* of this form of hydrothorax are the same as those described above (§ 8, 9. 19.)

163. *B.* Symptomatic, passive, or complicated Hydrothorax. — This state of disease is dependent upon some obstacle to the circulation of the blood, or lymph. Its connection with dilatation of the cavities; with hypertrophy, atrophy, &c. of the substance, and with alterations of the valves, &c. of the heart; has been long since pointed out by Bonet, Morgagni, Lieutaud, Meckel, Sandifort, &c. Disproportion between the capacities of the cavities, ossification of the valves, and various other lesions of this organ, have been still more minutely examined in relation to the production of hydrothorax, by Corvisart, Laennec, Testa, Kreysig, Bertin, and others. Varicose dilatation, also, of the veins of the lungs, and compression or obliteration of them, from chronic pneumonia, or tubercular and other productions, are sometimes the immediate causes of effusion. The dependence of this form of the disease upon alterations of the lymphatics, either in their glands or in their trunks, once so strongly insisted upon by the able pathologists already named in connection with this doctrine (§ 27.), although not improbable, has not been established so as to admit it otherwise than as an occasional, and by no means frequent, occurrence.

164. The *fluid* effused in this form of hydrothorax is commonly transparent, colourless, or of a citron tint; in rarer cases, it is of a light brown, or reddish hue, or even sanguineous; its quantity varying from a few ounces to ten or twelve pounds, in both the cavities. In some cases, a quantity of aëriform fluid is also present. (See art. Pleura.) On the evacuation of the serum, the pleuræ are generally observed to be sound; or merely paler, or somewhat softer, than natural. When the accumulation has been great, the lungs are generally pushed up to the vertebral column, are hardly crepitous, and are occasionally pale as if macerated; but they sometimes admit of being distended by insufflation, when they have not been inflamed and hepatised. In this form of the disease, effusion frequently takes place into the pericardium, as a coexistent result of the same organic changes; and occasionally some fluid is also found in the abdomen, or even within the head; but more commonly in the cellular tissue, constituting a more or less complicated or general state of dropsy. M. Rayer justly remarks, that anasarca, hydro-pericardium, and ascites, are more frequently associated with hydrothorax when it is caused by organic lesions of the heart, than when it is consequent upon alterations of the lungs.

165. *C.* Diagnosis. — As hydrothorax is generally produced by anterior disease, it follows, that it will not become manifest until some days, or even some weeks or months, afterwards; or, in cases of organic change of the heart or lungs, not until a few days or weeks previously to death. Even with the aid of percussion and auscultation, small collections of fluid are ascertained with much difficulty, and are marked by the symptoms of the lesions that cause them. But when the accumulation is considerable, it is generally evinced by phenomena which are proper to it. The patient feels an oppression and difficulty of breathing, great in proportion to its quantity. He generally lies upon the affected side, leaving the healthy one unincumbered in its functions. When the fluid is in both cavities, the respiration is still more difficult and short; the patient sits up in bed, and

calls in the aid of all the muscles of inspiration: his countenance assumes a cast of anxiety. Corvisart describes the chest as being more distended, and rounded on the side which contains the fluid; and, as the collection increases, the intercostal spaces are widened; the integuments of this side becoming œdematous, and, in a few instances, the arm on the same side. On *percussion* a dull sound is emitted, resembling that produced by striking the thigh on the side containing the fluid, or on both sides when effusion has taken place in both. When the patient sits, or stands up, and the fluid only partially fills the cavities, the lower part of the thorax only will give out a dead sound. This sound generally changes its place with the change of position, owing to the gravitation of the water to the depending part. This, as M. Piorry contends, is an important diagnostic between the dead sound of effusion and that produced by hepatisation of the substance of the lung, which always retains the same situation. In the acute states of the disease, a feeling of soreness, tenderness, or pain, is often complained of in or over the seat of effusion.

166. Upon *auscultation*, the respiratory murmur is found to have ceased in the region corresponding to the fluid collection; and in its place is heard the tubular or bronchial respiration. In some cases ægophony is heard when the effusion is not very great. If the fluid be accumulated only in one cavity, *mensuration* of the thorax then becomes a useful mode of diagnosis; but the increased fulness of one side, and widening of the intercostal spaces already noticed, may be recognised at sight. When the collection is very great in one side, not only is the lung compressed, but the diaphragm and liver are pressed downwards; and, if it be in the left side, the heart is pushed towards the right. *Succussion* of the trunk cannot furnish any information, unless air accompany the effusion, in which case fluctuation may be distinctly heard. (See Empyema, and Pleura.)

167. *Passive* hydrothorax, in itself, frequently occasions but little general disturbance, the functions of respiration being only mechanically disordered by it, unless it exist to a very great degree. The lesions of which it is the consequence are the chief causes of both the constitutional derangement, and the disorders of the respiratory and circulating functions; and, upon the nature of these lesions, the ultimate result more intimately depends, than upon the effusion itself. The great diversity of the primary alterations — whether seated in the lungs, or in the heart and large vessels — is the chief cause of the very great differences remarked in the symptoms and progress of the malady. It becomes, therefore, important to ascertain the nature and seat of these alterations — the true extent of *associated* disease — on account of the diagnosis, and of the indications of cure. The early history of the case, and the immediately antecedent states of disorder, are among our guides in this inquiry. The investigation of these should, therefore, not be overlooked.

168. (*a*) When the effusion has been consequent upon pneumonia, active congestion of the lungs, pleuro-pneumony, phthisis, or bronchitis, the oppression and dyspnœa, characterising the effusion, supervene without the irregularity of the pulse and palpitations attending the cardiac complication. Either in addition to the symptoms of these diseases, or at an indefinite time from their partial or apparently total disappearance, the dyspnœa increases, particularly upon exertion; the patient requires his shoulders and head to be more elevated in bed than usual, and œdema is observed in his eyelids and feet. In this class of cases, the effusion is generally not very great, nor are the œdema and lividity of the countenance remarkable; but he is unable to lie on the side opposite to the effusion, which is most frequently limited to, or at least in greatest quantity in, one cavity; and ultimately he is often unable to lie down in any position. A fatal termination is commonly slow, and attributable more to the alterations of the lungs, which have been increasing with the effusion, than to the effusion itself.

169. (*b*) When the accumulation of fluid has arisen from organic change about the heart and large vessels, the oppression and dyspnœa attending it are associated with irregularity and intermissions of the pulse, with leipothymia, palpitations; very disturbed sleep, sudden startings, and frightful dreams; a livid and œdematous countenance, sometimes anasarca; and sinking of the vital energies. The patient can often lie upon the side most affected, but, more commonly, there is fluid in both cavities, and sometimes in the pericardium also. When it is confined to both sacs of the pleura, he often lies upon his back; but, if all the thoracic cavities be affected, he sits up, leans forward, and brings all the respiratory muscles into action. The quantity of fluid collected is usually greatest in this class of cases; and a fatal issue, although frequently delayed or prevented for a longer or shorter time, is more apt to occur suddenly, particularly in fat or plethoric persons. But, occasionally, before this event takes place, the organic lesions of the heart superinduce congestions of the lungs, or brain, which may accelerate dissolution. Also, if, in either of these classes of cases, any important emunctory ceases to perform its functions, more especially the kidneys, whether from functional or organic change, the effused fluid may excite a low grade of inflammatory irritation or action in the pleura, giving rise to a modification of the effusion itself, as well as to some of the changes observed in the pleura and lungs after death, and which have been too generally viewed as the original disease, instead of being considered a consecutive and contingent occurrence. As to the state of the *excretions* in hydrothorax, they are generally either impeded or disordered. The *urine* is very different in different cases; in the acute and sub-acute forms, it is commonly scanty, high coloured, or deposits a thick lateritious sediment, and often contains albumen, particularly when it is consecutive of eruptive diseases and suppressed evacuations, or associated with acute disease of the lungs. But in the passive and chronic cases, it is often not materially diminished, and is seldom coagulable unless the kidneys become diseased. It should not be overlooked, that the primary lesions in hydrothorax are generally and often necessarily progressive; and that to this circumstance, as well as to the increase of the effusion, the exasperation of the symptoms and its fatal issue are to be imputed. (See also (§ 29, 30.)

170. *D.* Prognosis.—The complicated nature of this malady, the advanced stages of the organic lesions producing it at which it supervenes, and the age and habits of those among whom it is commonly observed, will always influence the practitioner to give an unfavourable opinion of the ultimate issue, although the results of repeated observation will induce him to inspire hopes of affording great relief. But every return of the effusion diminishes the chance of even partial restoration. His opinion, also, will be founded on the nature and extent of the primary lesions, either of the lungs, or of the heart, &c., as made manifest by the auscultatory and rational signs. In every case, however, the prognosis should be guarded; for, under circumstances apparently favourable, an unexpected change may occur from the patient's conduct, or the progressive changes in the seat of disease: and his friends ought to be informed that, even in a state of no very apparent danger, he may be suddenly cut off.

171. *E.* Treatment.—The principles of treatment so fully described in the early part of this article are applicable to hydrothorax. In the acute and sub-acute states, *bleeding*, general or local — more frequently the latter — is required; but it must be practised with caution. The results of experience will confirm the inference at which I arrived above, that, notwithstanding the close resemblance of the morbid appearances, in acute hydrothorax, to those of true inflammation, yet vascular depletions are not nearly so well borne in the former as in the latter, evidently owing to the differences, particularly constitutional, on which I insisted. But the extent to which it should be carried, and mode of practising it, must entirely depend upon the nature of the original lesion, and the state of vital energy and vascular action. Generally, when the lungs are acutely affected, and their substance congested, or when the lesion of the heart is of an acute kind, as active enlargement of its cavities, moderate depletion is both requisite and beneficial. But in the more passive states of the malady, our reliance must be placed on digitalis, and other diuretics, with tonics, &c. In many instances, where depletion — especially local — is obviously indicated, the propriety of supporting vital power, even at the time of unloading the vessels, or immediately afterwards, by the exhibition of gentle tonics and diuretics, cannot be disputed, more especially when the vascular fulness, or morbid action, is secondary merely, and the consequence either of an excrementitial plethora,—in which cases, purgatives, and other medicines calculated to act upon the emunctories, should be also employed, — or of the irritation produced by the properties of the retained fluid. General bleeding is but seldom requisite in hydrothorax; for a sufficient quantity of blood may be taken by *cupping*, which possesses the advantage of producing a revulsive or derivative action. On this account, I have prescribed *dry cupping*, where the abstraction of blood was not indicated. In cases where congestion is superinduced in the lungs, or where hæmoptysis occurs, cupping, or even dry cupping, is a most important part of the treatment, assisted by digitalis, acids, and external *counter-irritation*.

172. *Revulsants* are generally of great benefit, conjoined with antiphlogistic and diuretic remedies, in acute, and with tonics, &c. in passive, hydrothorax. Setons, or issues, near the margin of the false ribs, on one or both sides, are among the best modes of fulfilling this intention. Wendt advises them to be inserted in the chest; and Autenreith directs a blister over the sternum to be kept constantly discharging. *Cathartics*, and *purgatives*, especially the hydragogues, above enumerated, often afford speedy relief; but they are admissible only when the powers of life are not greatly reduced, and in the more acute cases. *Diuretics* are more certainly beneficial in this species of dropsy than in any other; and of this class *digitalis* is the most efficacious, particularly in the form of infusion, and when combined in the manner already shown. The praises bestowed on it by Lentin, Withering, Darwin, Hamilton, Frank, Maclean, Percival, and many others, have been generally acknowledged to be just. *Squills* rank next in utility; but they are not always appropriate, and are even injurious in some of the more acute states of complication, particularly in that with pneumonia or hydro-pleuritis. *Senega* and *ammoniacum*, and the *æthers*, may be used in the passive form of the disease. The propriety of exhibiting diuretics, with tonic infusions, and with antispasmodics, as already advised, is especially evinced in the more passive conditions of this disease. Camphor, ammonia, and the æthers, particularly the spirit. ætheris nitrici, and spir. ætheris sulphur., are of great utility, when thus associated, or when given with purgatives and tonics. The importance of supporting the constitutional powers, in all the more passive states of the cardiac complication, cannot be too highly estimated. In such cases, purgatives should be given only in combination with tonics and antispasmodics; and digitalis will be best exhibited in a similar manner. Formulæ 400. 516. 781. 856. 859. 893, 894., and the following, as well as other diuretic preparations in the *Appendix*, exemplify some of the foregoing combinations: —

No. 190. ℞ Hydrarg. Submur. gr. j.; Pulv. Digitalis gr. j.—ij.; Zinci Oxydi gr. iij.; Pulv. Opii Puri gr. ss.; Syrup. Tolutan. q. s. Fiant Pilulæ ij., bis terve quotidiè sumendæ. (Hufeland.)

No. 191. ℞ Tinct. Digitalis ♏ x.—xvj.; Tinct. Calumbæ ʒ jss.; Spirit. Æther. Sulphur. ʒ ss.; Tinct. Opii ♏ v.; Mist. Camphoræ ʒ xj. M. Fiat Haustus bis quotidiè sumendus.

No. 192. ℞ Pulv. Scillæ gr. j.; Potassæ Nitratis gr. vj.—x.; Sodæ Sub-carbon. exsic. gr. viij.; Sacchar. Purif. ʒ ss.; Olei Anisi ♏ iij. Tere bene simul, et fiat Pulvis ter in die capiendus. (Selle.)

No. 193. ℞ Potassæ Sub-carbon. ʒ jss.; Potassæ Nitratis ʒ ss.; Tinct. Colchici ʒ iij.; Tinct. Aurantii Comp. ʒ iij.; Infus. Junip. ℥ vij. Misce. Capiat Coch. ij. vel iij. larga quartis horis.

When, in addition to diminished tone of the capillaries, the disease is complicated with atonic bronchitis and mucous expectoration, the first of the following recipes may be administered; and when it is associated with torpor of the liver, the latter may be exhibited: —

No. 194. ℞ Pulv. Scillæ exsic. gr. xij.; Pulv. Fol. Digitalis gr. xvj.; Hydrarg. Submur. gr. vj.; Pulv. Gum. Myrrhæ ʒ ss.: tere bene simul, et adde Assæfœtidæ ʒ ss.; et Syrup. q. s. Fiant Pilulæ xxiv., quarum capiat unam quater in die, vel duas mane nocteque.

No. 195. ℞ Gum. Ammoniaci, Saponis Venet., āā ℈ j.; Pulv. Scillæ exsic. gr. x.; Pilul. Hydrarg. gr. xv.; Olei Juniperi ♏ v.; Extr. Taraxaci ʒ j. Fiat massa æqualis, quam divide in Pilulas xxx. Sumantur duæ bis terve quotidiè.

173. *Paracentesis thoracis*, once so strenuously advised, has now fallen into disuse, and is seldom

or never resorted to, excepting in empyema. In some states of the acute disease, especially when the effusion is principally in one cavity, and is not attended by organic changes in the lungs or heart, of a necessarily fatal or dangerous kind, the condition of the patient in other respects not contra-indicating the propriety of performing it, this operation may be as safely and beneficially practised on the thorax as on the abdomen; the same risks — and no greater — existing in respect of the one as of the other. It has been recommended by Goula, Duverney, Bianchi, Delaporte, Moreland, Huetter, Morand, Lullier, J. P. Frank, Mursinna, Bell, Romero, and Archer, and practised successfully by nearly all of them. The chief danger proceeds from the introduction and action of the air; but not so much from its preventing the dilatation of the lungs, as from its action on the diseased pleura, and the fluid effused from it, as shown above (§ 157.). (See arts. Lungs, and Pleura.)

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VIII. Dropsy, Congenital (*Hydrops Congenitus; Dropsy of the Fœtus and new-born Infant*).

174. Defin.—*Effusion of watery fluid in the serous cavities, or cellular tissue, generally consequent upon disease of the mother, or upon organic change in the appendages, or in some of the viscera, of the fœtus, or upon both causes.*

175. Congenital effusions of fluid are found — (*a*) in the ventricles, or between the membranes of the encephalon; (*b*) between the membranes of or in the spinal cord; (*c*) within both the head and the spinal canal, in the same case; (*d*) in the abdominal cavity; (*e*) in the subcutaneous and other parts of the cellular tissue; (*f*) in the cavities of the chest — the pericardiac and pleural; and, generally, in the above sequence, as respects frequency of occurrence. They are observed in the fœtus at the full term of utero-gestation, and in abortions chiefly during the middle and latter months; and are, with the associated diseases either of the uterus or of the appendages of the fœtus, the cause of its death, or of its premature expulsion.

176. i. Congenital Hydrocephalus (*Hydroceph. congenitus*) sometimes appears, as other forms of congenital dropsy, dependent upon disease of the uterus, or on constitutional taint in the parent or parents, or upon organic change in the placenta or umbilical chord. In rare instances it has been associated with ascites in the mother, or with dropsy of the amnion; but it more frequently occurs without any such connection. In these latter cases it may be imputed to a morbid action seated in, and more strictly limited to, the membranes, or internal cavities of the brain. It is often attended by an arrest of the formation of the encephalon at some stage of the process; but, in other cases, the brain is fully, if not more than usually, developed. When the fluid effused, either in the general cavity of the arachnoid, or in the ventricles, is considerable in amount, the ossification of the cranial bones is interrupted generally towards their sutures, but occasionally in other parts; and, in these situations, the membranes are often protruded to a greater or less extent, forming, with the scalp, a watery tumour (*hydrencephalocele*), which may be large at birth, or scarcely perceptible, and may subsequently disappear altogether, or become larger. When the effusion is chiefly in the ventricles, the distended cerebral substance, and the membranes, with more or less of the fluid, constitute the tumour; unless the effusion has taken place previously to, and thereby prevented, the developement of the cerebral substance and hemispheres. Hence the character of the rupture depends upon the situation of the fluid; and its form, upon the size of the aperture through which it presses. Some forms of the disease approach to hemicephaly; a large portion of the cranium being wanting, and the protruding brain being covered by a thin membrane. In other cases, the opening is small, narrow, or cleft-like, and the protrusion is either small or has a narrow neck; the fluid being, in such cases, usually effused between the membranes. These ruptures are most frequent in the back of the head, in different parts of the occipital bone, and in the lambdoidal suture; and less frequently in the top, sides, and front of the cranium. (*See the Cases and Writers referred to.*)

177. Congenital hydrocephalus arises at various epochs of fœtal existence. At the earliest periods, it interferes more or less with, or entirely arrests, the formation of the brain, and cranial

bones. At a later epoch, or that most nearly approaching parturition, the brain and its envelopes may be not merely fully formed, co-existently with effusion, in the ventricles, but even more than usually developed for the period of existence. A very large proportion of cases of chronic hydrocephalus commences before birth; the effusion slowly increasing after this period, and expanding the sutures. Meckel, indeed, supposes that all cases of the chronic internal dropsy of the head begins at this epoch; but certainly, in some, although the smaller number, the disease originates after birth. Not infrequently water collects to an extent that precludes delivery until the head of the fœtus is opened, and the water evacuated. Occasionally the collection is so small at birth, as to render its existence somewhat doubtful, the signs of its presence gradually disappearing with the growth of the infant. In a few cases, in which effusion is more evident, an equally favourable result takes place. Congenital hydrocephalus is often associated with congenital dropsy of the spine, and various malformations. (See Dropsy of the Head — *Chronic.*)

ii. Congenital Dropsy of the Spinal Cord. — Syn. *Hydrorachis, Hydrorhachitis* (from ὕδωρ, water, and ῥαχις, the spine), *Water in the Spine, Spina bifida, Cleft Spine; Hydrorrhachia dehiscens*, J. P. Frank; *Hydrops Spinæ; Wassersuch des Rückgrates*, Germ.; *Idrorhachitide*, Ital.

178. Defin. — *A collection of a watery fluid between the membranes of the spine, generally occasioning a tumour through an aperture in the canal, occurring during fœtal existence, or becoming apparent soon after birth, and observed either in the prematurely born, or in the full-timed fœtus, whether dead or living.*

179. *Congenital dropsy of the spine* is often complicated with internal dropsy of the head, hemicephaly, and with hydrencephalocele; and generally terminates fatally with paralysis. Cases, however, have occurred, of children living several years, and reaching puberty, with the disease. Palletta and Acrel met with one at seventeen years of age; Henderson saw it at eighteen; Warner and Hochstetter, at twenty; Camper, at twenty-eight; and Cowper, one who lived to thirty. I saw the disease, in 1822, in a female of nineteen, who menstruated regularly through ulcers in the thighs. The tumour was about thirty inches in circumference. The excretions were passed in voluntarily; but, in other respects, she was then in good health. She died, however, in a few months afterwards. Although generally congenital, hydrorachis, with an aperture in the canal, has occurred after birth (Frank and Reydellet). In the most complete, but the most rare, form of the disease, the spinal marrow is entirely wanting; the membranes having fallen together, usually slit at one or more places, or more or less degenerated, and adherent to each other, forming sometimes a closed sac filled with lymph (Otto). This condition may even occur without cleft of the vertebral canal. In the less complete states of this disease, the spinal marrow presents its rudimental forms, like pultaceous masses of medullary substance and blood; or loose and separate nervous bundles; or the anterior columns running parallel but separate from each other; or, as in the early stages of formation, open, broad, and flat behind.

180. In the more common state of the disease, there is found only in one, or very rarely in two, distinct places in the spinal column, a more or less large swelling containing water: in some cases flat; in others, semilunar; and in several, necked; their parietes consisting of the expanded spinal membranes, often adherent and otherwise morbid, protruded through the cleft in one or more vertebræ; and connected with the thin and distended common integuments. This watery tumour most commonly appears in the lumbar region, more rarely in the dorsal and sacral, and still more rarely in the cervical, excepting in cases of coexisting hemicephaly or hydrencephalocele, in which the *spina bifida* always occurs in the neck, and, from this point, protrudes more or less outwards. The dropsy of the cervical spinal marrow is merely, in this case, a process from that of the brain; the degenerated brain being directly connected with the diseased origin of the spinal marrow, which is sometimes perfectly natural below. The size of the cleft in the spine varies greatly: generally more than one of the vertebræ are open; and rarely there is found only a small round hole in one bone, by which the tumour is connected with the spinal canal. It is extremely rare to find the bones healthy, and the aperture merely through the intervertebral substance.

181. The seat of the water is originally or naturally in the spinal marrow itself; which, at the part affected, is very much expanded, broken up, and even entirely destroyed; and often exhibits the canal in the axis of the marrow open and expanded up to the brain. The water is also sometimes contained, at the same time, between the membranes of the cord; and, in rare cases, in them alone; whilst the cord itself is either healthy, or merely compressed (Acrel, Palletta, Vacca-Berlinghieri, Urquhart). In those cases where the fluid is contained between the membranes only, there is generally coexistent effusion between the membranes of the brain. When the fluid is in the marrow itself, there is likewise often effusion in the ventricles. Sometimes the swelling also contains hydatids. Dropsy of the spinal marrow occurs, in some rare instances, without any external swelling, and without cleft in the spinal column; so that the canal running in the axis of the spinal cord, and which is generally closed, becomes more or less widely expanded by the water, with coexisting increased thickness of the cord itself (Santorini, Portal, Otto); or the water is effused only in the substance of the cord, and one part of the organ is distinctly swollen (P. Frank). About one half of the hemicephalic monsters have also spinæ bifidæ.

182. Whatever may be the seat of the external tumour, it presents *three varieties* as to its aspect (Billard): — 1st, That with the integuments covering the tumour in a healthy and uninflamed state; 2d, That with the skin discoloured, thinned, and sometimes permitting the exudation of a serous or sero-sanguineous fluid, indicating the approaching rupture of the parietes; 3d, That which is opened, and allows the effused fluid to escape through a fine ulcerated perforation, the vicinity of which is surrounded by a red, rugous,

and unequal elevation. The patient may live several months or years with the first variety of the disease; but death usually soon follows upon the second and third. The *fluid* effused varies in *appearance* with the state of vascular injection presented by the membranes. When these are injected, or apparently inflamed, the fluid is generally more or less turbid, or even flocculent; but this change may arise from the inflammatory action preceding the rupture of the external part of the parietes of the tumour. In other cases, the fluid is commonly limpid and pale.

183. The general *symptoms* of congenital hydrorachis, or cleft spine, are very diversified. They consist chiefly of debility, emaciation; paralysis, generally, of the lower extremities; resolution of the sphincters; anæsthesia; inability to take the breast; convulsions; and stertorous breathing. The *tumour* has usually a globular or pyriform shape; sometimes a broad base, and, at others, a narrow neck; and varies from the size of a hazel nut to that of the adult head, or even larger when the patient lives many years with the disease. Congenital dropsy of the spine, with external tumour, is sometimes *associated* with other congenital diseases or malformations; as dropsy either of the head or of some other cavity; vices of formation in the digestive canal (Voisin, *Journ. de Méd.* t. xxi. p. 57.; Revolat, in Ibid. t. xxvii. p. 378.); umbilical hernia (Preuss, in *Ephem. Nat. Cur.* vol. viii. p. 128.; Sandifort, *Observ. Anat. Pr.* t. iii. p. 1—41.; Meckel, *l. cit.* p. 679.); malformations of the urinary or genital organs, or the absence of one or more of these (Delfini, *Opusc. Scelti di Milano*, t. vi. p. 21.; Lobenwein, *De Monst. Genit. Difformitate*, in *Mém. de l'Acad. Imp. des Scien. de St. Petersb.* t. vi. 1817.); imperforate anus (Lamarc, in Roux's *Journ. de Méd.* t. xxxiii. p. 516.); and defect of various parts.

184. iii. Congenital Anasarca, and Dropsies of the Cavities of the Chest and Abdomen, are occasionally observed, particularly in the prematurely born fœtus, either dead or living; and under the circumstances already stated (§ 176.). The occurrence, unless when the effusion is very great, or associated with extensive visceral disease, should, however, not be viewed as necessarily fatal. Cases have been observed, wherein the collection of water in the abdominal cavity of the new-born infant has been very considerable, and yet recovery has taken place. In some instances, the effusion, in this situation, has been so great as to impede parturition; and, in very rare cases, it has been found necessary to puncture the abdomen of the fœtus before delivery could be effected. *Congenital encysted dropsy* is very seldom met with. The case recently recorded by M. Petit-Menoin is one of the most remarkable on record.

185. iv. Causes of Congenital Dropsies. — (*a*) The *remote causes* of congenital dropsies are not frequently very obvious. They have been stated to consist of constitutional vice in the parents, particularly the mother; the syphilitic taint; the scrofulous and rickety diatheses; violent mental emotions, as fits of anger, fright, &c.; whatever inordinately excites the circulation in the uterine organs during pregnancy, as excessive venereal indulgences (Klinkosch, J. Frank); external injuries affecting the uterus or its contents; violent concussions of the trunk; and suppressions of urine in the mother (Frank, Billard, &c.). — (*b*) The more *immediate causes* are organic changes, and hydatids, in the placenta; alterations in the umbilical cord; tumours or other lesions of the uterus; inflammations or congestions in the viscera of the fœtus, or inflammatory irritation in the serous membranes; tubercles in the liver and lungs; and tubercular thickening of the serous surfaces. The three cases recorded by Dr. R. Lee occurred in connection with dropsy of the amnion, and with disease of the placenta, and of some one of the viscera of the fœtus. In two, the effusion was seated in the peritoneal cavity, and in one of them it was associated with anasarca. It has been remarked by Michaelis and some other writers, that congenital dropsies, especially *spina bifida*, often occur in the same families with rickets.

186. v. Treatment. — Congenital dropsies may be somewhat benefited by medical treatment. When the aqueous collection is not great, and when the infant is well-formed, fully developed, and evinces little or no disease of any vital organ, we should not despair of success.—(*a*) Of the treatment of *congenital hydrocephalus*, particular mention will be made in that part of this article in which chronic hydrocephalus is discussed; and the same measures which will be recommended in dropsy of the spine with external tumour, are in great measure applicable to the congenital collection within the head, but more particularly to that form which is attended by imperfect formation of the cranial bones and protrusion of the membranes and other parts external to the seat of the collection (*Hydrencephalocele*, see § 176.). In most instances of congenital hydrocephalus, bandaging the head, and continued but gentle pressure, aided by the rest of the means advised in the next paragraph, seem most appropriate.

187. (*b*) *Of dropsy of the spine, &c.* — The removal of this form of disease by *ligature* was practised unsuccessfully by Heister; and was more recently recommended by B. Bell. But what has been stated above relative to the pathological relations of the tumour, independently of the circumstance of its form being such as not frequently to admit of this treatment, will show that this method can be but seldom appropriate, and that it must be generally hazardous. Gentle *pressure* has been advised by Mr. Abernethy, and successfully employed in a case by Sir A. Cooper, who also resorted to *puncture* in another case, with a similar result. These methods have, however, been often practised in the dropsical tumours, both of the spine and of the head, but very rarely with advantage. In a case, however, of the latter kind, Mr. E. Thompson succeeded by applying a ligature. Richter recommends setons to be inserted at a short distance from the tumour; Camper and Acrel, the application of discutient lotions; De Haen, the employment of defensive plasters; and Billard, gentle and continued pressure. Camper, Borsieri, the Franks, Racchetti, and Ollivier, are strongly opposed to repeated punctures; and state, that they excite inflammatory action in the membranes, and hasten an unfavourable termination. I believe that the tumour should be as little interfered with as

possible; that, if any local medication be resorted to, a simple discutient lotion — as one of vinegar, rose water, and spirit, or liq. ammon. acetatis — or a defensive and discutient plaster, with gentle pressure, will be found the safest and most successful; — that, in addition to this, the abdominal secretions and excretions should be promoted, by means the least calculated to lower the vital powers; — that a healthy wet-nurse should be provided, to whom a gentle course of iodine may be administered; — that change of air, or residence in a warm and dry air and locality, be directed; — and that the infant should wear soft flannel next the skin, and be warmly clothed. These have been the means I have employed in most of the cases of the disease I have treated; and they have often prolonged life, and diminished the tumour, although, in many instances, I was unable to learn the ultimate result. When the exterior of the tumour becomes inflamed, or the integuments thinned and disposed to ulceration, puncture may be then resorted to, as in the case recorded by Mr. ABERNETHY; but care should be taken to close the opening accurately after each operation, and to protect the part from the air and external injury by suitable applications. (See DROPSY OF THE HEAD — *Treatment of Chronic.*)

188. (*c*) As to the treatment of the *other forms of congenital dropsy*, but little need be added to the above. In some instances, it may be requisite to commence with the application of one or two leeches. Purgatives are generally requisite, and should be often repeated, and alternated with, or followed by, diaphoretics and diuretics, and assisted by the use of slightly alkaline baths, of a temperature ranging from 85° to 94°. Many of the cases of these forms of congenital dropsy are beyond the reach of medical aid; but, when the infant is in other respects well formed and strong, the existence of active congestion in, or of vascular determination to, some one of the viscera of the cavity in which the collection is formed, or of inflammatory irritation in the serous membrane, may be suspected, and moderate local depletions, and active alvine evacuations, aided by means calculated to relax the cutaneous surface, should be employed.

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IX. DROPSY, ENCYSTED. — SYN. *Hydrops Saccatus*; *Hydrops Cysticus*, Auct. var.; *Die Sackwassersucht*, Germ.; *Hydropisie enkystée*, Fr.

189. DEFIN. — *The fluid enclosed in a cyst, generally of a serous structure internally, and of adventitious formation; giving rise to local symptoms resembling those caused by effusion into natural cavities.*

190. The origin of *serous cysts* is discussed in the article DISEASE (§ 114.); it therefore remains only to notice those excessive collections of fluid in them, which are distinguished with difficulty from accumulations in natural cavities. The encysted productions, which either contain more or less consistent secretions, or are of so small size as not materially to affect the bulk of the organ in which they are seated, or the functions of parts adjoining, are considered in connection with the other lesions of their respective seats. In the view about to be taken of encysted collections of fluids, mention will be made only of those which possess, in many respects, a dropsical character, and which have generally been considered as such by writers and practitioners, although even they may possess no true claims to this distinction.

191. *A.* CAUSES. — The causes of common dropsy have generally no influence in producing the encysted. The same state of action, to which the formation of the cyst in the first instance is to be attributed, evidently is the main agent in the secretion of its accumulated contents. Of what this state consists, and of the causes in which it originates, but little is really known. When remarking on this and similar changes (see DISEASE, § 111.), I stated that the origin of serous cysts cannot be considered as truly inflammatory; but that it may be imputed to a modified nutrition, frequently connected with a weak-

ened or depraved state of the constitution; modifications of the formative processes — of the organic actions of secretion and nutrition — being more apt to occur from causes which deflect them from their healthy course, in such constitutions, than in the sound and vigorous. This view is important, inasmuch as it is based on an attentive observation of a number of cases of this description, and as it leads to a more successful practice than is too frequently adopted.

192. *B.* Prognosis. — Encysted collections of fluid, as long as they do not reach the extent of impeding the functions of adjoining organs, seldom occasion any serious disturbance. In this respect they are different from effusions into natural cavities; and, when they give rise to dangerous or fatal results, it is owing more to this injurious action on surrounding parts, than to any change they induce in the circulating, secreting, and natural functions. When not injuriously interfered with, and when the system is not improperly lowered, or if it be enabled to resist their increase, all the functions frequently proceed without any material disturbance, and these collections often remain long stationary. But, when the constitutional powers receive a severe shock from any cause; when the patient is imperfectly fed, or is made the subject of a meddling or active surgery; the cysts become the centre of a morbid determination of the organic actions; chronic inflammation supervenes in them; the accumulation of fluid advances rapidly, and the vital resistance is subdued. In some cases, the secretion proceeds in the interior of the cyst with greater rapidity than the cyst itself can either yield or be developed, and hence it is ruptured, and its contents effused. This circumstance may hasten an unfavourable issue; or, when the cyst is small, favour its disappearance or transformation.

193. Encysted dropsies are, with some exceptions, incurable when they have reached a large size, and when, either from this circumstance, or from their situation, they admit not of being removed entirely. But, in many instances, especially when they are seated in the ovaria, a judicious constitutional treatment will often prevent their increase for years, — sometimes during the greater part of a very long life, — or will even cause their entire disappearance, or transformation into an inert substance.

194. *C.* Treatment. — As to the indications of cure, only a few general observations are here necessary. In all encysted formations, particularly in those now under consideration, it may be viewed as a law, from which there are extremely few exceptions, that, in proportion as vital power, and its manifestations in the secreting, assimilating, and excreting organs are promoted, without materially exciting the vascular action, or heating the body, will the progress of these productions be overcome, or their diminution effected; whilst their increase will be both great and rapid in an equal ratio with depression of constitutional energy, or with disorder of any of the functions now alluded to. A healthy and vigorous performance of the various organic actions resists the progress of all adventitious formations; and an opposite state favours their increase. This rule holds in respect of all productions of a parasitic kind, and in all the kingdoms of organised nature, and is observed in both the *physical and moral manifestations.* The parasitic formation or animal can grow only at the expense of the weak; the robust frame resists it, and denies it nourishment; whilst the weak furnishes it with means which are slowly but surely turned to its own destruction.

195. During the treatment of encysted dropsies, care should be taken not to resort to any measures that may irritate or inflame them, particularly when they have acquired a large size. On this account, *puncturing or paracentesis* should be resisted to the utmost — until extinction of life would follow on its being longer deferred; and, when thus made a *dernier ressort*, the operation should be performed by a scalpel and lancet, with which latter the sac should be opened; the utmost care being taken not to admit the air. I have seen, on numerous occasions, the ill effects of not attending to this injunction, and of leaving a canula, or tent, in the wound, the inflammation thereby induced in the cyst, giving rise to so extensive a secretion, and so much constitutional disturbance, that the patient has rapidly sunk.

196. The *preparations of iodine,* when judiciously exhibited, are the most generally applicable and efficacious means that can be employed in this class of diseases. But they ought to be exhibited in very small doses, much diluted or reduced, and long persisted in. They become injurious as soon as they give rise to the slightest indication of irritation of the digestive organs. I have employed them extensively and constantly since 1819, when I brought some of them with me from the Continent. At that time they could not be procured in London. They are most beneficial when prescribed internally; but they are also of use externally, if they be directed so as not to inflame the part to which they are applied (see F. 332. 766—769.). When the debility is considerable, the *ioduret of iron,* taken in any aromatic infusions, the secretions and excretions being at the same time promoted by an aperient pill at bed-time, will be of essential service. I have lately prescribed it in several cases of cachectic disease, with remarkable benefit. The *diet,* in all encysted dropsies, should be light and nutritious; and the patient's mind be agreeably engaged: *change of air,* or residence in a pure, temperate, rather warm, and dry air, ought also to be recommended.

197. The situations in which encysted dropsy is most frequent, are numerous; and if all the places in which large serous cysts have been developed were taken into the account, it may be said that they comprise every part and organ of the body. Encysted dropsy, however, has been observed *under the integuments,* by Schenk, Van Swieten, Cruveilhier, and others, forming very large lymphatic tumours; *within the head,* as shown in the article Brain; between the *pleura and the intercostal muscles* (Haller, Desault, &c.); in the *mediastinum;* in the substance of the *lungs* (Stoërk, Maloët); in the *cavity of the thorax,* and in that of the *pericardium* (Mercker, Dupuytren, Itard, &c.); between the *peritoneum* and abdominal parietes (Acholzius, Morgagni, Morand, and J. P. Frank); in the *ovarium,* forming ovarian dropsy; in the *Fallopian tubes* (Riedlin, Douglas, Blankard, Baillie, Seymour, &c.); in or connected with the *uterus,— Hydrometra, &c.* (Gruner, Odier,

Lafosse, Rayer, Thomson, &c.); connected with the *liver* (Alix, Corvisart, Leroux, Frank, Lassus); in the *kidney* (Morgagni, Houston, Walter, Corvisart, J. Johnson, Howison); in the *omentum* (Hasenoerhl, De Haen, Portal); in the *mesentery* (Horstius, Tulpius, Sauvages, Morand); and in the *spleen* (Morgagni, Baader, &c.). Of the most important only of these, I now proceed to take a more particular notice. In some cases of very large encysted dropsy seated within the abdomen, the exact origin of the cyst can hardly be ascertained. Of this kind appears to be the instance recorded by Mr. Coulson (*Med. Gazette*, vol. ix. p. 577.), which was frequently tapped. Upon dissection, the cyst was found to adhere to the abdominal parietes, and to several of the viscera, and to consist of three layers. The ovaries were healthy. Similar cases are published by Portal and Cruveilhier (*Anat. Patholog.* vol. i. p. 268.).

i. Dropsy of the Ovarium. — Syn. *Hydrops Ovarii, Ovarian Dropsy, Dropsy of the Ovary; Hydroophorie,* Boivin and Duges; *Die Wassersucht der Eierstöcke,* Germ.; *Idropisia di Ovaria,* Ital.

198. Defin. — *Swelling, commencing with tenderness, pain, or weight in the iliac region of one or both sides, and irregularity of the menstrual discharge; the swelling gradually extending over the abdomen, and attended by obscure fluctuation.*

190. *A.* Pathology. — This is the most frequent species of encysted dropsy, and of the greatest importance in a practical point of view. It is very often complicated with other organic changes in the ovaria (see article Ovaria — *Diseases of*), peritoneum, uterus, and tubes; but it also frequently consists only or chiefly of a collection of a greater or less quantity of fluid in one or more cysts, into which the substance of the ovarium seems to have been converted; owing to the enlargement of one or several of them giving rise to atrophy of the proper structure of the organ. These cysts have been mistaken for hydatids, from which, however, they may be distinguished by their being nourished by vessels supplied from the parts in which they are formed; whilst hydatids are not thus supplied, but are nourished by their own vessels, and have an independent life. Sometimes "one or both ovaria are converted into simple cysts; the whole of the cellular substance and vesicles disappearing, that which was the fibrous coat of the ovarium becoming the fibrous coat of the cyst." (Dr. Seymour.)

200. The Graafian vesicles, which, in the healthy state, are of the size of millet seeds, frequently become as large as almonds, are filled with a limpid fluid, and their internal membrane is very vascular. This appears to be the commencement of the simplest form of ovarian dropsy; or, at least, a change, which may proceed no further, but which sometimes does proceed to an extent which constitutes this disease. When these vesicles enlarge to a greater degree than the size of a filbert or almond, it is always on the side nearest the proper coat of the ovarium; the rest of the ovarium, as shown by M. Cruveilhier and Dr. Seymour, appearing, when the cyst reaches a large size, as if atrophied at the parietes of the cyst. In this manner is sometimes formed an enormously large single cyst, having the proper us coat of the ovarium and peritoneum for an external covering; the internal membrane, or the parietes of the vesicle, secreting a prodigious quantity of fluid. In many of these cases, especially in those of long duration, the parietes of the cyst undergo various changes, and are thickened, hardened, cartilaginous in parts, or even ossified. Their external surface, in their earlier stages, are sometimes smooth, not infrequently inflamed or very vascular; and form adhesions with adjoining parts of the peritoneum and contiguous viscera, or with the fimbriated extremities of the broad ligament, or with the fundus of the uterus (Boivin, Seymour, Duges). In their more advanced states, also, their surface becomes the seat of chronic inflammation, of tuberculation, or both; and in this change the rest of the serous surface of the abdomen, or parts of it only, may participate. In some instances, the marks of associated inflammatory action in the peritoneum are indistinct; but this membrane not infrequently contains, in these cases, more or less fluid, the encysted dropsy thus being complicated with ascites. The interior of the sac, or cysts, is commonly smooth, and resembling a serous surface (Morand, Burns); or it is lined with a false membrane: it is, in some cases, irregular or mamelonated; and, in others, imperfectly divided by incomplete partitions (Cruveilhier).

201. The *fluid* contained in these cysts varies remarkably. In some cases, particularly when it is lodged in one, or a few cysts of a very large size, it is serous, or mixed with a ropy or mucous matter. In others, it is dark-coloured and resembles coffee. Where the cysts are more numerous, their contents are generally thick, gelatinous, and of a brown colour of varying depths of shade. The fluid is also, but more rarely, of the appearance and consistence of custard; and occasionally it resembles honey. I have seen it, in some instances, where the accumulation was remarkably great, brown, thick, and gelatinous; and in others, its characters have changed at subsequent stages, especially after tapping; and it has become greyish, dissolved, ichorous, flaky, or puriform and even offensive. The quantity which collects, particularly when there is only one cyst, and when its contents are serous or watery, is sometimes very great. Wepfer, Haller, Monro, and Frank have found as much as 120 pounds of fluid in a single cyst, and Müller as many as 140 pounds. When the necessity of resorting to puncture has once become imperative, the rapidity with which the fluid is again formed is often remarkable. Morand drew off 427 pints in ten months; and Martineau nearly 500 in a twelvemonth; and, from the same patient, upwards of 6600 pints, by eighty operations, within twenty-five years. Sir A. Cooper thinks, with great probability, that the case of Mrs. Mumford, who was tapped 155 times in less than four years, was one of ovarian dropsy. When the ovarium contains a number of cysts, is lobular, and irregular in its surface and firmness, each of the individual cysts often is filled by a different and peculiarly characterised secretion — which is either watery, gelatinous, sanguineous, fatty, &c.; and, when the tumour has been punctured, partially decomposed or putrid, and mixed with gaseous fluids (De Haen, Boivin, Duges, and myself). In rare instances, sebaceous matters with long hair have been found in the same ovarium that con-

tained large dropsical cysts, and even in the same cyst with the watery collection: the cyst in which the hair and fatty substance had been formed having subsequently become the seat of dropsical effusion.

202. *B.* CAUSES. — (*a*) The *predisposing causes* are, the scrofulous diathesis; debility, however induced; frequent or excessive menstruation, and venereal indulgences. The disease occasionally commences as early as the first appearance of puberty. J. P. FRANK saw it at thirteen, and M. ITARD at fourteen years of age. MARJOLIN states, that it may begin before puberty; but I know of no such occurrence. It is most common between the ages of twenty and fifty. It may commence soon after the cessation of the catamenia; but, although chronic cases of it are found in very old females, yet it rarely originates at an age much beyond fifty. It often follows abortions.

203. (*b*) The *exciting* causes have not been satisfactorily shown: but it has been very generally imputed to external injuries, succussions of the pelvis, the mismanagement of parturition and abortions; or to cold, fright, and anxiety of mind. From much attention to this disease, I have inferred that it is occasionally consequent upon inflammatory action in the ovaria or uterus, or connected with this change in its earlier stages. Hence its causes may be considered to be, in some cases, those in which inflammatory action in these organs generally originates. Yet there are numerous objections to this view; for even when the tenderness and pain in the region of the ovaria, accompanying its commencement, are greatest, there is also a frequently recurring and copious menstruation, indicating an excited, rather than an inflamed, state of these organs. From various considerations, and a review of the circumstances in which the disease seemed to originate, it is not improbable that it is connected with an often excited, but an imperfectly gratified, sexual appetite. Hence its frequency in females who are sterile, or whose state of health is insufficient to the developement of a healthy and vigorous orgasm, owing either to premature and illicit indulgences, or to previous disease.

204. *C.* SYMPTOMS AND PROGRESS. — Ovarian dropsy is very commonly far advanced before recourse is had to medicine. It usually commences with irregularity of the menstrual discharge, and disorder of the excretion of urine, which is either voided frequently, or is long retained. There is also severe pain in the loins, with pain, tenderness, and swelling in one or both iliac regions. In some instances, the pain shoots through the abdomen, and down the thighs; and occasionally there is numbness, hæmorrhoids, or complete strangury, owing to the pressure of the enlarged ovarium before it rises out of the pelvis. The catamenia, at this period, is frequently either copious or of too frequent occurrence; but it is rarely altogether suppressed. Various hysterical symptoms also come on; and disappear at a later stage. The bowels are usually costive; but they are sometimes irregular, or relaxed. As the malady proceeds, the patient experiences various dyspeptic symptoms, and often nausea and vomitings, as in the early months of pregnancy. The mammæ also enlarge, and the areolæ around the nipples assume a darker shade. Dr. SEYMOUR states, that, when both ovaria are affected, the catamenia are always absent; but, when one only is diseased, this evacuation is either absent or irregular. This does not agree with my experience, the results of which I have just now given, as regards the early stages of the disease; but, as respects the last stages, particularly in the more chronic cases, the observations of this physician seem to be correct. With the increase of the tumour, various inflammatory phenomena, referrible chiefly to the peritoneum, and commencing in the pelvis, but often extending upwards to parts of the abdomen, supervene.

205. The *progress* of the tumour and abdominal enlargement is extremely various. Occasionally the ovarium, whether it consist of a number of cysts, or of one or few, increases very slowly. It sometimes remains long stationary; afterwards augments rapidly, and fills, ultimately, the whole abdomen; and in rarer instances it recedes, or even entirely disappears. It proceeds more regularly, however, in most cases, until it gives rise to appearances rendering the diagnosis very difficult. The general health, as already stated in respect of encysted dropsies, continues but little impaired, until the morbid accumulation has advanced so far as to disturb the functions of adjoining viscera; but this is not uniformly the case; for the means used to cure it not infrequently are sources of disorder, deranging the natural functions, and thereby favouring the increase of the disease. When the collection rises as high as the epigastric region, and the abdominal distension is great, the functions of the stomach are often completely overturned, and the constitutional powers rapidly sink; singular and unexpected changes, however, sometimes occur, even in the most chronic cases. Dr. BAILLIE mentions an instance of its spontaneous disappearance, after it had existed thirty years; the patient remaining, subsequently, in good health. The accumulated fluid is also occasionally discharged into some part of the large intestines, having previously formed adhesions with it; or into the vagina, pressure on the tumour increasing the discharge. Instances of this have accurred to Dr. ELLIOTSON, Dr. MONTGOMERY, myself, and others. In a case treated by me some years ago, and put upon a course of iodine, the catamenia were profuse every fortnight or three weeks. The tumour, which filled the whole abdomen, remained long stationary, and ultimately burst into the large intestines. It did not return again until upwards of a twelvemonth: ultimately the patient was so much benefited as to leave off treatment. Dr. SEYMOUR adduces an instance, in which the morbid collection was discharged both by the intestines and by the vagina, and recovery took place. Sometimes it forms adhesions to the abdominal parietes, and bursts externally at the umbilicus. A permanent cure is often effected by judicious management under the foregoing circumstances. A case was seen by me, in which adhesion of the tumour took place, to the parts adjoining the puncture by which its contents had been drawn off. The cicatrix ulcerated, and the fluid was afterwards discharged by degrees through the opening, and the patient recovered. A nearly similar instance of recovery occurred in the practice of Mr. BARNWELL. When the fluid finds its way into the peritoneal cavity, the result

is, in my opinion, generally fatal, although some authors contend that the fluid may be absorbed from this situation, and the patient recover. This, however, is certainly a very rare occurrence. The best authenticated case of restoration from effusion of the contents of the ovarian tumour into the abdomen is recorded by Dr. BLUNDELL, in his published lectures.

206. *D.* The DIAGNOSIS of ovarian dropsy is not always easy. It may be mistaken for pregnancy, for ascites, for hydrometra, or for tumour or abscess of some adjoining part. The appearance of swelling and pain in one side, or both, of the pelvis, in connection with irregularity, without suppression, of the catamenia; this swelling being at first but little, or not at all, changed by position — by lying on either side or by the erect posture; — obscure fluctuation as it expands, with a sense of elasticity, and sometimes of irregularity in it; — the motions and activity of the patient not being very materially impaired, or not in proportion to the magnitude of the tumour; — the principal abdominal organs not having evinced much disorder, or signs of organic change, previously to the swelling, and their functions not being greatly disturbed during its course; — its slow increase, its situation, its direction to one side and limitation to the lower regions of the abdomen when the patient is supine, until a late stage of the disease; — the inefficacy of purgatives and of diuretics in producing any diminution of it, and the not materially lessened secretion of urine, until after the disease has advanced very far, or until the fluid has been drawn off by art; — the more healthy aspect of the patient than in ascites, — and pain, stupor, or œdema of the thigh, leg, and ancle, having been complained of, on the same side with that where the swelling commenced, — will serve, when carefully considered, either separately or in conjunction, to guide the practitioner. These phenomena, however, may not be uniformly present, but many of them will — and will be so associated as to leave little doubt as to the nature of the disease, particularly when aided by an examination *per vaginam*, and also *per rectum*. At the commencement of the malady, the local symptoms have sometimes been so manifest, and attended by so much pain in the back, and pain and œdema of the lower extremity of the same side, as to have been mistaken for *psoas abscess*. The disordered excretion of urine and strangury, and the evidence obtained by examination, will, however, generally indicate satisfactorily the nature of the disease. Dr. MACINTOSH states, that the tumour may sometimes be felt between the vagina and rectum, before it becomes much enlarged; the *os uteri* being, in such case, tilted forwards close to the symphysis pubis, so as to resemble *retroversion of the uterus*; but an examination by the rectum will make the nature of the affection evident. When the increase of the ovarian tumour is slow, and it rises in the abdomen by a narrow neck before it is perceived, it may be mistaken for *enlargement* of some other organ; especially if it have formed adhesions with the parts in contact with it. The difficulty of diagnosis is also increased by the presence of fluid in the peritoneal cavity, — a circumstance which occasionally occurs. When this is suspected, or when the diagnosis is difficult, the patient should be examined in the recumbent posture, when the ascitic fluid will be found to gravitate towards the hypochondriac and lumbar regions; and the limits of the ovarian tumour may be ascertained. The history of the early stages of the case, and the recurrence of the catamenia during the greater part, or even the whole, of its course, its chronic duration, and the absence of the progressive changes of the os uteri characterising *pregnancy*, will sufficiently distinguish it from that state; the uterus being moveable and light upon examination *per vaginam*, pressure on the hypogastrium at the time not affecting, or propagating any movement to, this organ.

207. *E.* The PROGNOSIS will depend entirely upon the constitutional powers of the patient, and the progress the disease has made. Although it should be generally unfavourable, and always expressed with caution, and with much reservation, even in cases apparently the most favourable, yet we may entertain reasonable hopes that the progress of the disease may be checked by careful regimen and treatment, particularly when the energies of the constitution are unbroken, and the digestive and excreting functions are not materially disturbed, nor the progress of the swelling rapid. J. P. FRANK met with a case where it commenced at thirteen, and yet the patient reached the great age of eighty-eight years. The occurrence of tenderness in the abdomen, any manifest diminution of the patient's activity, its complication with ascites, emaciation, accelerated pulse, great disturbance of the functions of the stomach, and the necessity of having recourse to paracentesis, are all unfavourable circumstances.

208. *F.* TREATMENT. — The utmost care should be directed to the removal of all sources of irritation from the uterine and adjoining viscera. The urine ought to be drawn off, if its excretion be interrupted; and particular attention should be paid to the state of the bowels, the evacuation of which must be procured daily, by cooling aperients, or laxatives conjoined with gentle tonics, when they require it, or by means of tepid and emollient injections. In the early stages of the disease especially, and when pain, tenderness, and other symptoms of inflammation are present, particularly if the catamenia are deficient or delayed, local depletions by cupping on the loins or sacrum, or the application of leeches, or cupping about the tops of the thigh, are requisite. External irritation should afterwards be prescribed; and, as soon as the symptoms of inflammation are removed, the patient should be put upon a mild course of *iodine*. The mode of counter-irritation deserves attention. Blisters increase the strangury that is often present at this stage, and excite the vascular system. I have usually, therefore, had recourse to the tartarised antimonial ointment, or to the insertion of issues or setons in the insides of the thighs. When symptoms of irritation exist in the uterine and urinary organs, they must be removed, by the sub-carbonates of the alkalies, with nitre, taraxacum, and hyoscyamus given in the infusion of calumba, or the infusion of cinchona. The course of iodine should be assiduously persisted in, and the preparations adopted should be given in small doses, much diluted. The *hydriodate of potash*, or the *ioduret of iron*, are upon the whole the preferable combinations of this substance. Iodine, in some one of the preparations — liniment or ointment — may also be

used externally. In this case it should be rubbed upon the insides of the thighs; where, if it should produce irritation of the integuments, the effect will be the more salutary.

209. *Cathartics* and *diuretics* have no influence upon the disease, further than to accelerate its progress, if they be used in such a manner as to weaken the powers of life. Purgatives of a tonic kind, however, may be employed to evacuate fæcal matters, and to promote the intestinal secretions; but such only, as are not calculated to excite or irritate the large bowels, should be selected; as the supertartrate of potash with confection of senna, or the infusion of calumba or of gentian with infusion of senna. As to *diuretics*, I have seen no benefit derived from them, with the exception of those which possess tonic and astringent properties, as the balsams and terebinthinates; the latter of which have been productive of benefit, particularly when used in the form of liniment or epithem. Camphor and narcotics are also useful palliatives, especially opiates. The *liquor potassæ*, and **Brandish**'s *alkaline solution*, in suitable vehicles, and aided by sarsaparilla, by local depletions when tenderness in the situation of the tumour is perceived, and by setons, have also been of great service in some cases in which I have prescribed them. The good effects of vomiting in swelled or inflamed testicle have induced some practitioners to have recourse to *emetics* in the early stage of this malady. Dr. **Percival** records a case in which they proved of service; but I have had no experience of the practice. Mr. **Abernethy** prevented the reaccumulation of the fluid after tapping, by repeated blistering. Dr. **Hamilton** (*On Mercurial Medicines, &c.* p. 202.) states that he has cured seven cases by percussion, or patting, for a long time daily, on the tumour, using a bandage so as to make constant compression, giving a solution of the muriate of lime, and employing the warm bath. Many instances will, however, be found to confirm the opinion of Dr. W. **Hunter** (*Med. Observ. and Inquiries*, vol. ii. p. 41.) "that the patient will have the best chance of living longest under it, who does the least to get rid of it." In addition to the above means, but little can be attempted with much hopes of success. The chief objects are to support the vital energies throughout the frame, — to promote a healthy assimilation, and the excretion of effete matters, — to ward off all irritation, physical and moral, from the uterine organs, — to adopt a light, cool, and moderately nourishing diet, — to engage the mind agreeably, — to reside in a dry, airy, moderately warm, or temperate locality, — to take regular but gentle exercise in the open air, — and to have frequent change of scene and atmosphere.

210. *Paracentesis* in some instances becomes imperative, owing to the urgency of the symptoms, particularly after it has been once performed; and the *extirpation of the tumour* has been recommended by **Vander Haar**, **Delaporte**, **Morand**, **Logger**, **Siebold**; and practised by **L'Aumonier**, **Smith**, **Lizars**, **Blundell**, **Granville**, **M'Dowal**, and **Dieffenbach**. Of these measures a brief notice is required. — (*a*) The observations which have been already offered on *paracentesis* apply to the treatment of ovarian dropsy even more fully than to any other. It often accelerates a fatal issue by inducing inflammation of the sac. Of this I saw a remarkable instance many years ago in a near relative. Dr. J. **Johnson** has adduced an example of it (*Medico-Chirurgical Review*, vol. xi. p. 258.). Dr. **Macintosh** refers to one in his practice (*Practice of Physic*, vol. ii. p. 374.); and many others have been recorded, and observed by experienced practitioners. I therefore agree with Dr. **Denman**, that paracentesis ought to be deferred as long as possible. In such circumstances, this operation occasionally gives temporary relief; but there is a frequently recurring necessity for its repetition until the patient sinks. It has been proposed to effect a radical cure by evacuating the matter, and either laying open the tumour, or keeping a canula inserted in the wound. **Le Dran** mentions two cases which recovered from great suffering consequent on this measure; and analogous examples have been recorded by **Houston**, **Voison**, and **Portal**. But these are few compared with the numerous instances in which it has either failed, or accelerated a fatal issue by the severe inflammation and constitutional disturbance thereby induced. In two cases in which I was consulted, a canula had been left in the puncture, and rapidly produced these effects; the introduction of air and the mechanical irritation having inflamed the cyst and peritoneum, and converted the secretion to a foul, fœtid, and ichorous discharge: both rapidly proved fatal. It has likewise been proposed to inject the cyst. Dr. **Denman** mentions a case in which this was practised, but the patient died on the sixth day afterwards.

211. The *extirpation* of the tumour, although entertained by the older surgeons, was discountenanced by **Morgagni**, **De Haen**, **Sabatier**, and **Murat**. **L'Aumonier**, of Rouen, however, performed this operation successfully towards the close of the last century; and it has recently been practised by Dr. **Smith** and Dr. **Macdowal**, of the United States, with a like result. Notwithstanding the favourable issue of these cases, I stated, in the *Medical Repository*, at the time of their publication, reasons against resorting to this measure. The issue of several cases in which it has since been performed, both in this and other countries, confirms the opinion I then expressed. The operation has no chance of succeeding unless it be resorted to during that stage, at which a judicious constitutional treatment may either delay, or even remove the disease: and I believe that the cases in which it has succeeded are such as would have terminated favourably if they had been left to nature or to medical management. The results of the cases in which it was performed by Mr. **Lizars** and Dr. **Blundell**, are well known; and I may add that it has likewise been attempted at least five times at Berlin, by **Dieffenbach**, **Chrysmer**, and **Martini** (**Graefe** and **Walther**'s *Journ.* b. xii. h. i.), and, excepting in one instance, it entirely failed. Three of the patients died in consequence of the operation. In one case the surgeon did not proceed in the operation, on finding the tumour adherent on all sides.

212. ii. **Dropsy of the Fallopian Tube** — *Hydrops tubalis* — is not to be distinguished from ovarian dropsy; nor, indeed, does it differ from it further than that, instead of the cyst being in the ovary itself, it is developed in the fold of the ligament, near the uterus, or close to the ovarium, or to the fimbriated extremities of the tube; these extremities being either adherent to the ovarium, or

closed by coagulable lymph, or adhesions. In either case the cyst is solitary. The disease has been described by Dr. **Baillie**; by **Munnis**, who found the cyst contain as much as 110 pounds of fluid; by **Cypriani**, who found 150 pounds; by **Harder**, who found 140 pounds; and by others, who have observed much smaller quantities. Dr. **Good** defines this variety of dropsy as commencing with a heavy elongated intumescence of the iliac region spreading transversely, with obscure fluctuation; but no distinction can be made between it and ovarian dropsy, in respect either of its causes or progress. The *treatment* of this variety is also the same as that of the ovarian disease.

213. iii. **Dropsy of the Womb** — *Hydrometra* — *Encysted Dropsy of the Uterus* — has been doubted by some authors: but it has been not infrequently observed by physicians of the greatest reputation. The cysts which are, in rare instances, found attached to the exterior surface of the womb, do not belong to this disease, which consists of *a collection of fluid in the cavity of the unimpregnated uterus, contained in a membrane or cyst*. It has, however, been disputed whether the fluid is thus surrounded, or whether it has accumulated in consequence of inflammation having occluded the os uteri by the deposition of coagulable lymph, or of the developement of some tumour or growth, plugging up this outlet; the morbid action which occasions the latter also giving rise to the secretion of a great quantity of serous fluid, which accumulates in consequence of this obstruction. It is very probable that this affection may arise from either of these causes, in different cases; and that, in its slighter grades, it is not so infrequent as some writers suppose,—the dilatation of the uterus, and the pressure of its parietes, overcoming or rupturing the obstruction at the mouth of the womb, and causing the fluid to escape. A considerable proportion of the cases vulgarly, but probably correctly, called false conceptions, is of this kind; they seldom becoming the object of medical attention, owing to the little disturbance produced by them, either during their increase, or afterwards, as well as to the deception to which they give rise. Some of these cases may also consist of hydatids, or other morbid productions, which may be associated with hydrometra, as in cases recorded by **Baudelocque**, **Boivin**, **Duges**, and others. (See **Ovaria**, and **Uterus**.)

214. iv. **Encysted Dropsy of the Peritoneum** — *Extra-peritoneal Dropsy* — *Hydrops Peritonei* of **Tulpius**, and some other authors — consists of *the collection of water between the parietes of the abdomen and the peritoneum, enclosed in a cyst*. It was first noticed by **Morgagni**, and accurately described by **Morand**. Twenty-six cases of it have been adduced by **Lieutaud**, twenty-four of which occurred in females. It presents the same constitutional features as have been noticed in respect of encysted dropsies generally; and although, when the accumulation of fluid is very great, it can hardly be distinguished from ascites, excepting in its early stages, it may generally be suspected from the less uniform enlargement of the abdomen, the greater anterior prominence of this cavity, its much slower progress, and the less constitutional disturbance; the countenance and surface not presenting the cachectic appearances generally accompanying ascites, and the patient often retaining much vigour and activity of all the natural and animal functions. Still the *prognosis* in this disease is unfavourable. The sac generally continues to enlarge, and sometimes forms adhesions with the contiguous viscera; and if not evacuated, it eventually bursts into the cavity of the peritoneum, as in the cases recorded by **Chomel** (*Mém. de l'Acad. Roy. des Scien.* an. 1728.), **Morgagni** (*De Caus. et Sed.* ep. xxxviii. art. 51.), and **Tavernier** (**Le Dran's** *Obs.* 65.); or externally, as in those of **Degner** (*Acta Cur. &c.* vol. v. obs. 2.) and **La Motte**. M. **Chantourelle** met with a case wherein the sac opened into the intestines after a puncture had been made for the discharge of the fluid, and fæcal matters passed out at the external opening.

215. The *treatment* of this form of disease has not been satisfactorily illustrated. It seems not materially benefited by purgatives or diuretics; but it is stated, in some instances, to have been permanently removed by paracentesis. And cases have been adduced by **Nuck**, **Degner**, **Le Dran**, **La Motte**, and others, in proof of the propriety of the practice. But in cases of recovery from a disease of this description, there must still exist doubts of its nature. If puncture be resorted to when the tumour has reached a very large size, the opening should be valvular, and graduated pressure subsequently employed. The terrible effects occasioned by keeping open the orifice in order to drain the cavity, were fully demonstrated in M. **Chantourelle's** case, the cyst having become inflamed, and gangrenous with the adjoining parts; as well as in two interesting cases recently recorded by Mr. C. **Hawkins**.

216. v. **Encysted Dropsy of the Liver** is liable to be confounded with abscess of this organ, or with large accumulations of bile in the gall-bladder, from obstruction of its duct, or of the common duct. The cysts which are sometimes found in the substance of the organ, whether of a simple kind, or containing hydatids, are different from those encysted collections of fluid, which either form between the peritoneum and its proper covering, or are apparently attached merely to this viscus. These last evidently consist of hygromatous cysts developed on the adhering surface of the serous membrane, and reaching an uncommon size. When large cysts containing hydatids are formed near the surface of the liver, although essentially different from the simple cysts, and seldom reaching the same magnitude, they generally occasion similar symptoms, both local and constitutional, to those which attend the latter. In some instances, these cysts become inflamed; thereby occasioning great tenderness of the external surface, and changing the contained fluid to a sero-puriform matter, as well as increasing its quantity.

217. Encysted dropsy of the liver is generally accompanied with more disturbance of the general health than the other forms of encysted dropsy of the abdomen, and its progress is usually more rapid. Although a dangerous disease, recovery sometimes takes place from it. Cases terminating favourably have been recorded by several writers referred to in the *Bibliography*. This is most likely to occur if the cyst is attached to the anterior part of the surface of the organ. In this case, a large fluctuating tumour is commonly formed below the right false ribs, or near

the epigastric region, extending more or less downwards and in other directions, according to its size and situation. Inflammation may take place in the more prominent portion, and the cyst may discharge its contents through an external opening, either made artificially or occurring spontaneously. This latter termination, however, is rare; but it may be followed by recovery; two instances of which are adduced by M. Itard. More frequently the cyst opens into the abdominal cavity, or into some part of the alimentary canal, or even into the thorax; and in either case a fatal result generally ensues. In some instances the rupture of the cyst has been occasioned by external violence. The difficulty of distinguishing this state of disease from abscess of the liver pointing externally, or from distention of the gall-bladder, is always great, or nearly impossible. In both these latter cases, however, there are generally more or less jaundice, more constitutional disturbance or greater pain in the region of the liver, more disorder of the bowels, and more interruption to the biliary secretion, than in the encysted collection; the purulent formation being preceded by the usual signs of chronic hepatitis, and distinguished in the manner pointed out in another place. (See Liver — *Diseases of.*) Interesting cases of this form of encysted dropsy have been published by Mr. Brodie, Dr. Thomson, Dr. Thomas, Dr. Abercrombie, Dr. Hastings, and Mr. Cæsar Hawkins. In three of these cases, the early puncture of the tumour, before inflammation supervened, seemed to have been successful. But in nearly all the instances on record, where this operation was performed in a far advanced state of the disease, or when inflammation of the cyst was present, a fatal termination has occurred.

218. vi. Encysted Dropsy of the Kidney is sometimes observed as a consequence of obstruction of the ureter, the pelvis of the organ becoming distended, and the glandular substance either atrophied or absorbed as the accumulation of fluid and distension are increased. This is evidently the manner in which the largest collections of fluid are formed in the kidneys, and interesting cases of it are recorded by Bonetus (*Sepulchretum*, l. iii. sect. xvii. obs. 22.), and by Dr. Howison and Dr. J. Johnson (*Medico-Chirurg. Review*, vol. iii. p. 657.). In this state of disease there have been observed great irregularity in the appearances, and in the excretion of the urine. The abdomen has ben very much enlarged, chiefly towards the side of the diseased kidney, with obscure fluctuation and severe pain in the spine and lumbar region. Simple cysts may also be developed in the substance of the kidney, and contain a limpid or yellowish fluid. They are generally of small size, but occasionally they are found very large. Portal describes one which contained a pint of clear fluid; and M. Itard another, in which there were found two cysts, the larger of which was a foot in diameter. This communicated with the pelvis of the viscus, the structure of which was absorbed, and contained a fluid of a urinous odour and colour; and most probably originated, as in Drs. Johnson's and Howison's cases, in obstruction of the ureter. This species of encysted dropsy generally terminates unfavourably in a shorter time than, perhaps, any other, probably owing principally to the serious consequences always arising from an interruption to the urinary secretion. In an interesting case, which occurred to Dr. Seymour, and is described by Mr. C. Hawkins, a single cyst was found in the substance of the kidney, unconnected with its pelvis, and containing five pints of fluid, not possessing any urinous characters.

219. vii. *Encysted dropsies of the omentum, of the mesentery, and of the spleen*, are of rare occurrence, and can seldom be distinguished from some other diseases during the life of the patient. When fluid is found in the omentum, it is generally effused, or infiltrated between its laminæ. But simple cysts, containing a watery or serous fluid, of various sizes, are, in rare instances, found in these situations.

220. viii. Encysted Dropsy is very rarely seen *in the thoracic cavity*. Haller observed it between the pleura and intercostal muscles, this membrane having become so distended by the fluid as to occupy nearly all that cavity of the chest; the pericardium being also filled with water. Stoërck relates a case in which a female with consumptive symptoms experienced great difficulty in lying on the left side. On dissection, a large simple pellucid cyst, formed in the substance of the right lung, and containing eight pounds of a yellowish serum, was detected. Maloet found, in a person with all the symptoms of hydrothorax, and who was obliged always to sit up, a similar cyst, but not so large, in each lung; and the same productions have been observed by M. Dupuytren, in this situation, and in the pericardium.

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X. **DROPSY IN THE HEAD.** — SYN. *Dropsy in the Head and Brain*; *Hydrocephalus*; *Hydrocephalum*; *Hydrocephale* (ὕδωρ, water, and κεφαλὴ, the head); Ὑδροκέφαλον, Ὑδροκέφαλος; *Hydrops Capitis*, Auct. var.; *Hydropisie du Cerveau*, *Hydrocéphale*, Fr.; *Der Wasserkopf*, *Kopfwassersucht*, *Hirnwassersucht*, Germ.; *Idrocephalo*, Ital.; *Water in the Head.*

221. DEFIN.—*Sopor, with paralysis, anæsthesia, or convulsions, and often with slowly increasing size of the head, from a collection of watery fluid within the cranium.*

222. It is not my intention to notice the very rare and unimportant disease, called *external hydrocephalus*. My limits will be more profitably occupied with the consideration of the very common, dangerous, and somewhat imperfectly understood malady — internal hydrocephalus. *Dropsy within the head*, internal dropsy of the head, or water in the head, as it is usually designated, may be divided into — (*a*) *dropsy of the membranes*, and (*b*) *dropsy of the ventricles*. Either may occur singly, but both may exist in the same case, in various degrees. The former variety is much rarer than the other, and takes place usually to a much less extent. In it the water is contained in the general cavity of the arachnoid, and is in some instances a congenital disease, producing watery tumours, protruding through apertures in the cranium (§ 176.). The fluid is rarely effused in any considerable quantity between the arachnoid and pia mater, and still more rarely between the latter and the brain. In dropsy of the ventricles, which is the most common, and which MECKEL designates the internal dropsy of the head, the water is collected in the bags of the arachnoid and vascular membranes, lining the internal cavities of the brain, and is contained in all or the greater number of these cavities in the same case.

223. Dropsy within the head is *idiopathic* or primary, and *symptomatic* or secondary, — more frequently the latter. It is also either *acute* or *chronic*, or of intermediate grades. It occasionally commences in an acute or sub-acute form, and insensibly and gradually passes into the chronic state. It is often congenital, — in which case it is usually chronic, or quickly becomes so; and it occurs at all periods after birth, particularly during the earliest epochs, — when it is generally acute or sub-acute. These circumstances are important in respect of its nature and treatment.

224. Hydrocephalus cannot be said to have been known to the ancients; this term having been applied by them chiefly to collections of fluid exterior to the cranium. HIPPOCRATES, however, in speaking of the maladies which arise from the head, notices one which has a marked resemblance to the symptoms of the acute or sub-acute form of this disease; and at the same time assigns water on the brain — ὕδωρ ἐπὶ τῷ ἐγκεφάλῳ, — as its cause (*De Morbis*, lib. ii. cap. 15. edit. *Vander Linden*, t. ii. p. 47.). From HIPPOCRATES to RHAZES, no mention is made of internal hydrocephalus. But this latter writer states, in his book on the diseases of children, that the head sometimes acquires an increased bulk, owing to the collection of fluid within the cranium. The chronic form of this malady was described nearly a century before any notice was directed to its acute states; but, during the last fifty years, these states have attracted attention great in proportion to their prevalence and fatality in the early stages of life.

i. **ACUTE DROPSY IN THE HEAD.** — SYN. *Hydrocephalus Acutus*; *H. Acutus internus*; *Hydrencephalus* (from ὕδωρ, water, and ἐγκέφαλος, the brain); *Febris Hydrocephalia*; *Carus Hydrocephalus*; *Apoplexia Hydrocephalica*, Cullen; *Hydrencephalon*, Hufeland; *Hydrops Cerebri Acutus*; *Hydrocéphale aigu*, *Fièvre Cérébrale des Enfans*, Auct. Gall.; *Hydrocéphalite*, Brachet.

225. DEFIN.—*Fever, with sopor headach, and morbid sensibility to light, &c.; inability to bear the erect posture; vomiting; costiveness; screaming; dilated pupils; squinting; convulsions and paralysis.*

226. Lit. Hist.—Acute hydrencephalus, notwithstanding the remark of Hippocrates already referred to, was formerly confounded with cerebral fever, or fever with determination to the brain. A case, in which it is accurately described, but considered as one of fever merely, was published by Dr. **St. Clair**, in 1733, in the *Edin. Med. Essays and Observations*, vol. ii. p. 287. Mr. J. **Paisley**, of Glasgow, in the following year (in *Ibid.* vol. iii. p. 333.), recorded a case, with the *post mortem* examination, and first recognised it as a specific form of disease. It was not, however, until the appearance, in 1768, of Dr. **Whytt's** "*Observations on the Dropsy of the Brain*," that the history of the malady and its nature were made subjects of investigation. The observations of Dr. **Fothergill** (*Med. Observ. and Inquir.* vol. iv.) contributed something to the knowledge of its symptoms; but those of Dr. **Watson**, in the same work, furnished evidence merely of its extreme danger. Dr. **Dobson's** case, published in 1775 (*Ibid.* vol. vi.), was valuable, inasmuch as it showed the possibility—at the time, very generally doubted—of curing the disease; and of the influence of mercury in bringing about this result. **Harris**, however, had long before stated, as Dr. **Cheyne** has remarked, that a physician of experience had saved children in fevers attended by unusual stupor, and even coma, by giving them *mercurius dulcis* six times sublimed.

227. The opinion of **Whytt**, that the disease depends upon laxity of the exhalants, or upon a watery state of the blood, had been generally received, until Dr. **Quin**, in 1779, maintained that it is allied to inflammation,—a doctrine which had suggested itself to both Dr. **Withering** and Dr. **Rush**, before Dr. **Quin's** views had become known. Dr. **Withering** stated explicitly, that the malady originates in inflammation, and that the water found in the ventricles of the brain is not its cause, but its consequence. Dr. **Rush** made an important addition to its history, by showing that it may be produced by other diseases, especially by fevers, rheumatism, pulmonary consumption, the exanthemata, and worms; and that death may supervene, preceded by hydrocephalic symptoms, and little or no water be found in the ventricles,—circumstances which will be fully enquired into in the sequel. Dr. **Percival** demonstrated its frequent connection with scrofula, and seemed impressed with the idea that it is not altogether identical with inflammation in its nature. Its inflammatory origin was afterwards supported by Dr. **Patterson** and Dr. **Garnett**, although neither appeared to consider it advisable to carry the depletory and antiphlogistic treatment so far as such a doctrine might have warranted. This last writer believed that, in hydrocephalus, a local inflammation without much general sthenic diathesis obtains; and that a depletory treatment, injudiciously employed, may weaken the general tone of the system, and increase the effusion, without materially diminishing the local morbid action, for the removal of which such means are employed. Of the justice of this view there can be no doubt. The local action, which has been called inflammatory, merely because it is attended by injection of blood-vessels, has been too generally treated as true inflammation occurring in a healthy constitution, and without reference either to the series of vessels affected, or to the grade, or the product of action; and, what is equally important, without regard also to the diathesis, or state of vital manifestation and power. It is unnecessary to notice here the opinions of more recent writers, as the chief of them are referred to in their proper places.

228. Descriptive History.—The *Precursory* or *Early Symptoms* of acute hydrocephalus are remarkably diversified, owing to the circumstance of their dependence upon disorder of the digestive organs, or of the circulation in the brain and membranes: and it is chiefly owing to the predominance of the symptoms referrible to one or other of these parts that the disease has been divided by some writers into the primary or idiopathic, and the secondary or symptomatic. The possibility, however, of making the distinction in practice is not so easy as some writers would make it appear. For the dependence of the functions of the liver, and digestive organs, upon the state of circulation in the encephalon, and of the latter on the former, is so very intimate, that it is often impossible to ascertain which is primarily affected. The majority of writers on the disease in this country consider that the digestive organs are the first to betray disorder; whilst the French pathologists and Dr. **Abercrombie** believe that the morbid action very frequently commences either primarily or simultaneously in the brain itself. I am convinced, that the true acute hydrocephalus originates more frequently in the encephalon, than the abdominal functions indicate, and at a period anterior to the disorder which these functions manifest,—such disorder often proceeding from the silent morbid action in the brain, reacting on it, and promoting the evolution of those changes constituting the disease; and that, when hydrocephalic symptoms supervene more suddenly and violently, and without much previous disorder of the chylopoietic viscera, or nervous system, they have a more intimate relation to acute or sub-acute inflammation of the brain and its membranes, than to those states of morbid action which terminate in copious effusion, and to which the term hydrocephalus is more strictly applicable. The chief exceptions to these inferences will be found in those who inherit a peculiar morbid diathesis or predisposition to the malady—who are scrofulous or weakly constituted,—and in these the brain and its membranes will often coetaneously suffer, in a greater or less degree, with one or more of the digestive organs; the excited action it experiences being either attended, or soon followed, by deficient power, and by relaxation of the exhaling surfaces. In these cases, as well as in those in which it is ushered in, or predisposed to, by derangements of the abdominal viscera, it does not, as in true cephalitis, readily occur in a previously healthy constitution, but chiefly in states of pre-existing ailment, or as a consequence of inflammatory action arising under such circumstances,—in which not only the chylopoietic viscera imperfectly perform their functions, but also the organic nervous system is weak, and the capillary vessels and exhalants are so deficient in tone as to be readily relaxed, or exhausted when over-excited. In other words, that acute hydrocephalus is a consequence of

disease, which originates variously; — in some it is the result or termination of inflammatory action occurring in a weak or morbid state of constitution, — in others of general febrile excitement, affecting patients similarly constituted, or occasioned by accumulated morbid secretions and excretions, or by local irritation; — that it stands in the same relation to inflammation as other acute dropsies; and, even when most inflammatory, that it differs from encephalitis much in the same way as phlegmon differs from erysipelas, or as acute peritonitis differs from the true puerperal fever. From what I have now stated, it will appear important to be acquainted with the symptoms indicating the pathological states terminating in acute hydrocephalus. These may be referred to two principal seats, viz. the *head* and the *abdomen*, but with the understanding that, in many instances, although the more distressing ailments seem to proceed from the one, the primary and principal disease may exist in the other.

229. Forms and Stages of the Disease. — (*a*) The *Forms* have been chiefly referred to the mode of attack and symptoms of the first stage. Dr. Cheyne has particularised three *varieties*; the gradual, the sudden and violent, and the secondary. These answer to the nervous, the inflammatory, and the consecutive, respectively, of Hopfengärtner and Kuhn. Guersent divides the disease into the ataxic or febrile, and the apoplectic; Itard, and several writers, into the idiopathic and symptomatic. M. Brachet designates three forms; the nervous hydrocephalitis, the inflammatory, and the gastric; but it is very difficult to distinguish the nervous from the gastric form. Goelis distinguishes merely the acute, and the hyper-acute or waterstroke. The division recommended by Cheyne and Hopfengärtner is, upon the whole, the best; it matters but little how the forms are named. The terms, however, used by the German writers seem to be the least objectionable. — (*b*) Since the appearance of Dr. Whytt's description, the disease has usually been divided into *periods* or *stages*. But much difference has existed as to the number of stages, and as to what symptoms indicate them. Goelis points out four periods, viz. of turgescence, of inflammation, of effusion, and of palsy. Whytt, Quin, Tissot, Baader, Sprengel, Cheyne, and others, mention three, according to the three different states of the circulating and nervous systems that obtain in the course of the malady. Some writers notice, with P. Frank, Rush, and Conradi, only two stages; whilst Formey, Von Portenschlag, and Guersent describe none. This diversity depends chiefly on the irregular progress of the disease, its uncertain commencement, and the circumstances referrible to the constitution and previous health of the patient under which it occurs. I shall adopt the division, employed by Dr. Cheyne and others, into — 1st, that of increased sensibility; 2d, that of diminished sensibility; and, 3d, that with palsy or convulsions.

230. *A. The Nervous form* is generally *preceded* by, or rather *commences* with, a great variety of symptoms, which continue a longer or shorter time before the disease is so fully developed as to be recognised, or as to excite the attention or alarm of the friends. For several days or weeks, or even for months, the child is vertiginous, liable to fall or stumble while at play or running about, is nervous, and starts or is fearful from slight causes, and more or less capricious in its appetite, or without appetite. The tongue is slightly furred, and white; the bowels are costive; the motions offensive, unnatural, clay-like, and indicating a morbid or deficient biliary secretion; the breath is fœtid; the urine is somewhat diminished in quantity; the complexion fades; the features collapse; the sleep is disturbed and dreamy; the eyes become heavy, very sensible to light, have a dark line under them, and lose their animation; the hypochondria and abdomen are often tender or tumid; and the child complains of occasional pains, which resemble rheumatism, in these regions, particularly in the region of the liver, and sometimes in the limbs. Various other symptoms are conjoined to, or supervene upon the foregoing, which continue frequently for a considerable time, without additional ailment, or confining the patient. But sooner or later they become aggravated; the surface assuming a harsh, sallow, or unhealthy aspect. The movements are now languid; the sleep more and more disturbed and unrefreshing, and the disposition to it often greater. Giddiness, slight pain or noise in the head, tenderness of the scalp, and pains in the neck and limbs, are complained of. The countenance is heavy; the sense of sight and hearing often very acute; and the pulse is quicker, and more excitable than natural. The child is drowsy, silent, or appears as if in a reverie, and indifferent to those persons and objects he was formerly interested in. He is also irritable, or dejected, sighs often, and yet frequently makes no complaint, when questioned. Purgative medicines usually procure scanty, clay-like, pale, or greenish and slimy evacuations. These symptoms are very frequently removed by active purgatives; and although they often run into those indicating unequivocal disease within the head, yet they indicate nothing beyond a general and grave disturbance of the functions. But when they persist after proper treatment, or are neglected, the *first stage* may be considered as being actually present, although it should be rather viewed as commencing with the first signs of ailment; more pathognomonic symptoms superpervening on the foregoing indefinite ailments. The above series of symptoms nearly agrees with the first period, or that of turgescence, of Goelis.

231. (*a*) The pain in the head returns more frequently and acutely; and is often attended by severe ear-ach, by aching of the eyes, and more commonly by increased sensibility to light and noise, and alternate chills and flushes. The pulse is now quick, excitable, and of irregular strength and frequency. The gait is unsteady; the skin warm, dry, and unhealthy; the pains through the trunk and limbs more frequent and severe, and accompanied with sickness and vomiting, particularly on getting up in the morning. The tongue is loaded or furred. There is occasionally dragging of one leg, or a raising of the foot as if stepping over something in the way, or a painful crick in the neck. The stools, from being scanty, costive, and clay-like, pass to dark green, and a gelatinous or spinach-like state, exhale a sickly and peculiar smell, and are still

procured with difficulty, this change depending chiefly upon the morbid condition of the secretions poured into the digestive canal: the urine is scanty and turbid, and has often a milky appearance (Odier, Coindet, and Vieusseux). The erect posture or motion, particularly rotating the head, brings on sickness and retchings, without the appearance of offensive matters. There are also great fretfulness and restlessness; contracted pupils; frowning, or knitting of the brows; inability to sit up; a whining or moaning noise when lying down; and sometimes a slight cough, with irregular suspirious breathing. The sleep is short and restless; the infant rolls its head on the pillow, or often wakens with a scream or crying, and raises its hands to its head. The nostrils and lips are dry and cracked. This period is very variable in *duration*, but it usually continues from ten to fifteen days.

232. (*b*) *Second stage.*—The pulse, from being very quick, excitable, irregular, and weak, now becomes slower—sometimes as slow as natural, or even more so; but chiefly when the patient is in the horizontal position; for if he attempt to sit up, it generally acquires its former frequency. The sensibility is now remarkably impaired: sopor or stupor gradually supervenes, with dilated pupils, squinting, and imperfect or double vision. The eyes are dull, heavy, vacant, or staring; the eyelids drooping or half closed. Sickness or retchings are now less frequent, unless the child be raised up, when one or both often occur. The excretions are passed unconsciously, and are scanty, and procured with difficulty. The stupor is interrupted by exclamations, or shrill piercing screams; the hands, which are tremulous, being raised to the head or neck, or occupied in picking the lips or nostrils. Emaciation proceeds rapidly; but food is generally swallowed greedily when presented. These symptoms are, however, by no means uniform; for the pupil is frequently, particularly at first, oscillatory, or, although dilated, affected by light. The stupor, also, is not always constant; nor does the pulse always becomes slow. Deep inspirations, hectic flushings of the cheeks, cold extremities, low delirium, and an almost total suppression of urine, are occasionally observed. The *duration* of this period varies from four or five days to two weeks.

233. (*c*) *The third stage* has been generally recognised by the returning frequency of pulse, which is often remarkably rapid, thready, and weak; by the occurrence of general or partial convulsions; by paralysis of one side or limb; by twitching of one or more of the muscles; and by suffusion of the eyes, the eyelids being motionless, and the cornea becoming dim and filmy. Often, when one side is paralysed, the other is more or less convulsed. The patient is now either insensible or delirious. He rolls his head on the pillow, grinds his teeth, moves the unpalsied hand in the air, and moans or breathes heavily and hurriedly. Alternate flushings and pallor, or flushes of one cheek, the other being pale; irregular distribution of the circulation; partial sweats; cold extremities; irregular, or stertorous breathing; an eruption of vesicles about the mouth, or on the face and upper part of the chest (Formey, Goelis, Schmalz, Raimann, and myself); collapse of the countenance; blueness or paleness of the lips; and, more rarely, sphacelating sores; are remarked towards the close of the disease. The dilatation of the pupil and strabismus generally continue throughout this stage, which may terminate fatally (generally in a violent convulsion) in a few hours, or it may last for ten or twelve days, or even longer. Such is the common course of the most frequent form of the disease, which comprises the *Nervous* and *Gastric* of Brachet; and which may either originate in the encephalon, or in the digestive organs. But it is seldom that the early history of the case is so precise as to enable the physician to draw a correct inference as to its commencement. In some instances, I have observed slight symptoms of cerebral disease, for some weeks, or even months, after repeated attacks of congestion or of inflammatory action within the head, of a well marked character, but supposed to have been removed by treatment. In some of these cases, the disorder of the digestive organs was so evident as to give rise to the idea of the primary affection of these viscera, indicating the difficulty of ascertaining the parts first deranged. The information furnished, in most instances, seldom enables us to carry our pathological analysis sufficiently far back to connect the early ailments with their causes; and, consequently, we often fail in ascertaining the quarter where disease commences.

234. *B.* The *Inflammatory variety*, or the second form of Dr. Cheyne, of M. Coindet, and of Hopfengärtner, is more acute than the preceding. The *precursory* symptoms are generally of short duration, and sometimes so slight as to be overlooked. This variety nearly resembles fever, with predominant affection of the head; and in many cases it is not to be distinguished from inflammation of the brain and its membranes (see Brain, § 174. *et seq.*), the disease being merely a modification of inflammatory action, depending upon diathesis, and previous state of health; and, owing to these circumstances, giving rise to effusion. After the child has been drooping for a short time, fever, with slight, short, and irregular remissions, flushings, severe headachs, increased heat and sometimes soreness of the scalp, augmented sensibility, thirst, hot skin, brilliancy of the eyes, and tenderness over the abdomen, supervene; the pulse being rapid, hard, or small; and the tongue white or loaded. Stupor or unwillingness to be roused, alternating with violent screams, and complaints of the head and belly; great irritability of the stomach; retching readily brought on by changes of position or by sitting up; a morbid and scanty state of the alvine evacuations; a vacant, dejected, or heavy expression of the eyes; a pained and terrified look; and diminution of all the secretions and excretions; commonly characterise this form of the malady. This *first stage* is usually accompanied with many of the phenomena of the first period of the foregoing variety: the chief difference being in the more febrile condition of that now under consideration, in the earlier and more evident connection of the symptoms with the brain, and in the shorter continuance of this stage. As soon as the changes which attend the *second period*, *viz.* dilated pupils, strabismus, stupor, diminished frequency of pulse, &c., appear, the progress of this is in all respects the same as that of the first variety; the stages being

more distinctly marked, but frequently of shorter duration, than in it. This form is generally idiopathic, whilst the foregoing is often symptomatic of disease of the liver and digestive organs.

235. *C. The Consecutive variety* is observed in an advanced stage of some acute disease, or soon after its decline, assuming either of the foregoing forms. It may follow the disappearance of some scrofulous affection; in which case it generally presents the characters of the first variety. It may come on after scarlatina or measles, and early in hooping cough; and it then commonly makes its attack with all the violence of the second variety. When it appears during remitting fever, difficult dentition, and in the latter periods of pertussis, it often steals on so imperceptibly, as not to be recognised until dilated pupil, strabismus, convulsions or paralysis, and other symptoms of the advanced stages, are remarked. In such cases, the symptoms of the early period are liable to be confounded with those of the malady of which it is consecutive. Pain, which is one of the most prominent features of hydrocephalus, is sometimes but little felt in this form.

236. *Remarks.*—The varieties now pointed out can be recognised only during the first stage, and chiefly by the mode of *attack*, which, in the *first*, is always slow and insidious. This is the most frequent form of the disease. In the *second*, the attack is more sudden and tumultuous; its first stage lapsing into the second in from two to four or five days. This, however, is the least frequently observed in practice, and is hardly to be distinguished in its first stage from inflammation of the brain and its membranes, of which it is only a modification or termination, when affecting the more central and internal parts of the encephalon. It occurs in more healthy children than the other forms do, and is commonly idiopathic or primary. The *third* variety often proceeds not only insidiously, but rapidly; and is generally the most fatal. It may present very unequivocal inflammatory characters in some cases, particularly when it follows the exanthemata; and in others, neither the symptoms, nor the appearances upon dissection, of true inflammatory action, may be observed; as when it is consecutive of hooping cough, remittent fever, and other affections, chiefly referrible to the digestive organs. During the progress of all the forms of the malady, especially the first and third, the febrile symptoms are very irregular, and often only occasionally present. The thirst and appetite are also various; and the breathing is sometimes calm and soft, and, at others, laborious, quick, and suspirious. The circulation is at times irregularly distributed, the head being hot and the cheeks flushed, while the lower extremities are cold; and at other times it is more equable, the countenance being pale, the skin warm, and even perspirable throughout. The bowels are generally as already described; but, in some cases, a bilious purging attends the vomiting. In a few instances, after the delirium, insensibility, and convulsions in the last stage, a return of the senses and intellect has ushered in dissolution.

237. In *young infants*, hydrocephalus is ascertained with much difficulty, and is liable to be confounded with disorder of the digestive organs. The knitting of the brows, watchfulness, moaning, feverishness, the throwing back of the head, starting from sleep with a cry of alarm, frequent vomiting, aversion from light, the peculiar character of the stools, the half-closed eyelids, the full or distended fontanelle, and hanging or rolling of the head on the nurse's arms, are the chief symptoms. The expression of pain is not violent at this epoch; and there are not, in this disease, the drawing up and flinging out of the legs, with screaming and crying, as in colic or griping pains. It seldom, however, appears before the period of dentition; but, when it occurs about this period, it is often ushered in by convulsions, or convulsions appear at an earlier stage of the malady than in older children.

238. The *duration* of acute hydrocephalus is extremely various. When it has reached the second stage, its duration is very uncertain; for death may supervene in a few hours, or not until after two or three weeks. In young infants, it frequently advances most rapidly. Fothergill, Coindet, Sprengel, Cheyne, Goelis, &c. consider that it commonly runs its course within three weeks. Whytt, Frank, C. Smyth, Yeats, and others, believe that it may be protracted much beyond that period. The consecutive form may terminate in about a week; and the inflammatory seldom lasts longer than three weeks; but the first or nervous variety may continue for four, five, or even six weeks, or longer, if the earliest symptoms be taken into the account. In some instances, especially of the first form, the disease may assume a nearly chronic character, or a state intermediate between the acute and chronic, or may pass altogether into the latter, especially in young children; a slight separation of the sutures, enlargement of the head, sallowness, marasmus, palsy, &c. taking place; and a larger collection of fluid being found in the ventricles than in the more acute states, although less than in the congenital and chronic. The most common duration of the disease, according to my experience, is from two to four weeks. There is great difficulty, as respects the first and third forms particularly, in determining the period at which the malady giving rise to the effusion begins. As to the effusion itself, it may commence coetaneously with the second stage, or not until a subsequent period.

239. *Appearances on dissection* vary remarkably, even in cases belonging to the same form of the disease. — (*a*) In the *first form*, the veins of the membranes are generally found congested, with dark-coloured blood. In a few instances, I have observed inflammatory appearances in the longitudinal sinus; and a similar observation has been made by Bucholz. The ventricles usually contain from two to six or eight ounces of limpid serum. The substance of the brain is soft and blanched, especially towards the central parts; and in the vicinity of the ventricles it is often very much softened, the fornix and septum lucidum being more or less disorganised, and soft like curd. The choroid plexus is pale, sometimes granulated. The pituitary gland is occasionally infiltrated, or otherwise slightly altered (Morgagni and myself); a slight watery infiltration of the substance of the brain has also been noticed. Tubercular formations have been found in various situations within the cranium (Laennec, Merat, &c.). Several other slight lesions of the encephalon have been observed; but they are by no means constant, and may be viewed as merely contin-

gent changes. The *liver* is often inflamed, somewhat enlarged, and extensively adherent to the adjoining surfaces. Dr. CHEYNE has remarked small white tubercles on the surface of this organ; and I have seen them in this and other parts of it, as well as in the *spleen*. The *mesenteric glands* are frequently enlarged, and contain caseous depositions. The *stomach* and *intestines* are sometimes inflamed, the latter constricted, and even intus-suscepted. The mucous follicles of the digestive canal are often enlarged.

240. (*b*) In the *second*, and in most of the *third*, forms of the disease, the brain and its membranes, particularly towards the base and central parts, present many of the usual appearances of inflammatory action, especially injection of the vessels, and thickening and opacity of the membranes, in addition to effusion of serum. The fluid is not so generally limited to the ventricles in these forms as in the first, is usually in less quantity in these cavities, but is effused also between the membranes, especially in the general cavity of the arachnoid, or between this membrane and the pia mater, elevating the former, and thereby exhibiting a gelatinous appearance. BONET and GREDING observed effusion between the cranium and dura mater; and Dr. ABERCROMBIE thinks this not a rare occurrence, and that it is the source of the fluid which escapes upon opening the head. The *fluid* itself is much less limpid in these varieties, than in the first; it being often turbid, or whey-like, containing minute shreds of lymph, and presenting evident traces of albumen. In many of the cases belonging to the second form, the cerebral substance retains its consistence, its cut surface indicating increased vascularity. In some cases, the surface of the ventricles is covered by a fine film of lymph, which hardly adheres to it. In several instances of the disease consequent upon scarlatina, I have observed the effused fluid of a turbid, brownish, and sanguineous appearance.

241. *D.* HYPER-ACUTE HYDROCEPHALUS; *Apoplexia Hydrocephalica; Wasserschlag*, Germ.; *or Waterstroke.*—*The sudden effusion of water on the brain*, although noticed by some other writers, was first described by GOELIS. He states that it may take place either idiopathically, or in consequence of various diseases. Although I have met with many cases of its consecutive occurrence, I have seen none that could be strictly called idiopathic. It most commonly appears in the advanced stages of the exanthemata, after the repulsion of chronic eruptions, as tinea capitis, crusta lactea, discharges from the ears; or after the arrest of habitual evacuations and excretions, as chronic diarrhœa, dysentery, the choleric fever of infants, habitual perspirations, &c., and when the powers of life are much reduced. In all such instances, it is to be considered merely as a more rapid form of the *third*, or consecutive, variety of hydrocephalus already described; taking place, in some instances, with surprising suddenness, and terminating fatally with great rapidity — sometimes in from twelve to twenty-four hours. The attack, under these circumstances, is seldom or ever recognised until the symptoms of the second or third stage of acute hydrocephalus supervene. GOELIS supposes, from the appearances of vascular turgescence observed in some cases after death, that a degree of inflammatory action may suddenly supervene, and be coincident with effusion. But it is very rare that marked vascularity of the membranes and brain of children is not observed upon dissection, whatever may have been the disease of which they died. It is very probable that increased determination of the circulation has preceded, or accompanied, the effusion in these cases; but the vascularity is no proof of inflammation. The *effusion*, in the several instances of this kind that I have examined, was chiefly in the ventricles, although partly also between the membranes; was generally in less quantity than in the common acute disease, — in all the cases, under four ounces; was less turbid than stated by GOELIS; and occurred in children who were of an unhealthy habit, lax fibre, and much reduced by disease.

242. *E.* SUB-ACUTE HYDROCEPHALUS. — This form of dropsy in the head, already alluded to, is deserving of more particular notice, from the frequency of its occurrence. I have met with it most commonly as a slighter grade of the *first variety* described above (§ 230.). It generally occurs between the second month and the commencement of the second year of age. After the continuance of many of the symptoms characterising the first stage of that form, the head begins to enlarge, with slight separation of the sutures, and imperfect developement of the symptoms of the second stage. In many cases, the disease is slighter, and the duration longer, than in the first form; but, in others, the symptoms are quite as severe for several days, when the yielding of the cranial parietes before the effused fluid seems to abate their violence. In some cases, the malady is prolonged merely for a few days; in other cases, for a much longer period, so that it runs into the *chronic*. In rare instances, recovery is slowly and insensibly established, the patient — especially if nature be judiciously assisted by art — outgrowing, as it were, the disease. During its progress, the symptoms vary but little in kind from those already described. The bowels are generally irregular after having been long torpid, and they sometimes become lax, the stools being mucous, unnatural, and offensive. In some instances, diarrhœa comes on during the advanced stages; and if this be not checked, and if the powers of life be supported or promoted, and appropriate remedies prescribed, recovery may take place. But more frequently the loss of flesh, general cachexia, disorder of the bowels, sopor, paralysis, &c. advance slowly, until convulsions or exhaustion terminate life.

243. *Dissections.* — In all the cases I have examined, the fluid effused was altogether in the ventricles, has exceeded eight ounces, and was either entirely or nearly limpid. The brain surrounding the ventricles was frequently softened; but, excepting a common injection of the membranes, there were no remarkable inflammatory appearances in the encephalon. A thin film of mucous lymph covered the surface of the ventricles in some instances. An increased quantity of fluid was occasionally found about the medulla oblongata, and in the spinal canal. The *liver* was often more or less inflamed or enlarged, the digestive mucous surface also inflamed in various parts, and PEYER's glands were enlarged — in some cases ulcerated. The mesenteric glands were frequently diseased in the manner stated above (§ 239.).

244. Diagnosis.—Although the disease is readily ascertained in its far advanced stages, when it is nearly or wholly beyond the reach of medical aid, it by no means admits of easy recognition at an earlier period. Indeed, as will be hereafter shown, the effusion being often an occurrence contingent on a variety of ailments, and often arising out of a morbid condition of the system, and of the parts contained within the cranium, no early diagnosis can be formed; for the functional disturbances and general febrile commotion characterising the commencement of the disease, are readily removed in many instances, whilst, in others, apparently as slight, or even slighter, the symptoms commonly attributed to the effusion will rapidly supervene, notwithstanding the most judicious treatment: and, after all, it remains very questionable, whether or not the symptoms commonly attributed to the effusion are not rather the results of the changes which have taken place in the organic nervous influence, in the circulation, and in the structure of the brain, upon which changes the effusion is merely contingent, than the consequences of the effusion itself; for I have observed, in several cases, as much fluid effused within the cranium, there having been no hydrocephalic symptoms during life, as in the most marked form of the disease. We have, moreover, seen that, in many of the cases of inflammation of the brain, or of its membranes (see Brain, § 175.), very nearly the same train of symptoms appear as in acute hydrocephalus, and yet little or no effusion takes place; and that, in the more inflammatory variety of this malady, where the symptoms characterising the advanced stages are most marked and uniform, the quantity of the fluid effused is generally the least. Where, however, we see a child in a state of insensibility, rolling his head upon the pillow, frequently grinding his teeth, screaming acutely, moving one hand in the air, while the other is palsied, with a hectic on the cheek, drooping eyelids, heavy vacant stare or strabismus, dull filmy cornea, dilatation of the pupils, collapsed features, general emaciation, partial sweats, suspirious, laborious,' or rapid breathing, and convulsions, after having been ailing for some time, and more recently affected by febrile action, with marked disorder of the digestive organs and of the head, it may be inferred that effusion has taken place within the ventricles, and at the base of the brain, chiefly in the former; but of this there is no complete certainty, for very nearly the same phenomena may arise from extensive encephalitis, or from inflammatory softening of the brain, at their most advanced stages.

245. (*a*) I have already stated that the disease, in its inflammatory form, is nearly related to *inflammation of the brain and its membranes*; and I may now add, that, in the first form described, it is often equally closely connected with *softening of the organ* (see Brain, § 214.). In many cases, the distinction is made with great difficulty, and in some it is not to be made at all; for the effusion is, in such, merely one of several coexistent changes either immediately consequent upon, or more remotely following, the inflammatory act in the former class of cases, and the softening in the latter. When, however, any diagnosis can be established by the close and experienced observer, it is most important to be guided by it. The turgescence, which attends inflammation of the brain, often gives rise to symptoms which nearly resemble those produced by watery effusion: and it is only by estimating the history of the case in connection with the causes and a number of existing phenomena, that an opinion can be formed as to the exact state of disease. — α. *Encephalitis* occurs more frequently in previously healthy children; its attack is sudden, and the progress of its early stage rapid and tumultuous: *hydrocephalus* appears in the unhealthy; and consecutively either of previous attacks of congestion or inflammation of the brain, or of disease of the digestive and chylopoietic viscera,— generally in a gradual, slow, or insidious manner: the former being commonly an idiopathic, the latter often a symptomatic disease. — β. In *encephalitis*, pain is constant and throbbing, increased by any excitation of the circulation, frequently preceded, or attended, or followed, by distinct chills or rigors: in *hydrocephalus*, pain is intermittent or remittent, shoots with great violence, occasioning anguishing screams, wants the pulsating character, is not increased by what excites the circulation, often alternates with pains in the abdomen, and is seldom attended by chills or rigors. — γ. The sickness and vomiting, symptomatic of the former, are unaccompanied by the fulness and tenderness of the hypochondria and epigastrium which commonly precede and attend these symptoms in the latter malady. — δ. The countenance in *encephalitis* is tumid and injected, the features enlarged, the attendant fever of a sthenic or phlogistic character, and its progress very acute: in *hydrocephalus*, particularly its first and most common form, the countenance is not very sensibly tumid; the cheeks only are irregularly flushed; the thirst is not so great, nor the anorexia so complete; the febrile heat is not so high, so general, or so constant; the surface is not so full and animated, nor is the pulse so steady and strong as in the former disease. The pulse is more excitable, irregular in strength and frequency, in the respective stages; more rapid and weak at the commencement, and partakes more of the asthenic character, in the latter malady; the emaciation is also greater and more rapid. — ε. The stools in *encephalitis* are devoid of the peculiar characters they present in acute *hydrocephalus*; they are not of the same dark greenish colour, have not the gelatinous consistence, with the oiliness and glossy appearance, of those in the latter; nor do they possess the peculiar sickly, but not fœtid smell. — ζ. The contractions and spasms of particular limbs and muscles, often observed in *encephalitis*, are seldom met with in *hydrocephalus*; whilst, in the latter, paralysis is more common. From the circumstance of inflammatory appearances in the membranes, as well as of softening in the central parts of the brain, having been often found in hydrocephalic cases, in addition to the effusion of fluid, it may be legitimately inferred, that the disease will often partake more or less of the symptoms usually caused by these lesions (see Brain, §§ 146 — 182. 214. *et seq.*); and that cases will occur but slightly modified in their characters from those consisting of inflammation on the one hand, and of softening on the other; the former commencing suddenly and acutely, the latter slowly and insidiously.

246. (*b*) Acute hydrocephalus may be distinguished from *fever*, by the somnolency, knitting of the brows, the great irritability of the stomach, which is increased by motion and the erect posture; by the raising of the hands to the head, the throwing back the neck, the excitability and irregularity of the pulse, the peculiar character of the evacuations, and obstinate costiveness; by the pains shooting in various parts, and the overpowering headach which admits not of the head being raised, — the pain darting at intervals through the centre of the brain, and not throbbing as in phlogosis, nor being increased or brought on by excited circulation; and by the starting, peculiar scream, and the expression of anguish when the child is awakened by it from the constant dozing, into which he instantly afterwards falls. — *a*. The infantile *remittent fever* is distinguished from this disease by the absence of the above symptoms, by the expression, by the regular morning remissions, and by the feculent, brown, and more easily procured evacuations. — *β*. *Typhoid* or *adynamic fever* is rare in children, and is to be distinguished from this malady, by the more equable pulse, by the dark and fœtid stools and diarrhœa, low muttering delirium, supine posture, tumid abdomen, sometimes by petechiæ; by the dark brown, tough sordes on the teeth and gums; by the slipping down in bed; and by the absence of acute pains, convulsions, paralysis, and of the other remarkable symptoms of hydrocephalus. — *γ*. The *febrile disorders* produced by *worms* are generally more protracted than this disease; are without distinct stages, but with manifest remissions, — the sleep being sound, and pulse uniformly quick. In worm fever, the pains in the head and abdomen are dull and not much complained of; the appetite is ravenous, the stools spontaneous and copious, the urine abundant and pale, the perspiration free, the cheeks generally pallid, the sight and hearing are unaltered, the mouth and nose moist, the abdomen is constantly tumid, and the body but little or not at all emaciated; and if convulsions occur, they are not followed by paralysis. It should not be overlooked, that either of these states of fever may give rise to aqueous effusion on the brain, the early symptoms proceeding insidiously, or being masked by the primary disease, and thus often escaping detection until some of the characteristic symptoms of hydrocephalus supervene.

247. (*c*) Various *organic lesions* within the head may occasion very nearly the same series of morbid phenomena as constitute this disease; but generally they are of much longer duration, and are not attended by so much emaciation, or such overpowering pain in the head. The stages of the malady are not so well marked. Rarely, however, do organic changes occur in the encephalon or its membranes, in children, without the effusion of more or less fluid.

248. (*d*) The strangulating or crowing inspiration, with purple complexion, not followed by cough (see LARYNX — *Spasm of*), but often accompanied by clenching of the hand on the thumb, with spasms of the toes, has been considered by many as connected with acute hydrocephalus. Without denying that this affection may occur as a symptom at an early stage of the disease, it should be recollected that it often disappears after scarifying the gums, or cutting the teeth, or removing morbid secretions. The *convulsions* attendant on hydrocephalus are generally characterised, as Dr. CHEYNE justly remarks, by a greater affection of one side of the body than of the other: one arm or leg is, with some regularity, retracted and flung out, while the other is affected with spasmodic catchings; the eyes are suffused; there is often a circumscribed flush on the cheeks, and the breathing is slow, or irregular and sobbing.

249. (*e*) *Exhaustion of vital power* may occasion symptoms often closely resembling acute hydrocephalus. The circumstance of exhaustion giving rise to hydrocephalic symptoms — in some cases without any effusion, in others with the collection of more or less fluid — has been well known to me, and acted upon in my practice at the Infirmary for Children for many years. It was first very imperfectly alluded to by Dr. CHEYNE; and subsequently by Dr. ABERCROMBIE, Dr. GOOCH, Dr. DARWALL, and others, who appear not to have clearly understood it. These writers consider this consecutive affection as one of exhaustion of nervous power only: but I infer that something approaching to hydrocephalic is occasionally connected with it; for the benefit afforded by nutrients, stimulants, or tonics, is no proof that the exhaustion has not been attended by some degree of effusion. Indeed, the physical condition of the brain renders it most probable that some fluid is collected, owing to exhaustion, diminished nutrition, and the state of the cerebral circulation; and that it is absorbed as the pathological states that occasioned its effusion are removed by appropriate treatment. The appearances observed in the fatal cases fully confirm this view. I am at this time attending two cases of this affection that fully illustrate its nature. It is generally consequent upon weaning, improper or imperfect feeding, protracted diarrhœa, and exhausting treatment; and is usually attended by loss of flesh, increased sensibility and irritability, a feeble quick pulse, transient and irregular flushings, quick breathing, sometimes sighing or moaning, a white loaded tongue, scanty urine, and a mucous diarrhœa, — the evacuations being flatulent, unnatural, greenish, or gelatinous. Sometimes there is increased heat of the head towards night, but seldom any pain or screaming. In addition to evidence of pre-existing or attendant irritation of the digestive mucous surface, the bronchial lining, also, often indicates irritation by a dry hacking cough. This first, or *irritative stage* of the complaint is followed by one of more marked exhaustion, with stupor or torpor, particularly if the causes continue in operation. The pupils become dilated; the eyes vacant, and sunk in their sockets; the eyelids half shut; the countenance pale and cool; and the extremities, especially the lower, cold. If the complaint occurs during dentition, sometimes squinting, with partial convulsions, or with crowing or croupy inspirations; slow, irregular, or suspirious breathing; clenching of the hands, or spasms of the fingers and toes; are observed. The feet and legs are always cold, and with difficulty kept warm, especially if the head be hot. The fontanelle is sometimes depressed, or nearly natural. The pulse seldom or never loses its frequency. This torpid stage may terminate fatally with increased coma, a rattling respiration

ing and disappearance of the pulse, and profound exhaustion. Convulsions occasionally occur, but at no particular period of the complaint. A favourable issue frequently follows an appropriate treatment. In some of the cases which have ended fatally, I have found, on *dissection*, more or less fluid in the ventricles. The membranes were even less vascular than commonly observed in young subjects. In these cases, death is more to be imputed to disease in other viscera, and the attendant exhaustion, than to any change within the head.

250. (*f*) When acute hydrocephalus is consecutive of scarlatina, measles, small-pox, &c., it becomes important to detect it as early as possible. These diseases may terminate fatally, in their latter stages, copious effusion having taken place in the ventricles, and between the membranes of the brain; or the symptoms of this malady may not commence until a few days or even weeks after they have disappeared, more particularly after scarlatina. Severe and frequently recurring pain in the head at this period should always receive attention; and when this is attended with other symptoms of the first and second stages, decided measures should be adopted. When it follows scarlet fever, the occurrence of headach, stupor, or convulsions, either with or consequent on anasarca, may be viewed as evidence of approaching or commencing effusion in the head, which may be averted by antiphlogistic and other appropriate remedies.

251. PROGNOSIS.—This disease is not now so fatal as it was viewed by the first writers on it. If recognised early, a large proportion of cases will recover; even in the most advanced periods, the patient should not be despaired of. I have repeatedly seen recoveries take place, although strabismus, paralysis, convulsions, blindness, unconscious evacuations, and other unfavourable symptoms, had existed some time. Data furnished by the writings of ODIER, CHEYNE, MILLS, BRICHETEAU, GOELIS, and others, show that from a sixth to a third of the cases has recovered. But a perusal of the cases they have adduced, has convinced me, that some of those which recovered, as well as of those that died, belonged to acute or sub-acute encephalitis — little or no effusion having taken place — several of them presenting, on dissection, this as the least important change; the fluid sometimes amounting only to two or three drachms, — a quantity not nearly sufficient to warrant the designation given to the disease.

252. Although the prognosis should always be given with much caution, and be generally unfavourable; yet in few circumstances, indeed, ought the anticipation of such a result to paralyse our treatment. Dr. CHEYNE justly observes that, whilst the pulse continues steady, and the breathing natural, the most alarming symptoms should not prevent the use of active remedies. I would even go beyond this, and say, that the supervention of hurried breathing is the only symptom that should lead us to despair of the case. We should be cautious not to be misled by the falling in the frequency of the pulse in the second stage; and not to be induced to give a favourable prognosis from this circumstance. The coming down of the pulse should, therefore, be viewed in connection with the state of the eyes, and of the evacuations, and with the other symptoms, before any opinion should be formed from it. More copious and more readily procured bilious stools, and their more feculent appearance and natural smell, an increased flow of urine, mucous or watery discharges from the nose, and an abundant warm perspiration, are favourable signs. The occurrence of the disease in comparatively sound constitutions, in an inflammatory form, or after scarlatina, admits of greater hopes of recovery. This opinion is accordant with that of GOELIS and ABERCROMBIE, although it is different from that expressed by Dr. CHEYNE. The idea of effusion in the head being necessarily fatal, has operated unfavourably in the treatment of the disease. I believe, from extensive and attentive observation, that, notwithstanding the uncertainty of the existence of this change, it may be removed, when the powers of the constitution are not sunk too low.

253. When hydrocephalus follows protracted ill health, in scrofulous constitutions, in families where others have died of it, after remitting states of fever, during protracted convalescence, or when it steals on so as not to be recognised until it is far advanced, an unfavourable opinion of the result may be entertained. The breaking out of a vesicular eruption about the lips and face; total insensibility of the retina; great rapidity, smallness, and feebleness of pulse; dryness of the mouth, lips, and nostrils; boring of the finger in the ears; hurried respiration, and partial sweats, particularly on the neck and back of the head; indicate approaching dissolution. Even when the treatment is followed by very striking amendment, we have no certainty of the recovery of the patient; for most of the unfavourable symptoms have been removed; but, in one or two days, they have recurred, and death ensued. Even when an improvement has become more permanent, we cannot be sure of the result, until the actions of the iris return, and the alvine excretions, and other functions, become natural, — until then, a cautious opinion of the issue should be given.

254. CAUSES.—(*a*) The *predisposing causes*.— GOELIS and several others suppose that the disease is more common now than formerly, owing to the less frequency of eruptions on the heads of children. He also believes, and refers to facts in support of the opinion, that terror and anxiety in the mother during the last months of pregnancy predispose to it, — the disease often appearing in the child soon after birth. The *epochs of infancy and childhood* are, however, the most remarkable predisposing causes. At these periods, the rapid developement of the encephalon, and the great susceptibility of the nervous system, dispose the cerebral circulation to frequent excitement; and in proportion as the cerebro-spinal system acquires a predominancy in capacity and function over other parts, is the predisposition to vascular determination, to inflammatory action, to increased exhalation of serum, and other disorders of the cerebral vessels, augmented. The more frequent occurrence of the disease, often in an inflammatory form, in children with precocious intellects and large heads, is a common observation, and is confirmed by the experience of GARDIEN, HOPFENGÄRTNER, GUERSENT, and others. The more usual period of attack is from the first to the eighth year; its frequency dimin-

ishing as we depart from this epoch, down to the period of birth on the one hand, and up to puberty and manhood on the other. I believe, that, previous to the tenth year, the disease is most frequent in boys. Dr. CHEYNE thinks, with LUDWIG, that, after ten, girls are more subject to it. A *scrofulous diathesis* is also one of the most remarkable predisposing causes,—sometimes several children being carried off in a family where it exists. CHEYNE, SPRENGEL, and others, consider that hydrocephalus and scrofula are convertible into each other. That the former sometimes follows the disappearance of other scrofulous affection, admits not of doubt; but it rarely happens that the latter is influential in the removal of the former; indeed, effusion on the brain much more frequently proceeds simultaneously with tubercular and other strumous diseases in other parts of the body.

255. *Hereditary disposition* has also been viewed as a cause by QUIN, ODIER, FORMEY, P. FRANK, PORTENSCHLAG, BAADER, GOELIS, &c.; some, however, with CHEYNE, imputing such disposition to the scrofulous diathesis. But I have repeatedly remarked the hereditary tendency, without its dependence on scrofula. GOELIS, BRACHET, COINDET, and GIRTANNER ascribe this disposition to a peculiar connate irritability of the nervous system; this, however, does not advance the question much further. The children of parents addicted to drunkenness, particularly if the mother be given to the use of spirituous liquors during suckling, are also, according to my experience, prone to be attacked. In addition to these, may be enumerated a syphilitic taint of the parents (THOM); frequent congestions in the head, however induced; the use of too stimulating food and drink in early age; keeping the head too warm; the premature and excessive exercise of the senses and of the intellects; violent mental emotions, as terror, anxiety, anger, fear; the exhibition of anodynes to the child by nurses, or in the treatment of other diseases; repeated falls; injuries during parturition (STOLL, ARANTIUS, GOELIS); rocking in cradles (BLANCARD, *Anat. Prat.* c.i. obs. 18.); the early and repeated application of cold to the head or other parts (PERCIVAL); concussions of the body; too frequent motion and depending positions of the head; whirling round on the toes; the injudicious use of emetics; the continued irritation of worms in the prima via, and of dentition during both the second and first periods; congestions, inflammations, and enlargements of the liver and and spleen; previous attacks of encephalitis, or of cerebral congestion; interruptions to the secretion and discharge of the bile; disorders of the stomach and bowels; enlargement and obstruction of the mesenteric glands; long continued costiveness; remittent and exanthematous fevers; pertussis; previous diseases imperfectly cured; and affections much disordering the respiratory functions. Dr. THOMPSON, of Jamaica, observed it frequently consequent on worms in the dark races.

256. (*b*) The *exciting causes* are, cold to the head of young infants; external injuries from falls, blows, &c.; concussions or agitations of the brain, from jumping, whirling, or depending positions of the head; the suppression of eruptions on the scalp, and behind the ears (CONRADI, GOELIS, &c.); the extension of inflammation from the ear (ITARD, LALLEMAND, &c.); the retrocession of acute eruptions, and suppression of chronic evacuations or discharges; the extension of irritation to the membranes or brain, from inflammations of the organs of sense, from the throat, scalp, face, &c., and from erysipelas of those parts; too copious general depletions in the exanthemata and acute diseases, in relation to the form of the malady and strength of the patient; the too liberal use of narcotics in young children, or their employment too early in several diseases, particularly in hooping cough, spasmodic croup, spasm of the larynx, and flatulent colic; whirling, tossing, or rudely rocking children in order to quiet them, when crying from disorders of the digestive organs, or erethysm or irritation of the encephalon; insolation; the early use of fermented liquors; carrying heavy loads on the head (J. JOHNSON); allowing children to sit on stones or other cold seats; and the metastasis of various maladies. RUSH, LETTSOM, GOELIS, and COINDET mention its occurrence from metastasis of rheumatism. I have seen this take place in a grown-up person,—the effusion being chiefly between the membranes,—but not in children; although I have met with metastasis to the heart in many cases of children — in one case now under treatment, which is the second in the same family. (See also BRAIN, §§ 182, 183.)

257. PATHOLOGICAL OPINIONS.—Acute hydrocephalus has been generally classed as a dropsical disease, although its claims to be thus arranged are somewhat equivocal. Its similarity, however, to other acute dropsies, particularly those of the chest, is most striking. Indeed, it seems to hold such a relation to inflammation on the one hand, and to chronic dropsy on the other, as to entitle it to be viewed as an intermediate disease, and as identical in most cases with other acute dropsies; in some instances approximating more nearly to the one than to the other. WHYTT considered it as altogether a dropsical malady; and Dr. CULLEN, in designating it apoplexia hydrocephalica, did not seem to entertain a very different opinion. PINEL fell into the same views, after having described it as a species of cerebral fever; which was the idea conceived of it by Dr. MACBRIDE. Contemporary with, and subsequent to, the appearance of Dr. QUIN's work, numerous authors, particularly RUSH, RAND, WITHERING, WHITE, ACKERMANN, GARNETT, MARTINI, HEINECKEN, GARDIEN, GOELIS, and RAIMANN, treated it as inflammatory in its origin; and a number of French pathologists, especially MARTINET and PARENT-DUCHÂTELET, have viewed it as arachnitis of the ventricles and base of the brain. Others, again, have supposed, with LALLEMAND and ABERCROMBIE, from the frequency of disorganisation of the cerebral structure in the vicinity of the ventricles, that it is a consequence of inflammatory softening or cerebritis; the disease either commencing in, or extending to, the arachnoid of the ventricles. ROSTAN (*Clin. Méd.* t. ii. p. 321.) has stated it to be a result of inflammation or other lesions of the brain and membranes, and seldom or never an essential disease. This is doubtless the case, if we consider all sensible lesions as sequences of anterior changes; but when the nature of the early changes cannot be readily inferred from the alterations they induce, we must be contented

to grapple with the obvious malady, until we know more of its antecedent pathological states. If we adopt the views of M. Rostan, no changes, excepting those immediately consequent upon remote causes, will be considered essential.

258. Several writers, observing the history and lesions of hydrocephalus to differ in several respects from inflammation, yet still to resemble it very closely, have viewed it as a peculiar form of inflammatory action affecting the more interior surfaces and substance of the brain. Thus, Conradi termed it *Encephalitis exudatoria infantilis*; Brachet, *Hydrocéphalite*, or watery inflammation of the brain; and Coindet, *Céphalite interne hydrencéphalite*. Other writers, particularly Abernethy, Curry, Cheyne, Yeats, Thomson, &c., have considered it as most commonly proceeding from disease in the digestive organs, and seldom arising from primary inflammatory action in the brain or its membranes. This opinion has been carried too far; for I have often had evidence to convince me, that morbid action had been proceeding in the brain long before it was suspected, and that one of its chief effects was to disorder the liver and digestive canal; this sympathetic disorder being frequently considered as primary, and its reaction on the brain as the sympathetic production of hydrocephalus. I believe that the malady often originates in the substance of the brain; and that, conformably with what is observed in respect of lesions of this structure, the digestive viscera, frequently at one time the most remarkably deranged, are merely sympathetically affected. Formey and Dr. Shearman have viewed the effusion as a consequence of simple excitement of the cerebral circulation, entirely independent of inflammation. The latter writer has considered it to be contingent on various diseases, and to arise from a diversity of causes; but that its occurrence is chiefly owing to the predisposition or previous state of the membranes, — the essential character of the disease consisting in that previous state or predisposition which, in connection with an excited state of the circulation, gives rise to increased exhalation or effusion. Dr. C. Smyth has argued against inflammation, and in favour of debility, as the cause of the effusion; but whilst he has strenuously contended for the latter pathological condition as respects the tone of the extreme vessels, he has admitted the existence of accelerated circulation, and its influence in producing the disease. There is one inference, however, in which nearly all modern pathologists agree, viz., that the effusion itself does not constitute the malady, but is only its consequence, — contributing to the production of the more advanced symptoms, but in a less degree than many suppose.

259. *Pathological Inferences.* — (*a*) The *first* or *nervous form* of acute hydrocephalus is frequently consequent upon changes in the substance of the brain, in the membranes lining the ventricles, and in the vessels and circulation of the encephalon, probably arising from the state of the organic nervous influence supplied to this quarter, and to the perversion of the vital actions. (See Disease, § 87—92.) — (*b*) That these changes often commence gradually, or almost imperceptibly, and proceed far before they disorder the functions, either of organic or of animal life, in a remarkable degree; and when such disorder becomes manifest, it is often difficult to trace the quarter in which it has originated, owing to the intimate dependence of both classes of functions upon the organic nervous system. — (*c*) That the changes observed on dissection in this variety have evidently been in progress a considerable time before effusion has taken place; the effusion being the consequence of these changes, assisted by the physical condition of the encephalon. — (*d*) That nervous, as well as inflammatory and consecutive, hydrocephalus being merely contingent upon lesions of the organic nervous influence, of the circulation, and of the substance and membranes of the brain, such lesions actually constitute the disease during its early periods. — (*e*) That the nature of the cerebral affection, and the exact state of vascular action, in these periods, are not manifest: but if it be at all inflammatory — which admits of dispute — the vascular action possesses more of an asthenic or ataxic, than of a sthenic, character; or is attended by a perverted, rather than by a dynamic, state of vital power; and by imperfect performance of the digestive and assimilating functions. — (*f*) That, although the *first form* of the disease be consecutive of changes in the circulation, or in the organic nervous influence of the brain, the resulting phenomena may be such as to be mistaken for the exciting causes; the organs of locomotion may be so enfeebled as to occasion falls, which will aggravate the primary affection, and develope a state of sub-inflammation, or of vascular reaction in the encephalon, and its usual consequences, viz. determination of blood, injection of vessels, and effusion of serous fluid; or the viscera of digestion and sanguifaction may become so congested, or otherwise disordered, as to appear the parts primarily affected. — (*g*) That when this form is coincident with, or consecutive of, congestion, inflammation, or other disorders of the digestive and chylopoietic viscera, effusion into the ventricles cannot be viewed as the earliest changes that take place within the head; but that this effusion is merely consequent upon similar changes to those which have been already alluded to (*d*, *e*); the lesions in the digestive organs, as well as the earlier alterations in the brain, being, very probably, coetaneous results of pre-existing disorder of the system, or of constitutional vice. — (*h*) In whatever quarter disorder commences, it is probable that, sometimes at least, the sensorial power becomes exhausted, possibly coetaneously with the supervention of the second stage, and the cerebral tissue itself more or less wasted; but it is difficult to say whether this wasting be the consequence, or the cause, of the effusion into the ventricles, — possibly the latter. — (*i*) That, in the early stage of the disease, as well as in its progress, the vascular excitement, or febrile disturbance, attending it, is characterised by general adynamia or perversion of vital power. — (*k*) That great cerebral excitement does not necessarily imply the existence of inflammatory action in the encephalon; for accelerated circulation in a weakened state of the frame, and susceptible condition of the sensorium and nervous system generally, will produce cerebral excitement, particularly towards the close of febrile or protracted diseases; but this, instead of being inflammation, is a state very different from, or sometimes even opposed to, it, as shown by the *lædentia* and *juvantia*, and by

the *post mortem* appearances.—(*l*) In the *second form*, and in many of the *third*, particularly as occurring after the exanthemata, the symptoms, as well as the appearances after death, are more manifestly inflammatory; cases varying in grade from such as are described in the article Brain (§ 174.), until the characters of the nervous form of the disease are nearly approached; the inflammation differing in kind accordingly from sthenic inflammation, owing to the diathesis and the state of vital power.—(*m*) That the *waterstroke* or *hyper-acute* disease, in every case in which I have observed it, has arisen independently of inflammation, although generally consequently upon determination to, or congestion in, the head.—(*n*) That hydrocephalus, particularly its nervous form, may assume intermediate states or grades between the acute and chronic, which grades may be denominated *sub-acute*.—(*o*) That the disease may, in some instances, commence in an acute or sub-acute form, and become *chronic*, especially in infants whose cranial sutures have not closed.—(*p*) In some cases, also, the acute or sub-acute may supervene on the chronic state.—(*q*) That acute dropsy in the ventricles, although most common previously to puberty, may occur at any subsequent period, especially during the decline of life, and in old age.—(*r*) That it is, in such circumstances, generally attended by inflammatory appearances in, or softening adjoining, the surface of the ventricles; but it sometimes is unattended by any of these lesions.—(*s*) That in these cases it often terminates fatally in a short time, with apoplectic or comatose symptoms; constituting the *Serous Apoplexy* of authors, which is sometimes consequent upon other forms of dropsy in persons advanced in life; they being cut off by the effusion into the ventricles, without any other material change within the head,—the coma, or apoplexy, gradually becoming more and more complete until life is extinguished.*

260. Treatment.—*Lit. Hist. of*.—The opinion of Dr. Whytt, as to the nature of acute hydrocephalus, and which was for a time very generally adopted, led to an inefficient treatment. Dr. Watson, who adduced one of the first successful cases, trusted chiefly to blisters, purgatives, means to lower the attendant fever, and to the powers of the constitution for a cure. Drs. Haygarth and Dobson were the first to prescribe mercury in the disease, particularly calomel,—a medicine which had been very largely employed about a century before, but had fallen into disuse; and which, having proved extremely efficacious in many of the maladies incidental to Europeans in the East Indies, was then finding its way, through means chiefly of Dr. Lysons, Dr. Hamilton, and Dr. Clarke, into the practice of this country. Dr. Dobson exhibited mercury with the intention of thereby increasing the function of absorption; and Dr. Haygarth, in order to induce salivation, with the expectation that, by procuring an aqueous evacuation from the neighbourhood, it might be the means of removing the fluid accumulated in the ventricles. Drs. A. Dawson, Simmons, and White placed their chief reliance on blisters and opium,—means which, in the present state of our knowledge, amount merely to useful adjuvants. The views of Drs. Quin, Withering, and Rush caused a revolution in the treatment of acute hydrocephalus. Dr. Quin, observing in dissection, evidences of inflammatory action in the membranes of the brain, advised bloodletting, and cold applications to the head, in the first stage, and mercury afterwards; Dr. Withering used digitalis, but his cases were not sufficiently demonstrative of its efficacy; and Dr. Rush placed confidence chiefly in large bloodlettings and active purgation.

261. Dr. Percival was amongst the first who appears to have been aware of the fact, that, however nearly acute hydrocephalus may approach true inflammation, it is no more identical with it, than the adhesive form of inflammation is the same as the diffused, or as erysipelas. He directed the means which had been previously recommended, according to the circumstances of the case; and combined the use of blisters, mercurials, and opiates, with that of squills, musk, and other diuretic and nervine medicines. Consistently with these views, he was cautious in the employment of bloodletting. Dr. Paterson prescribed calomel and opium, and a more antiphlogistic treatment than was risked by Dr. Percival; but Dr. Garnett, although he believed in the inflammatory nature of the complaint, hardly ventured beyond local depletions; and confided more in digitalis conjoined with mercurials, than in other internal remedies.

262. It is impossible for the experienced reader to have perused the writings on the disease, as far as I have now proceeded, without being forcibly struck with the circumstance, that great misapprehension prevailed as to the succession and *ensemble* of morbid phenomena, on which the name acute hydrocephalus has been imposed. This is shown by many of the cases adduced by authors in support of the inflammartoy nature of the disease; these cases exhibiting the usual results of inflammation only: whilst those who observed the fluid collection unattended by very remarkable inflammatory appearances, limited their idea of this malady to such as these only, and considered them as distinct from those evincing changes strictly referrible to inflammation, without any, or with but little effusion; which latter cases they viewed as constituting true inflammation of the brain and its membranes, and not falling within their definition of hydrocephalus, however nearly the symptoms of the one resembled (in consequence of the physical condition of the brain) those of the other. The fact is, that the larger number of writers down to the present day applied the term acute hydrocephalus to a certain succession of phenomena, without regard to the different pathological states giving rise to it, and the shades of diversity by which each may be recognised; and were either unaware of, or unheeded, the circumstance, that an inflammatory state of the brain and its membranes in young subjects may terminate without effusion, or may give rise to effusion to an extent warranting the denomination of hydrocephalus; and that, moreover, w

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* Since the above was sent to press, the fifth volume of M. Andral's "*Clinique Médicale*" has appeared. It contains a few cases of idiopathic and acute effusion of fluid into the ventricles, occurring in adults, both without and with slight inflammatory changes or softenings of the surfaces of these cavities, or parts adjoining. The symptoms, in these cases, were those of *waterstroke*, or of *serous apoplexy*. Two cases occurred in persons who were labouring under dropsy of other cavities.

be collected within the cranium, without any truly or sthenically inflammatory action of the vessels; and, nevertheless, the most experienced observers often will hardly be able to distinguish, by means of the symptoms, between these classes of cases.

263. The *intentions* with which the treatment of acute hydrocephalus should be conducted, are resolvable into the following: — 1st. To remove all causes of irritation or morbid action operating either directly or sympathetically on the brain. — 2d. To lower vascular excitement in the head, and equalise the circulation. — 3d. To guard against effusion, by fulfilling the above objects, by diverting the morbid determination of fluids from the head, and by changing the action of the extreme vessels. — 4th. To restore discharges and eruptions, when these have been suppressed. — 5th. To alleviate pain and sickness. —And, 6th. To support the powers of life, and to recruit them when they are sinking. It is obvious that the means which will accomplish one of these intentions, will often also fulfil one or more of the others.

264. The physician, having considered the origin, pathological states, the constitutional relations, the form, history, and stage of the disease, as well as the means which may have been already employed, should cause the patient to be placed in a well-aired chamber, and to be screened from strong light. The bed or couch should approach a slightly inclined plane, from which he ought to be slowly raised, and on which gently placed, when removal is necessary. All quick motions or changes of position, as well as excitement of the senses, and irritation of the temper, must be carefully avoided. The temperature should be rather cool than warm, and the bedclothes only sufficient to preserve the natural heat. With these preliminaries, the remedies determined upon should be promptly and faithfully administered. During both the first and second epochs of dentition, the patient's *gums* and *teeth* ought to be carefully examined, and the former freely incised, or the latter removed, as often as may be requisite.

265. *A. Vascular Depletion.* — In estimating the reported success of treatment in this disease, it is very necessary to keep in recollection that often no distinction has been made between it and encephalitis: indeed, many modern writers consider inflammation of the brain and its membranes, occurring in children, to be identical with acute hydrocephalus, — or, in other words, that this latter is the same as the phrenitis of adults. Now this sophism, so general and injurious in medicine — this affirming as true of the genus, what is true merely of the species — has had a most baneful influence on the treatment of this disease, inasmuch as it has led practitioners greatly to over-estimate the advantages of sanguineous depletions; a large proportion of their cases of imputed acute hydrocephalus being acute and sthenic meningitis or encephalitis, in which this evacuation may be carried much further than in the former malady; and has induced them to recommend, and others to employ, the practice with too little reservation. This circumstance is especially manifest upon perusal of the histories and treatment delineated by RUSH, MAXWELL, and several others, who have carried bloodletting as far as it is admissible in sthenic inflammation of the membranes. Having perused these authorities, after the experience derived from the treatment of very many hundred cases of cerebral diseases in children, I am convinced that the larger proportion of those which they considered hydrocephalus, was neither that malady, nor would have given rise to effusion in such quantity as to have justified the designation: the details they have furnished are decisive of the fact in the mind of the competent judge. Therefore, let not the inexperienced practitioner be led astray by the circumstance of its having been recorded by authors, that arteriotomy, large bloodlettings, &c., cured half the cases in their practice; I am convinced that the majority of such cases were simple encephalitis, or inflammation of the membranes of the base of the encephalon. Dr. MAXWELL avers that he cured sixty cases out of ninety — two thirds — by bleeding them in the horizontal posture until insensibility — occasionally for some hours — afterwards ensued. Would the most heroic practitioner of the present day attempt such practice in an undoubted case of acute hydrocephalus? I believe not.

266. (*a*) In the more *inflammatory states* of the disease, and especially in the *first stage* (§ 234.), the same means, as are fully described in the treatment of inflammations of the BRAIN and its membranes (§ 191. *et seq.*), should be employed; and to an extent which the pulse, the febrile excitement, and previous health and strength of the patient, will point out. These means consist of general or local bleeding, active purging, the application of cold to the head, derivatives and counter-irritants, mercury, sedatives, and diuretics, &c. In the inflammatory form, as it occurs either primarily or consecutively, these remedies may be prescribed very nearly in the manner explained in the article referred to. When the disease supervenes suddenly on any of the exanthemata, as decided depletory measures, as are advised for encephalitis thus occurring, must be pursued. (See BRAIN, § 191.) In children under three or four years of age, leeches, or cupping behind the ears, on the occiput, or on the nape of the neck, will be preferable to venæsection; but, after this age, the latter method may be practised in the first stage of the disease. I have observed no greater advantages obtained by bleeding from the jugular, than by bleeding from the arm. Many Continental physicians consider depletion more derivative when it is practised in the feet, and numerous facts favour the inference. In the *second stage*, local depletions, if they have not been already employed, or carried sufficiently far, and if circumstances indicating the propriety of the practice exist, may still be resorted to; but with strict reference to the pulsation of the carotids, the pain and temperature of the head, to the warmth of the extremities, and to the state of vital power. I have often derived advantage from repeated local bleedings even in this stage, aided by the other remedies enumerated, when employed in the manner about to be described.

267. (*b*) In the *first form*, as well as in such of the *third* as partake chiefly of the same character, *vascular depletion* must be employed with greater caution, and as early as possible in the *first stage*. I have seen hardly any benefit from it when the *second period* of this variety had com-

menced. When the disease has been detected sufficiently early, and when it has followed previous attacks of congestion or inflammatory action in the head, the febrile excitement being neither general, continued, nor well marked, the application of blisters behind the ears, and of leeches around, or close to, the blisters, has been of much service. But it will be requisite to repeat this practice every second or third day, or oftener, and to carry it as far as the circumstances of the case may warrant. If the cerebral affection appear to have been induced by disease of the digestive and chylopoietic viscera, a blister should be placed on the epigastrium or right hypochondrium, and leeches applied around it, as soon as redness is caused by it; when it ought to be removed. This method may be repeated, according to circumstances, after intervals of one, two, or three days: it possesses great advantages in this state of the disease, inasmuch as, whilst it relieves the gastric symptoms and the affection of the liver, it is a most energetic derivative from the head, without reducing vital power so far as general depletion does; for general bleeding, however early employed in this variety, is seldom productive of much benefit. Indeed, I have seen it detrimental in many instances; and I consider both it, and local depletion, if carried to any considerable extent, as decidedly injurious in some states of this form, particularly in weak and cachectic children.

268. *B. Cathartics.*—The discharge of morbid secretions and fæcal collections should be procured as early as possible by remedies calculated, at the same time, to derive from the brain, and to diminish vascular plethora and excitement. The fulfilment of this intention is appropriate to all the states of the disease. A large dose of calomel, either alone or with James's powder, ought to be immediately exhibited, and, after three hours, repeated with the addition of toasted jalap, or scammony; and its operation should be promoted by an active terebinthinate enema. If the irritability of stomach be such as to prevent the retention of medicine taken by the mouth, vascular depletion, a blister or mustard catalasm on the epigastrium, and an active cathartic enema, will often remove it. Calomel, in full doses, will generally be retained, under any circumstances; but, in conjunction with cathartics, it is frequently ejected, unless after the measures now stated. *Elaterium*, in small and repeated doses, has been suggested by Dr. ELLIOTSON; but it, as well as *croton oil*, will seldom be kept on the stomach. When retained, they are occasionally of use. I have seen most advantage derived from the latter, when it has been added to the terebinthinate enema, or applied over the abdomen as a rubefacient. Dr. CHEYNE found a drachm or two of magnesia saturated with lemon juice, given every two or three hours, most useful in such circumstances; and I believe that this will act more certainly than irritating purgatives, particularly if a full dose of calomel have been taken a few hours previously. A gruel or broth enema containing some purgative salt may also be administered two or three times in the course of the day; and if the bowels be very torpid, and the sopor considerable, the terebinthinate enema should be repeated daily, or even oftener. Saline purgatives may also be given in the infusion of senna, when they can be retained. Active catharsis at the commencement of the disease, after vascular depletion has been instituted to an extent which the nature of the case demands, will have a more decided effect than any other means whatever.

269. *C. Cold applications* to the head, the hair having been removed from it, should be employed in the manner, and with the precautions, directed in the article BRAIN, § 192., whenever the temperature of the head will admit of them. But, like the measures already advised, it is only early in the disease, and in the inflammatory states more especially, that they are productive of much benefit. In these states they may be used simultaneously with the tepid semicupium or pediluvia, salt and mustard having been added to the water. RUSH, QUIN, CONRADI, FORMEY, GOELIS, and nearly all the writers on the disease, are favourable to cold applications in its treatment; and, in some form or other, they are appropriate to most of its states.

270. *D. Mercurials.*—These are, perhaps, the next important means that can be employed. They have been very generally prescribed since they were first adopted by DOBSON and HAYGARTH, and subsequently by EASON, MACKIE, REEVE, LETTSOM, HOOPER, HOPPENGÄRTNER, FERRIAR, and more recent writers. Early in the *first stage* of the disease, *calomel*, given every three or four hours, in full doses, either alone or with James's powder, in small quantities, is, in ordinary circumstances, the best preparation. In children under one or two years, neither salivation, nor much intestinal disorder, will be produced by it. In those above three or four years, its specific action may be obtained, but with little certainty, even although it be conjoined with opium or the compound ipecacuanha powder. When no essential benefit has accrued from the foregoing means, and the bowels have been fully purged as directed above (§ 268.), then calomel may be given with digitalis and narcotics, or with the latter only, particularly opium or hyoscyamus, with the view of fulfilling the *third* and *fifth* intentions of cure (§ 263.). But in young children, especially when the bowels are griped or are irritable, the *hydrarg. cum creta*, with small doses of compound ipecacuanha powder (F. 653.), will be most serviceable. The bowels, however, should always be kept sufficiently free by either of the enemata recommended (§ 268.). I may add, that calomel has been prescribed with cantharides, by DOBSON; with James's powder, by CAMPBELL; with opium, by LEIB and others; with digitalis, after local depletions, by WEAVER, GOELIS, and FISCHER; with digitalis and arnica, by J. P. FRANK; and with active purgatives (in which form I believe that it is most generally beneficial), by HUFELAND, CHEYNE, ABERCROMBIE, and many others. Dr. MERRIMAN and myself have given very small doses of the *oxymuriate* of mercury, every four or five hours, with advantage. In the *second stage*, this is one of the best preparations that can be prescribed; but it requires much caution; and, in this period of the *first* and *third forms* of the disease, it should be prescribed in tonic and diuretic infusions. The utmost care should be taken in exhibiting mercurials in these forms, particularly in cachectic subjects, and where the powers of life are much

reduced. The state of the gums, mouth, and tongue, should be always carefully observed during their use; for I have seen fatal sloughing of these parts follow from them in such cases. The external employment of mercurials has also been recommended by CAMPBELL and others. The *ointment* may be rubbed into the scalp, or between the shoulders, in the more urgent cases; but I have seldom seen advantage derived from this method. Mercurial ointment may also be employed in dressing blistered surfaces; or the *liniment* may be applied to them on warm bread and water poultices. This plan has sometimes been productive of benefit, particularly in children of two or three years of age or upwards.

271. *E. Derivatives and Counter-irritants* are often serviceable, especially in the *second stage*. They are also admissible in the *first stage* of the *first* and *third forms*, when there is little febrile heat, or when the lower extremities are cold or cool. *Blisters* have been very generally preferred by MONDSCHIEN, RUSH, ODIER, PERCIVAL, CHEYNE, HOPFENGÄRTNER, GOELIS, &c. Much difference of opinion, however, exists as to the places to which they should be applied. They may be placed between the shoulders, on the thighs or legs, on the epigastrium, and on the neck and occiput, and behind the ears, in the earlier stages of the disease; and in infants they should be removed as soon as they produce redness. In the *first stage*, they ought to be preceded or accompanied by depletions (§ 266, 267.); and in older children they may be kept discharging for several days, or be repeated. Some writers, and especially PORTENSCHLAG, WHITE, HOPFENGÄRTNER, SIMMONDS, GARDIEN, and ELLIOTSON, have advised them to be placed upon the head or occiput; but I have never seen benefit derived from them in the former of these situations, unless in cases where the disease has followed the suppression of tinea capitis, or in the *second* or *third stages*, when the sopor has been great; and then the blister may be large, and the part over the occiput kept discharging for some time subsequently. In infants, *sinapisms* to the epigastrium, or lower extremities, are often preferable to blisters in these situations. The tepid or *warm semicupium* and *pediluvia*, salt and mustard having been put into the water, are often of use in the second stage, or in the first, when the extremities are cool; but when there are general febrile excitement, and much heat in the head, they are seldom of service, unless in a tepid state, and in conjunction with cold applications to the head after evacuations have been directed. The *warm bath* is less serviceable than the semicupium, and is as often detrimental as beneficial in the early periods of the more inflammatory states of the disease. The *vapour bath* has been proposed by Dr. A. HUNTER. M. ITARD advises it to be impregnated with vinegar. This practice is admissible chiefly in the second stage. *Setons* and *issues* are too slow in their effects for this disease; and the same may be said of the tartarised antimonial ointment. But I have seen benefit result from producing erubescence by *croton oil*. In the latter stages, *urtication* may be practised. *Moxas* have been applied to the occiput and behind the ears, by M. REGNAULT. Dr. MERRIMAN has had recourse, in several instances, to the *tinctura lyttæ* in doses of from five to ten minims, given every four hours, until severe strangury was caused by it; and in three of these cases the disease was arrested. It may act beneficially, not merely as a derivative, but as an excitant of nervous power.

272. *F. Sedatives and Narcotics.* — (*a*) *Digitalis* has been much employed in this disease since it was first recommended by WITHERING. BROWN, WHITE, CHEYNE, and others, have mentioned it favourably. Any of its preparations may be used. GARDIEN prefers the æthereal tincture, which he directs both internally, and externally in liniments. GOELIS and MERRIMAN prescribe half a grain of the powder with a grain of calomel every four or six hours; and WENDELSTATT, any of its formulæ with opium. KLEBER advises that it should be rubbed in over the scalp, with the *vinum scillæ*. It may be given in both the *first* and *second* stages; — in the former as a sedative of vascular excitement; in the latter, to modify the state of the capillary circulation, and prevent effusion. Much discrimination, however, is necessary in distinguishing the effects of this medicine from the symptoms of the second stage — particularly the vomiting, slowness of the pulse, and dimness of sight. Dr. CHEYNE points out certain differences between them; but they cannot be relied on. The sopor and strabismus, however, of this stage will generally distinguish it from the depression produced by digitalis. When this substance is prescribed in the first stage, it should be given at once in a full dose, and be repeated every four or five hours. In the second stage it may be conjoined with squills, the spiritus ætheris nitrici, or with serpentaria, or the decoction of the flowers of arnica, as advised by several German physicians. *Colchicum* has also been employed in this disease, within the last few years, with the same intentions as digitalis. I am unable to speak of its effects, as I have considered it less appropriate than this and some other remedies. It may, however, be prescribed in the same stages as digitalis. Little benefit can be hoped from it, especially in the second period, unless it act upon the kidneys or bowels.

273. (*b*) *Opium.* — PERCIVAL, ODIER, CRAMPTON, BROOKE, and many of the writers already referred to, recommend this substance in the *second* and *third* stages, particularly when the pain in the head, the convulsions, and irritability of the stomach and bowels, are very prominent symptoms. In the earlier part of the second stage it may be given with *calomel*, James's powder, or antimony. When the bowels are very irritable, without sickness at stomach, it is preferable in the form of DOVER's powder, with hydrarg. cum creta; and, when the general irritability is great, or the convulsions violent or frequent, with full doses of *digitalis*. Later in the disease, I have seen benefit from it in small doses given in the terebinthinate enema directed above, or with serpentaria, or diuretics. *Hyoscyamus* may be employed with the same intentions, and in similar states of combination, as opium; but I doubt its being equally efficacious.

274. *G. Antimonials.* — The tartarised antimony, in large doses, — in from five to twenty grains in the twenty-four hours, — has been advised by the followers of the new Italian doctrine, and employed successfully by M. LAENNEC in a

few instances. Although long in the habit of having recourse to this practice in pulmonary and some other diseases, I have had no experience of it in acute hydrocephalus. Small doses of James's powder with calomel, or with calomel and active cathartics, or with calomel and opium, as prescribed by Dr. CHEYNE, appear the most judicious mode of directing this mineral. I have seen, however, benefit follow moderate doses of the tartarised antimony, either with or without opium, as recommended by Dr. MILLS, in the first stage of the disease, when vascular action and febrile excitement were great.

275. *H. Diuretics, &c.* can be but little confided in; yet I have believed them to have been of much service in the second and third stages of some cases. The most energetic is certainly the spiritus terebinthinæ, in the form of enema, or of liniment rubbed on the scalp. Squills, digitalis, spiritus ætheris nitrici, spiritus juniperi, or hydro-chloric æther, — formerly CLUTTON's febrifuge spirit, — may be used, in these periods, with small doses of opium, or with a weak infusion of serpentaria, or decoction of the flowers of arnica. FLAJANI and KLEBER prefer squills to other diuretics; and I believe that they are not altogether without efficacy.

276. *I. Palliatives and Restoratives.* — The *pain* in the head and *vomiting* are to be relieved by the local depletions, — behind the ears and from the epigastrium, — and blisters in these situations; by the cold affusion on the head; by calomel with opium, and by the terebinthinate enema; or a warm terebinthinate epithem or sinapism placed over the stomach, till redness is produced. *Convulsions*, in the earlier periods, will be abridged by the cold affusion, and most certainly by the enema just recommended. A tobacco enema ought not to be hazarded. The oxide of zinc, or musk with ammonia, or with small doses of opium, may also be employed to relieve this symptom in the latter stages. I believe that practitioners in this country[*] have been too often deterred from the use of restoratives in the advanced periods, particularly of the nervous form, of the disease. I have, in several instances, seen benefit follow the cautious exhibition of them along with diuretics, and enemata with assafœtida. The preparations of ammonia with tincture of squills; or camphor mixture with magnesia, the tincture of valerian, and syrup of roses; or the weak infusions of arnica or of serpentaria, with liquor ammoniæ acetatis, digitalis and syrup of squills; or a weak infusion of green tea, either alone or with digitalis, and spiritus ætheris nitrici; and either of these, with a drop or two of laudanum, in small doses at short intervals, are the medicines I have most frequently had recourse to in the latter stages; allowing the patient beef tea, warm jellies, &c. in addition. In several cases approaching the sub-acute form of the disease, I have prescribed a solution of the hydriodate of potash in distilled water, with or without a little iodine added to the solution, in small but frequent doses, and with evident advantage. In a few cases, the compound infusion of roses, or a weak infusion of cinchona, or of valerian, have been given with some aromatic water, and with squills or spirits of nitric æther.

277. TREATMENT OF THE HYPER-ACUTE HYDROCEPHALUS. — But little can be done in this form of disease, owing to the circumstances under which it usually occurs, and to its severity as well as rapidity. In cases consequent upon exhaustion, the sopor or coma being profound, a blister on the head, the terebinthinate enema, and the treatment advised for the advanced stages of the acute hydrocephalus, are most likely to be useful. When it appears with less evident signs of exhaustion, leeches to the occiput or behind the ears, or cupping between the shoulders; active derivatives; a cold terebinthinate epithem applied around the head, and a blister on the epigastrium, with such internal medicines as the circumstances of the case require, conformably with what has been above stated; seem to be the most active and appropriate measures. The bowels should be energetically acted on, by medicines given by the mouth and exhibited in enemata, whenever the malady has not been consequent upon diarrhœa. When it supervenes during, or soon after, the eruption of any of the exanthemata, particularly scarlet fever, it is more or less inflammatory, and requires very decided treatment. Bleeding from behind the ears, or nape of the neck, should be carried as far as an attentive observation of its effects will indicate, particularly in children that have been well fed; and the rest of the remedies now advised, and especially the active enemata already directed, should be promptly, or even simultaneously, employed.

278. IN THE SUB-ACUTE FORM of hydrocephalus, a similar treatment to that which has been recommended for the acute, should be adopted early in the disease; vascular depletions being then practised, according to the circumstances of the case: and, when it seems disposed to pass into a more chronic state, small doses of iodine, or of any of its preparations, should be given during the day. A few grains of hydrargyrum cum creta, with digitalis, may be also taken at bedtime, and blisters be applied behind the ears, and kept discharging for some time. The bowels ought to be freely opened by the means already advised, especially the terebinthinate enema; and, in the latter stages, the same measures as have been directed for these stages in the more acute states of the malady, should be prescribed. If the disease assume a *chronic* form, the treatment about to be recommended (§ 297.) will then be necessary; but I have seldom seen benefit derived from any mode of treatment in such cases, probably owing to the disorganisation that has taken place in the brain.

279. DIET, ETC.—During the early periods of the disease, cooling diluents only, given frequently and in small quantities at a time, are required; but in the latter stages, particularly when the emaciation and debility are consider

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[*] The following is an abstract, made in my note book many years since, of the practice of the most able German physicians in this disease. In the *nervous or typhoid variety*, cold applications to the head, sinapisms to the arms and legs, and purgative clysters. If these fail, digitalis, with the decoction of flores arnicæ or infusion of serpentaria; blisters from the occiput to between the shoulders to be kept open, the inunction of mercury three or four times a day; and, if the vomiting persist, sinapisms on the epigastrium. Subsequently musk and ammonia, chiefly on account of the convulsions. In *the inflammatory form*, and in *that consequent on the exanthemata*, local bleedings, digitalis, calomel and jalap, and, in the latter stages of these forms, the treatment directed for the nervous or typhoid variety.

able, suitable nourishment is necessary. If the child be still at the breast, the milk of the mother, or of a healthy nurse, in moderation; or asses' milk, beef tea, jellies, and the various farinaceous articles of food suitably prepared, are generally the most appropriate. During *convalescence*, the same kind of nourishment must be adopted for some time, but in more liberal quantities; and animal food should, at first, be cautiously and sparingly employed. Gentle tonics may also be exhibited, as a weak infusion of cinchona, or the compound infusion of roses. German writers prefer a weak infusion of valerian; and my experience leads me to concur with them. Either it, or the infusion of cinchona, may be given with magnesia, which will render it less unpleasant, and gently aperient; and, if the urine be not sufficiently copious, a little tincture of squills, or ammoniated spirit of colchicum, may be added; or the compound infusion of roses may be taken with a neutral salt. In the latter stages of the disease, or during early convalescence, if the secretions and excretions be morbidly increased, suitable nourishment, as well as restorative medicines, should be administered more liberally than in other circumstances; but, in every instance, the influence of the diet and of the remedies, upon the pulse, the temperature of the head, and the general surface, ought to be carefully watched. *Change of air* to a warm and dry situation, or, in summer, to the sea side, will have a very beneficial effect, and should be adopted as early in convalescence as possible.

280. PROPHYLACTIC TREATMENT. — We are frequently consulted, in the cases of children who are drooping in health, or who evince incipient symptoms of cerebral disorder; and even respecting those who have no manifest ailment; but for whom, owing to the circumstance of one or several of the children of the family having had the disease, measures of prevention become absolutely requisite. The best of these are, — 1st, the increasing of the abdominal and cutaneous secretions and excretions — 2d, the establishing an artificial irritation and discharge; — 3d, strict attention to diet and regimen; — and, 4th, change of air. — (*a*) The evacuations should be carefully examined; and, when the bowels are sluggish, or the bile deficient, hydrarg. cum creta, or calomel, with rhubarb or jalap, should be given at bed-time, in gentle doses. James's powder should also be prescribed, whenever the skin becomes dry, either alone, or with small doses of calomel. — (*b*) Issues, moxas, or repeated blisters, may be employed, with the second object. Blistering behind the ear, the discharge being kept up for a considerable time, is very beneficial. Issues, either in the usual way, or by means of the inner bark of the mezereon, or scraped horseradish, will also be very efficacious. Dr. CHEYNE refers to the circumstance of ten children in one family having died of the disease; the eleventh, for whom this means was employed, having been preserved. The nape of the neck, the occiput, or the upper arm, are the most suitable situations for issues. — (*c*) Moderate diet, and that chiefly farinaceous, of a bland quality, and easy of digestion, is extremely requisite. All stimulating aliments or drinks; warm opiates, and too much animal food, are very injurious. Children should also be instructed not to retain any of the excretions, after the first intimations to evacuate them; and their limbs and trunk should be freed from all close cinctures. Premature, or too great, exertion of their intellectual powers, particularly in forward or quick children, should be guarded against; and sufficient exercise in the open air should be imposed on them. — (*d*) In recommending change of air, the nature of the locality should not be overlooked. A dry, warm air is the most appropriate to hydrocephalic cases.

ii. CHRONIC DROPSY IN THE HEAD. — *Chronic Hydrocephalus.*

281. DEFIN. — *Effusion of a limpid fluid in the ventricles, commencing previously to, or soon after birth; frequently with enlargement of the cranium; and generally either unaccompanied by acute symptoms, or supervening gradually, with signs of debility.*

282. Chronic hydrocephalus has been stated above (§ 177.) to occur most frequently before birth, and sometimes to occasion the death of the fœtus. Some females have given birth to a succession of hydrocephalic fœtuses, either dead or alive, at some time during the latter months of utero-gestation. In such cases, the effusion is usually connected with defective developement of the cerebral organs, and with some other malformation or congenital disease. When it comes on after birth, it either commences so insensibly as to escape notice, until far advanced, or it is attended by symptoms of increased excitability of the nervous system: it seldom is consequent upon the acute disease, or upon other maladies. BOEHME and WIGAND believe that an hereditary disposition to be affected by chronic hydrocephalus after birth exists in some children; and ROSENSTEIN, STRUVE, LODER, GOELIS, and BRESCHET consider, that, when not congenital, it usually begins a few days or weeks after birth, and very rarely after some months or years. It may, however, occur in old age. GOELIS mentions a few cases of this kind; but they seldom are of long duration. Instances are not uncommon of considerable collections of fluid having formed in the ventricles of the brain, consecutively either of chronic diseases of the thoracic or abdominal viscera, or of prolonged affections of the brain itself, in persons far advanced in life; but these usually take place a short time only before death.

283. *A*. The CAUSES of chronic hydrocephalus are chiefly those assigned above as productive of congenital dropsies (§ 185.); family and constitutional predisposition, and a scrofulous and rickety diathesis. GOELIS states the circumstance of a mother having had successively six dead-born hydrocephalic children, at the sixth month; and three which became hydrocephalic after birth; and J. P. FRANK mentions another, who had seven children similarly diseased. The frights, passions, and diseases of the mother during gestation, have apparently some effect in producing this disease of the fœtus; and weakness of constitution in either parent is evidently not without a similar influence. M. BRESCHET thinks that the old age of the father is an influential cause; and I believe that both it and drunkenness in the mother may be included in the enumeration. This writer states, that a drunken man of about sixty, married to a young and healthy woman,

had three hydrocephalic children. Independently of diseases of the appendages of the fœtus, something, perhaps, may be imputed to the dress of the mother, particularly if it be such as may embarrass the developement of the uterus; for it has been observed by several pathologists, particularly Goelis and Breschet, that hydrocephalus has occurred more frequently, either previously to, or soon after, birth, in the children of unmarried, than in those of married, females. Injuries experienced by the mother during pregnancy, and by the infant during parturition; improper diet and regimen of the infant; exhausting affections of its digestive organs; difficult, delayed, and disordered dentition, particularly when attended by disease of the prima via, and emaciation; as well as the causes assigned for the acute disease; may all occasion this species of it. Goelis states, that a physician in Vienna, an ardent admirer of the doctrines of Brown, allowed his children wine and other stimulants from their birth; they all rapidly became emaciated, and died with chronic hydrocephalus.

284. *B.* Varieties. — Chronic hydrocephalus is most frequently *idiopathic* or primary; commencing during the latter months of fœtal life, and sometimes after birth; and is occasionally consecutive or *symptomatic* of severe and exhausting diseases of the abdominal or thoracic viscera. It may be accompanied — (*a*) by a diminution of the size of the head, a variety which is always congenital; the fontanelles being frequently closed, and the sutures united, at birth; — (*b*) by a normal size of the head; — and (*c*) by more or less increase of the volume of this part. — *α*. In the *first variety*, the head has a conical form, being depressed laterally and anteriorly. The eyes are in constant motion, insensible to the light, and the pupils dilated. Most of these infants die in convulsions, either soon, or a few weeks after birth, and but very few live a few months, or a year or two. Those who live so long are entirely deprived of sense, and of every intellectual manifestation. Their appetite is generally voracious, but nutrition is very imperfect. Their legs are crossed and drawn up, and the feet distorted. The excretions are all involuntary, and life with them is entirely vegetative.

285. *β*. The *second variety*, or that in which the head is not materially increased in size, is supposed, by Goelis and Breschet, to be the most common; but I think that such is not the case. It may be congenital, or may appear any time subsequently to birth. The writers now referred to believe that it is most frequent during youth and puberty, but that old age is not exempt from it. When chronic hydrocephalus occurs after the closure of the fontanelles, this necessarily is the form it most frequently assumes. Selle has termed it *cephalic dropsy*. The symptoms of this, are the same as those of the next variety.

286. *γ*. The *third variety*, or that with increased volume of the head, according to my own experience, is the most frequent. It is very often congenital, the size of the head even in the fœtus being enormous. More commonly, however, the volume of the cranium is not much augmented at birth, but becomes so very rapidly afterwards. When the patient lives so long, the increase of size is slower after the third or fourth year, and ceases at the age of manhood, at which period the cranial bones are firmly united. When the cranium is very much enlarged, the countenance presents a nearly triangular form, owing to the bones and the lower features of the face retaining their natural size, or being smaller than usual. As the disease proceeds, the sutures are more and more separated — sometimes so far as to admit of fluctuation being felt, as remarked by Tulpius, Dreyssig, Monro, and others. The veins of the neck become enlarged, (Lentin saw them varicose); the carotid arteries pulsate with much force; and the head generally hangs on one side, or on the breast. Owing to the unequal yielding of the cranial parietes, some one part of the head is occasionally more prominent than another. The eyes are generally watery, covered by the eyelids; the pupils dilated, directed upwards, — occasionally downwards, (Feiler, Goelis, Schmidt), — and sometimes horizontally to either commissure of the eyelids. The senses, the intellectual faculties, and the locomotive organs and functions, betray more or less disorder. Sight is first impaired, and all the other senses subsequently fail; the countenance is pallid and without expression; the complexion of the surface is unhealthy; the body emaciated; the gait unsteady; and the power over the muscles ultimately lost.

287. *C.* Symptoms. — (*a*) It is important to ascertain the *symptoms* indicating *the commencement* of the malady, in such cases as occur, or seem to occur, after birth. In many instances, however, these are so slight as to be overlooked both by the nurse and the physician; and the age of the patient generally precludes many of them from being discovered. According to Goelis, the nervous system is unusually excitable, the temper irritable, and the sense of smell perverted. At this period the eye is brilliant (Frank, Michaëlis, Schoeffer), but the sight soon becomes more and more imperfect. Vogel and Monro have noticed pains in the globe of the eyes, that subside as the effusion is increased. The nose is dry, subject to itching, and is frequently picked by the patient. Hearing is, at first, morbidly acute, sudden noises sometimes inducing convulsions; but it soon becomes obtuse, and often altogether lost. Discharges from the ears are rare. The senses of touch and taste remain the longest. Rotation of the head occasions vertigo, or stupefaction; and, if the fontanelles be not closed, pressure on them produces convulsions, which sometimes supervene spontaneously at night. Sleepiness, or stupor; dull pain, or heaviness of the head; grinding of the teeth during sleep, the patient sometimes uttering a piercing or peculiar cry upon being awakened; and defect of memory; are also observed. Thus early in the disease, the appetite is often irregular or voracious; there is sometimes vomiting; the bowels are commonly constipated; and the urine diminished. Articulation is generally slow, nasal, or difficult. During this period, if the patient be old enough, he commonly is able to go about; but he is very feeble, and loses flesh. He walks, however, with great difficulty; totters; places one leg in the way of the other, and turns the toes inwards. Anger, and joy, are expressed with great vehemence; and the mental manifestations are more or less weakened or deficient. Such is the *first period* of chronic hydrocephalus; but it most frequently comes before the physician when the second stage has supervened.

288. (*b*) Schmalz, Feiler, Goelis, and others, consider the copious flow of saliva from the mouth —which is always open—as indicating the *second* stage of the disease. When the patient can speak, he is now at a loss for words, or forgets them as he is about to utter them, and his voice is sad and monotonous. He is no longer able to go about; and is often sick. The bowels continue sluggish, and the urine scanty. The erect and sitting postures are attended by retchings, or vertigo, or pain in the head and stupefaction. The pupils are dilated; sight is more or less completely lost; the eyes roll from side to side; and squinting is sometimes observed. The pulse is small, irregular, and occasionally intermittent. Respiration, which was, in the first stage, scarcely affected, is often somewhat difficult, in some cases suffocative, and attended by a nervous cough. The position is often with the head very low, or drawn backwards; or upon the abdomen, with the face sunk in the pillow (Feiler and Breschet); and automatic movements of the limbs are frequent. Deglutition becomes difficult; but the appetite is still unimpaired, or even increased. All the senses and mental powers are more or less injured, or nearly lost.

289. (*c*) The *third and last period* may be said to commence with the involuntary discharge of the excretions, and abolition of all the senses; the patient lying with the lower limbs paralysed, or drawn up to the abdomen. Towards the close of the malady, the extremities become cold, damp, and often œdematous; the whole body extremely emaciated; and, if the patient has all his teeth, they are frequently worn to the stumps by the constant grinding of them in the early stages. Ultimately, either the symptoms of acute hydrocephalus, sometimes with convulsions, or those of apoplexy or coma, come on, and terminate life. Occasionally the patient is carried off by a paroxysm of convulsive or suffocative cough. The duration of these periods, especially the second and third, is extremely uncertain; and not infrequently very prolonged.

290. (*d*) Such is the usual progress of the disease, especially when it has seemed to have commenced after birth. But in these, as well as in such as have been congenital, modifications or anomalies present themselves. The senses and intellects may be quite unimpaired; or certain senses or faculties, only, may be impaired or lost, although the head is remarkably enlarged. The moral emotions, in such cases, are sometimes affected; the patient being passionate and vindictive; and fits of anger often excite convulsions. The sexual organs are sometimes prematurely developed, and the venereal desires strong even in children of both sexes. Great differences also exist as to the closure of the sutures and fontanelles; which very frequently remain much longer open than natural, especially when their separation has been considerable. Cavallini mentions a case, in which the fluid continued to ooze from between the sutures for some time before death; and Dr. Baron and Mr. Miller have recorded instances wherein it dribbled from the nostrils, the *dura mater* having been ruptured, some days or weeks before dissolution.

291. (*e*) The *size* of the cranium is sometimes enormous, both previously, and subsequently, to birth. It is frequently, in the fœtus, increased to fifteen, seventeen, or twenty inches in circumference. Wrisberg records an instance in which it reached thirty inches and a half. Meckel has in his museum the skeleton of a hydrocephalic fœtus of seven months, the horizontal diameter of whose cranium is sixteen inches, and the vertical diameter—from the occipital hole to the vertex —fifteen, being a circumference of forty-eight inches. And cases in which the head had acquired the volume of seventeen, twenty-five, twenty-nine, thirty, and thirty-one inches, soon after birth, have been recorded by Lechel, Malacarne, Willan, Baron, Büttner, and Miller respectively. It is only, however, the cranial part of the head which is thus distended; the bones of the face generally retain the natural size, or are developed in an inferior degree, especially in those cases which are prolonged to, or which pass the period of, puberty. The only instance in which the contrary was observed, is recorded by Hartell,—the bones of the face having in that case acquired such a size as to resemble those of a giant. The form of the head is often not materially different from that of the fœtus; but, as the collection becomes greatly increased, it commonly extends in the direction of those parts where ossification is the least advanced. In some cases, one side either is more elevated, or is protruded more anteriorly or posteriorly, than the other, or both, the cranium assuming an oblique form in all its aspects.

292. (*f*) The Duration of the disease varies extremely. It has already been stated to terminate fatally in the fœtus at any time during the latter months of pregnancy, or immediately, or shortly, after birth. Whether it commence previously, or subsequently, to birth, its duration may be indefinitely prolonged from some weeks to a number of years. Hartell, Malacarne, Miller, and Goelis adduce instances of hydrocephalic patients having lived seventeen years; Loder mentions one aged twenty-two years; Breschet, another who was twenty-eight; Michaëlis saw a case aged thirty; Buttner, one at thirty-one; Schneider, one at forty-three; Aurivill, another at forty-five; Schomberg, an instance of its having been prolonged to forty-eight years; and Gall, another, where life was prolonged to fifty-four years. A patient died a few years ago, in Guy's Hospital, at the age of thirty-two years: his head was thirty-three inches and a half in circumference; his appetite and digestion were undiminished; and his mental powers not much impaired. Walking induced vertigo; and costiveness, convulsions. Coma came on a few weeks before death, and passed into fatal apoplexy.

293. D. Appearances on Dissection.—The cranial bones are generally found very thin, flexible, sometimes transparent, occasionally wider than usual; and the osseous fibres imperfect and radiated. In very young subjects, the bones are separated from each other by a greater or less interval; which is filled up, in somewhat older cases, by distinct points of ossific deposit, which ultimately constitute the *ossa Wormiana*. In rarer instances, the bones are thicker than natural, as in those recorded by Hartell, Reidlin, Albinus, Mollineux, Sandifort, and Loder. The ossa Wormiana are, at first, scarcely in contact with the margins of the normal bones; but when the case has been protracted, they fully occupy the

space, and ultimately become indented into, or nearly consolidated with, them. Entire obliteration of the sutures is very rare. The *fluid* is generally effused in the ventricles, — always when the disease commences after birth; and but seldom in the general cavity of the arachnoid, excepting in the congenital disease; when the cerebral hemispheres are sometimes either partially or entirely wanting, the base, the *pons Varolii*, &c. only existing. When much fluid is effused into the ventricles, the brain is distended, its convolutions are unfolded, and it is reduced to a sac, thin in proportion to the distension; its structure with difficulty, or not at all, admitting of being distinguished into cineritious and medullary substance. The corpus callosum is much raised, and thinned, and the septum lucidum torn; the lateral ventricles communicating freely with the third, and this with the fourth, the whole forming one cavity. The cineritious substance is of its usual consistence; but the medullary is generally firmer than natural. The brain, however, does not appear to be diminished by interstitial absorption, as its weight is not materially less than the healthy brain at the same age. The arachnoid is occasionally whitish, opaque, and in some places thickened. The choroid plexus often contains small cysts; and the corpora striata, as well as the thalami optici, are small and flattened. The parts near the base of the brain, in some cases, present only slight alterations, varying with the duration of the disease, and the extent of the effusion; and, in other instances, they are so much changed, as hardly to be distinguished the one from the other. The cerebellum is seldom materially altered. The *quantity of fluid* varies from ten or twelve ounces to as many pounds; and cases are recorded of as much as ten or twelve quarts having been found. **Fabricius Hildanus** (cent. i. obs. 10.) found eighteen pounds; and **Bonet** (*Sepulchret*. l. i. sect. xvi. obs. 11.; see also *Ephemer. Nat. Cur.* dec. iii. an. i. obs. 10.) twenty-four pounds. The *analyses* of **Bostock**, **Marcet**, **Barruel**, **Berzelius**, and **John**, agree in showing that this fluid is of the lowest specific gravity, and contains the smallest quantity of albumen, and of saline ingredients, of all the dropsical fluids (§ 11.). Although, in the congenital form of hydrocephalus, the formation of the brain may have been so early arrested, as to occasion the absence of a great part, or of the whole, of it, yet its envelopes — the cranial bones, the dura mater, the arachnoid, and even the pia mater — may exist nevertheless. In some cases, the *falx cerebri* is wanting (**Breschet**), and, according to some authors, the pia mater also; yet it seems to be generally present, but so thin, from the distension of the fluid, as to be detected with difficulty. The arachnoid is more dense, and less transparent, than natural.

294. In the case that occurred, some years ago, at **Guy's** Hospital, upwards of ten pints of fluid were contained in the great sac of the arachnoid, with which the ventricles communicated freely, the corpus callosum being wanting. The brain was lodged at the bottom of the immense cranial cavity; was somewhat flattened; and its convolutions unobliterated and unfolded. In a case recorded by Dr. **Baron**, the dura mater was found ruptured; a tumour of the cranial integuments having taken place over the seat of rupture some time before death. In a case described by Dr. **Duncan** (*Trans. of Med.-Chirurg. Soc. of Edin.* vol. i. p. 205.), the dissection of which was made by Dr. **Gordon**, the circumference of the head was twenty-nine inches and a half, and the fluid was contained in the general sac of the arachnoid, with which the ventricles freely communicated; the corpus callosum and fornix being entirely wanting, as in the case noticed above; the brain thus having a bifid or cleft appearance. A nearly similar instance is recorded by Mr. **Loftie**, in the *Medical Observations and Inquiries* (vol. v. p. 121.). In the one published by Mr. **Miller** (*Trans. of Med. and Chirurg. Soc. of Edin.* vol. ii. p. 245.), the dura mater was ruptured, and water seemed to have been lodged between it and the cranial bones, as well as in the general sac of the arachnoid. But it seems probable, from the appearances observed, that the fluid had been originally in the ventricles, from whence it had escaped by a lacerated opening, caused by their uncommon distension; nearly nine pints of fluid having been found.

295. Chronic hydrocephalus, especially the congenital, is often associated with other vices of conformation (**Meckel**, **Osiander**, **Murray**, **Deslandes**, **Otto**, **Autenrieth**, **Breschet**, &c.); as with cleft palate, single or double hare-lip, spina bifida (§ 178.), imperforate anus, distorted or club foot, and absence of one or more of the abdominal viscera.

296. *E.* **Prognosis.** — When the disease is congenital, as it most frequently is, even although it may not become manifest until some days or weeks after birth, or when it appears soon after birth, little or no hope of benefit from treatment can be entertained; for, in such cases, it is often dependent upon imperfect or arrested developement of the brain. When, however, it is either obviously, or very doubtfully, not congenital, I agree with **Richter**, **Dreyssig**, **Blane**, **Portenschlag**, **Goelis**, **Conquest**, and some others, in considering that it often admits of cure, particularly if it be treated early, if it be uncomplicated, and if the powers of the constitution be not much impaired. J. P. **Frank** states, that he has seen it disappear upon the occurrence of scrofulous disease in another part. **Goelis** and most other writers have seen more or less advantage accrue from spontaneous eruptions and sores, particularly behind the ears, and from chronic discharges from the bowels and skin, if they do not much reduce the patient's strength. When the disease occurs in those of a manifestly scrofulous or syphilitic taint; or follows the acute; or is far advanced; strangulating cough, difficult or suffocative respiration, coma, frequent convulsions, delirium, or other symptoms of the last period being present; hardly any hopes of recovery should be entertained. The exanthemata or hooping cough occurring in its course, generally induce a fatal termination in a short time. Its complication with hydrorachis, or with other forms of dropsy, is also very unfavourable.

297. *F.* **Treatment.**—The *indications of cure* are, —1st, to subdue irritation in the encephalon, when the symptoms of the first stage indicate its existence; 2d, to counteract the disposition to aqueous effusion into the ventricles; 3d, to remove the fluid, and prevent its re-circulation; and, 4th, to palliate urgent symptoms. — *a.* The *first* of

these intentions applies chiefly to those cases which occur subsequently to birth, and when evidence of nervous excitement or vascular irritation can be detected. In such cases, one, two, or more leeches, according to the age and strength of the infant, should be applied behind the ears, and means used to derive the irritation to some part of the cutaneous surface, or to the intestinal canal. In the majority of instances, the same measures as will subdue irritation, will also tend to the fulfilment of the *second* indication; more especially mercurials, aperients, purgatives, and artificial eruptions and discharges. In the use of this last, much circumspection is requisite; for tartar emetic ointment, or blisters kept open, may produce sloughing sores in young and delicate children.

298. *b.* To fulfil the *second intention*, various measures have been recommended. — *a.* GOELIS places most reliance upon small doses of *calomel*, — from a quarter to half a grain twice a day; and on the mercurial ointment applied to the head, either alone or with an ointment of juniper berries. He advises a flannel cap to be, at the same time, worn constantly upon the shaved scalp, to promote the insensible perspiration. This covering, in a few days, becomes charged with the ointment or ointments employed, and thereby tends to bring the system more quickly and fully under the influence of mercury. But affecting the constitution with mercury will rarely remove the disease; and, in very weak children, will only reduce more rapidly the powers of life, to which we should chiefly trust, as the more immediate agent by which this indication is to be fulfilled. My experience leads me to confide more in the *hydrarg. cum creta* than in calomel, in most cases of this disease. The best part of the treatment resorted to by GOELIS is the daily use of *mildly stimulating baths*. I have seen considerable advantage derived from them, especially when those first employed contained an alkali. Various tonic, astringent, diuretic, or slightly stimulating substances or infusions may be directed in this manner; as well as the preparations of *iodine*, or the *nitro-muriatic acids*, in very weak solution. M. RECAMIER states, that benefit has been derived from baths holding *tartar emetic* in solution; this substance being gradually increased to three or four times the quantity first employed; and that it acts as a diuretic.

299. In those cases, especially, which have commenced after birth, all morbid secretions and fæcal accumulations having been removed from the *primæ viæ*, by purgatives and cathartic enemata, from one to two or three grains of hydrarg. cum creta should be given night and morning, and the scalp shaved. If the head be quite cool, and without signs of vascular excitement, it should be kept moderately warm, and washed daily with a weak, tepid solution of the nitro-muriatic acids; the *baths* now recommended being also employed. This treatment, with proper diet and regimen, should be tried for some days, especially in delicate children; but in those who are stronger, it is preferable to exhibit, once, twice, or thrice a day, from five to ten or twenty minims of oleum terebinthinæ, with from twenty to forty or fifty of oleum ricini, according to the age of the patient, and effects produced upon the bowels and urinary organs. For infants, these oils may be mixed in syrup; but, by older children, they will be most easily taken on the surface of fennel water, or of milk. When this medicine does not act fully on the bowels, it may irritate the kidneys or produce strangury. In this case, it should either be intermitted for a few days, or given in larger doses, at longer intervals—or sometimes only twice or thrice a week — so as to act as a gentle purgative. An *enema* containing from one to four or five drachms of each of these oils, according to the age of the child, may also be administered every third or fourth day, in a suitable vehicle, either in addition to the above medicine, or when it is not prescribed; and the *liniment* F. 311. may be rubbed once daily upon the loins, or over the shaved scalp, the head being covered by a thin flannel cap. The hydrarg. cum creta should also be taken night and morning; and, if these oils be not employed so as to act sufficiently upon the bowels, as they ought, a full dose of calomel, or an active cathartic, should be occasionally given at bed-time. The above treatment was, for thirteen years, very generally adopted by me in chronic hydrocephalus, at the Infirmary for Children; and, in many instances, with marked success.

300. *β.* In other cases, particularly in private practice, and where the measures now detailed are not regularly pursued, owing to their unpleasant nature, a course of *iodine* should be entered upon, and continued for some weeks; but the preparations of this substance ought to be exhibited in doses which will not gripe or otherwise irritate the digestive canal; the alterative mercurial being taken at bed-time, and an occasional cathartic, or a terebinthinate enema, administered in the morning, during the course. If evident advantage follow not the iodine within a fortnight or three weeks, a *liniment* (F. 302.) or ointment (F. 767 —769.) of it, or an ointment of the *ioduret of mercury*, should be rubbed upon the head twice or thrice a day. If it occasion irritation in the scalp — which will seldom be the case with the preparations now referred to — the circumstance need not be considered unfavourable. If the internal course of iodine be not adopted, gentle aperients and diuretics, with mild tonics, should be taken in the course of the day. The above plans of treatment I have found more successful than any other; but they require great discrimination, and nice adaptation to the circumstances of the case: — that by the terebinthinated medicines has appeared most beneficial in the stronger children; and, whilst it has acted freely on the bowels, it has often greatly increased the quantity of urine: that by iodine is better borne by delicate children, but its operation is slower, than the former. The mouth sometimes becomes affected by the mercurial preparation during either of these courses, particularly in the older children; but this is to be viewed as a favourable occurrence. As long as the powers of the system continue but little impaired, and the patient does not lose flesh, either the one or the other course should receive a full trial; light and suitable nourishment being given, and the bowels kept freely open, always avoiding the supervention of diarrhœa.

301. *γ.* When these internal and external means fail of affording evident benefit in a few weeks, or when they cannot be satisfactorily tried, *blisters* should be applied, or *issues* inserted behind the ears, or over the occiput; and *tonics*, with laxatives and

diuretics, exhibited internally. Of these last, the *acetate of potash*, with *oxymel of squills*; and the *spiritus ætheris nitrici*, with a small addition of nitric acid; are amongst the best, and should, in the more debilitated, be given in tonic infusions. After the mercurial alterative has been continued sufficiently long, and the modes of treatment now detailed have been fairly ~~but~~ ineffectually tried, a very weak solution of the *nitro-muriatic acids*; or of the *hydro-chloric acid*, with the *chloric æther*; or of the *aromatic sulphuric acid*, with *Hoffmann's anodyne*; may be prescribed internally: but the exhibition of mercurials should be fully relinquished, and their effects satisfactorily ascertained, before any of these be taken, otherwise very serious disorder of the stomach and bowels may be occasioned by them. A succession of blisters to different parts of the head, the one side or part being allowed to heal whilst the other is discharging, is sometimes serviceable; but the blisters should not remain on after they have produced redness of the part, and the practice should be persisted in for some time.

302. δ. If acute symptoms supervene in the course of treatment, *leeching* or *cupping*, sometimes followed by *dry cupping*, and generally by calomel, and active purging, must then be resorted to appropriately to the strength of the patient, with such of the measures recommended for the acute disease, as the peculiarities of the case may require.

303. ε. If debility, languor of the circulation, and flabbiness of the soft solids, be considerable, in addition to the hydrargyrum cum creta, as advised above, the powder or infusion of *calumba*, or of *cascarilla*, or of *valerian*, or of *cinchona*; or small doses of the *sulphate of quinine*, or of the *sulphate of iron*, with the neutral sulphates — as the sulphates of magnesia, soda, or potass; or the sulphate or oxide of zinc; will be sometimes beneficial early in the second stage. The *ferrum tartarizatum* also should not be overlooked in the treatment of these cases. I have lately seen the *ioduret of iron* of service in two such instances. Several years ago, the *oxide of zinc*, or the *subnitrate of bismuth*, was frequently prescribed by me, in doses which would not offend the stomach, either alone or with mild vegetable tonics, and taken during the day; the mercurial alterative being continued night and morning, and a terebinthinate enema exhibited twice in the week. Some patients certainly improved, or recovered, under this treatment. But as most of these cases occurred in dispensary practice, the result in several of them was not ascertained. During the exhibition of tonics in chronic hydrocephalus, the secretions and excretions — both abdominal and cutaneous — ought to be freely promoted by means of slightly alkaline baths, and laxatives, otherwise the disease may assume an acute form, or pass rapidly into the *third* and irremediable stage.

304. ζ. Warm and other *diaphoretics* are directed by several writers: HOPFENGÄRTNER advising the flowers of *arnica*, and *serpentary root*; and Dr. TEMPLE, the *doronicum Germanicum*, with the more common medicines of this class. *Digitalis*, and the internal use of *cantharides*, are recommended by many respectable authorities. These two may be conjoined; for the former will be given, with greater benefit, in this state of disease, with tonic infusions and stimuli, than in any other combination; but its effects must always be carefully watched. The internal use of the *muriate of baryta* and *muriate of lime* is suggested in the more manifestly scrofulous cases, by AUTENRIETH. The repeated exhibition of irritating enemata is enjoined by MELLIN and MICHAËLIS, and has proved of great benefit in my practice, particularly the one already named (§ 299.). *Sialagogues* are favourably noticed, especially by the older authors. They deserve more attention than has been lately paid to them, and are certainly useful adjuvants, especially about the period of dentition, when the gums and teeth should be frequently examined; irritation of the former being removed by *incisions*. — *Errhines* are also prescribed, particularly by HEISTER, FORESTUS, and MONDSCHIEN.

305. η. *Various applications* — some of them the most opposite in their natures and effects — have been directed to be applied to the head, with the view either of promoting exhalation from its surface, and thereby transferring this action from the interior of the head; or of diminishing effusion in this situation, by restoring the healthy action of the capillary and exhaling vessels. BLANCARD and FABRICIUS recommend that the head should be kept warm by bladders filled with hot sand, or by sponges squeezed out of hot water; and MONDSCHIEN, that bags containing either unslacked lime, or roasted salt, be applied to it. BOERHAAVE, BORSIERI, and HECKER advise *fomentations* with aromatic wines; FLAJANI, PLENK, ITARD, and KLEBER, *epithems* with the wine or vinegar of squills; and PSAB, DELEURYE, and others, *dry fomentations* with warm aromatic plants. ZWINGER, SORBAIT, and MELLIN direct the scalp to be rubbed with *ointments* containing the etherial oils, especially the oil of turpentine or naphtha with alcohol; and PERDULCIS, JOHNSTONE, MONRO, &c. favour the use of woollen caps which have imbibed the essential oils. Besides these, a variety of *plasters*, especially such as possess a deobstruent and tonic quality, are mentioned by writers. Of this class of means, the *plasters* F. 116, 117, 118. and the liniments F. 300. 311. are the most efficient. Acrid applications, and *scarifications* of the scalp, are likewise noticed by HEISTER and DIEMERBROECK; and the actual or potential *cautery*, and *moxas*, by CHESNEAU, FANARON, and several other Continental authors.

306. ϑ. *Gentle and continued compression* by bandages is recommended by RIVERIUS, FORMEY, PITSCHEL, BLANE, and HOOD; and has manifestly been of service in some instances. Compression by means of strips of plaster, composed of equal parts of the emplastrum picis comp., and of the emp. ammoniaci cum hydrarg., or of these and the emplast. cumini, and spread on stiff linen, has been found by me preferable to the common method by bandages, and has commonly been employed in addition to the means detailed above (§ 298. *et seq.*). The plaster, thus composed, should be cut into slips; and, whilst each should partially surround the head, the number applied ought to be sufficient to cover the whole scalp, which must be kept closely shaven. In the case treated by compression, by Sir GILBERT BLANE, leeches and purgatives were also employed; and a favourable termination resulted. Mr. J. F. BARNARD resorted to pressure successfully in nearly the same manner as I have now advised, and used for the purpose broad strips of adhesive plaster. He also kept the head covered by linen wet with cold

water; a practice which should not be omitted whenever the temperature of the head rises above natural.

307. c. *The removal of the fluid by puncture* has been recommended from Hippocrates to the present time. But it has never been practised with success until recently; and it is doubtful whether some of the cases which have been said to have recovered by the operation, have ultimately been cured. Indeed, great difference of opinion has existed as to the propriety of performing it. Le Cat, Junker, Sorbait, Remmett, and many recent writers, have advised and practised it; whilst Heister, Boerhaave, Morgagni, Monro, Borsieri, Mercati, Richter, Flajani, Portenschlag, Goelis, Breschet, Hecker, &c. are opposed to it, on the grounds that it has never cured the disease, but has often accelerated a fatal termination. After the medical treatment above detailed has been appropriately, sufficiently, and ineffectually tried, this operation, as it is not attended by any immediate risk, when cautiously performed, may be resorted to. In such circumstances, I have concurred in it, where it has been, in several instances, performed by my able colleague, Mr. Dendy, at the Infirmary for Children; but I recollect no case in which it has ultimately succeeded, although the management of the cases could not have been in more experienced hands. Many of the older writers, who advised the operation, conceived the water to be collected in the sac of the arachnoid, and not in the ventricles, and, consequently, that, in making the puncture, the cerebral substance would not be penetrated; but such is not often the case. Instances of its performance are adduced by Tulpius, Fabricius Hildanus, De La Motte, Petit, Wepfer, E. Ferdinand, G. Fabricius, D. Panarolius, and several recent writers. The following is a brief notice of those which are the most instructive.

308. α. Le Cat (*Philosoph. Trans.* vol. xlvii. p. 267.) operated on a child three months and a half old, affected subsequently to birth, thrice in three successive days; death occurred on the fifth day after the first puncture. The pineal gland was found nearly destroyed, and the ventricles much expanded. Dr. Oppenheim (Rust's *Mag. für die Gesammte Heilk.* b. xxiv. 1827.) operated on an infant of seven months with a trocar, leaving the canula in the puncture. It died on the seventh day. The membranes were somewhat thickened, and the brain soft and pulpy. Dr. Whitmore (*Amer. Med. Recorder*, July, 1821.) punctured the head of an infant of six months, hydrocephalic after birth; and in eight days withdrew, without a canula, 116 ounces. Death followed on the tenth day, the membranes being found inflamed. Dr. Hood (*Edinburgh Med. and Surg. Journ.* Oct. 1821.) operated on a child of nine months by a trocar. Death took place on the third day. The brain was softened and the *tubercula quadrigemina* were suppurated. Mr. Dendy (*Lond. Med. Repos.* vol. xix. p. 446.) operated on a congenital hydrencephalocelic case, aged ten weeks, with a large, deeply grooved needle, and removed eight ounces at three operations, with three days interval between each. Death occurred on the tenth day. The fluid was lodged in the left ventricle, over which the brain had not been formed. The membranes were found inflamed, and the brain surrounding the effused fluid softened. Mr. Brown (*Med. and Phys. Journ.* vol. li. p. 102.) punctured the head of an infant of five months, on five occasions, in the course of thirty-six days. The last puncture was followed by great hæmorrhage and dissolution. Mr. Gray (*Ibid.* vol. liv. p. 204.), from a child whom he had cured of *spina bifida* by compression, but who became hydrocephalic soon afterwards, drew off forty-five ounces of fluid at three tappings. The symptoms were mitigated for a time; but death followed on the thirty-first day. Dr. Freckelton employed five successive punctures with a trocar, in the course of fifty-six days. Death occurred on the fifty-ninth day. Mr. Callaway (*Amer. Med. Recorder*, July, 1821.) operated on an infant five weeks old, and repeated the punctures on four successive weeks; but it died of marasmus and gradual exhaustion on the seventieth day. Mr. Remmett (*Edinburgh Med. Comment.* vol. vi. p. 422.), in a congenital case, punctured the head with a lancet, two months after birth; and in the first six days, on three occasions, drew off thirty-six ounces in all. He repeated the operation twice subsequently, with a month's interval between each. The infant died of atrophy ninety-three days after the first puncture. On dissection, the fluid was surrounded by the membranes; the rudiments merely of a brain, in a softened state, being lodged at the bottom of the cavity. Mr. Money (*Med. and Phys. Journ.* vol. lii. p. 462.), operated on a congenital case ten months after birth, by a small trocar, on ten different occasions, during seventy-four days. The child died on the eighty-fourth day after the first operation. The membranes were inflamed, and the brain dilated into a large sac. Mr. Sym (*Edin. Med. and Surg. Journ.* vol. xxiv.), in an infant of eleven weeks, punctured the head, and repeated the operation five times in the course of ninety days, withdrawing about seven ounces of fluid each time. Death occurred on the 104th day. The arachnoid was thickened. The fluid was contained in its general cavity, and the brain imperfectly developed. Dr. Glover (*New York Med. Repos.* vol. iv.) operated in a congenital case, nine months after birth; and, in four months, withdrew 156 ounces at eight tappings; but death took place, after a considerable period of amendment, on the 120th day. Mr. Lizars (*Edinburgh Med. and Surg. Journ.* April, 1821.) operated on an infant four months old; and in the course of 90 days repeated the puncture fifteen times, at intervals of from three to seven days, taking away each time from three to ten ounces of fluid. The child did well until convulsions occurred during teething; and the head was again enlarged. Puncture was again tried; but it died on the following day, and on the 171st after the first operation. Dr. Vose (*Med.-Chirurg. Trans.* vol. ix.), in a congenital case, operated seven weeks after birth, and thrice subsequently, at considerable intervals. The sutures afterwards ossified; and, three months later, when he published the case, the child was doing well. Dr. Monro, however, states (*Morbid Anatomy of the Brain, &c.* p. 146.), that symptoms of pressure appeared after the sutures were ossified, and the child ultimately died.

309. β. Mr. Greatwood (*Lancet*, No. 299. p 238.) records a case of a hydrocephalic child fifteen months, who, falling on a nail, punc-

tured the head at the upper third of the lambdoidal suture. The wound continued to discharge fluid for several days, and it afterwards perfectly recovered from the disease. In the same work, for April and November, 1830, the operation of puncture is stated to have been successfully performed in St. Bartholomew's Hospital. GRAEFE (his *Journ.* for 1831, b. xv. p. 3.) punctured the head of an infant hydrocephalic from birth, in the fourth month, and repeated the operation about eleven times during six months. The fluid was allowed to escape slowly each time; the canula being removed, and the wound closed, as soon as the pulse became weak, After the last puncture, the sutures closed. The child could walk and speak when a year old. At the age of two years and a half, it was shown to the Medico-Chirurgical Society of Berlin. Mr. RUSSEL (*Edin. Med. and Surg. Journ.* July, 1832, p. 43.) operated on a girl eight months old, hydrocephalic from birth, and whose head was twenty-three inches in circumference when he first punctured it. The operation was repeated four times, after intervals of about ten days; but the quantity of fluid withdrawn each time was small. After the last puncture, calomel was given so as to affect the mouth; when the hydrocephalic symptoms disappeared, and ossification of the sutures proceeded. The case is stated to have been cured. Dr. CONQUEST is reported, in a contemporary work, to have operated in nine cases, — successfully in four of them. The greatest number of punctures in one case were five, and the intervals between them from two to six weeks. The largest total quantity of water removed was fifty-seven ounces, by five operations; and the largest quantity at one time, twenty ounces. The trocar was introduced through the coronal suture, below the anterior fontanelle, and the wound carefully closed after each evacuation. Pressure was made by means of strips of adhesive plaster.

310. The cases in which I have been concerned in directing the operation, have all been unfavourable to its success. Medical treatment had been actively and perseveringly employed in all of them; and it is therefore probable, that such of them as admitted of recovery were amongst the number that was cured. Whilst in those in which the operation was resorted to, and which were mostly congenital, either the state of the brain and its envelopes precluded recovery, or the circumstances in which out-door patients of public charities are placed were such as to render this operation less successful than it otherwise might have been.

311. *γ*. Having stated the evidence we at present possess of the success of the operation, inferences as to the propriety of performing it may be easily drawn. Those who argue against it contend — (*a*) that it is apt to induce an irritative state of inflammation in the substance or membranes of the brain, particularly in the weakened and otherwise predisposed systems of such subjects — 1st, by the mechanical injury done to those structures; and 2dly, by the entrance of air through the puncture; — (*b*) that the collapse consequent upon the removal of the fluid is injurious to the organ and system; — (*c*) that the operation cannot change the state of the organ or function giving rise to accumulation; and hence that it cannot be permanently successful; — and (*d*) that the instances of success from it are not so numerous as those from medical treatment.

312. Those in favour of the operation, on the other hand, argue — (*a*) that greater injury than that by the puncture is often done to the brain and membranes, without bad consequences; — (*b*) that the air may be prevented from entering by the aperture; — (*c*) that danger from collapse is readily obviated; — (*d*) that cures from medical treatment, in an advanced stage, and when the head has become greatly enlarged, are very rare, and are then most likely to be obtained by an operation; — (*e*) that the instances of success on record are sufficient to warrant its performance.

313. *δ*. From much experience, I conclude that inflammatory irritation of the brain and its membranes does follow the operation in some instances; that the state of these parts, and of the system, favours its occurrence; and that the encephalic structures are in a very different condition in this disease, both mechanically and vitally, — but especially as to proneness to inflammatory action, and softening, — from what they are in health. — (*a*) Whilst, therefore, I so far agree with those who argue for the operation, as to advise it to be tried after the measures I have detailed above have failed, yet I would not recommend its performance early in the disease — 1st, because medical treatment has then sometimes effected a cure, especially when the head has not been very greatly enlarged; and, 2dly, because, when the fluid is in the ventricles, as it generally is in cases commencing after birth, a greater depth of brain must be penetrated to reach it at an early, than at a later, period. — (*b*) When punctures are resorted to, medical treatment must not be abandoned, or even relaxed; for we should still endeavour, according to the principles explained above, to remove the disposition to effusion, as well as to promote absorption; and, as a certain degree of pressure is requisite to the healthy performance of the cerebral functions, strips of plaster, as are already directed (§ 306.), should be applied around and over the whole scalp, in order to prevent the collapse consequent upon the operation. — (*c*) I believe that the punctures ought not to be frequent, nor much fluid withdrawn at one time; that gentle pressure should be made around the cranium during the discharge; that the discharge ought to be stopped, and the puncture accurately closed, so as to prevent the entrance of air, as soon as the pulse begins to sink; and that restoratives should be exhibited, in order to prevent convulsions, or other nervous symptoms. — (*d*) The operation seems to be best performed by a small trocar, or grooved needle; but it is difficult to withdraw any fluid with the latter, as the surrounding pressure fills up the groove. The application of a cupping glass may, however, procure a discharge. A thin trocar, with a two-edged or lancet-shaped extremity, — not a thick triangular pointed instrument, — is preferable, upon the whole.

314. *d*. *Urgent symptoms*, especially convulsions, and inflammatory action, require to be palliated or removed. — *α*. *Convulsions* should be treated according to the manner described in that article, particularly by the terebinthinated medicines and enemata already prescribed (§ 299.); by these, conjoined with the syrup of white poppies, or this latter with the oxide of zinc; by

fœtid enemata; by cold or tepid affusions on the head; and by dry cupping on the nape of the neck, or between the shoulders. — β. The appearance of *acute symptoms* requires the treatment stated above (§ 302.); with mustard pediluvia, or mustard poultices to the legs and thighs; cold affusions and applications to the scalp, &c.— γ. In the *third stage*, the disease is generally beyond the influence of medicine; the disorganisation which has then frequently taken place in the encephalon not admitting of restoration; and it is chiefly in it that the palliation of urgent symptoms is required. But little beyond the fulfilment of this intention can then be attempted, unless *puncture* be resorted to as a last resource.

315. *e. Diet and Regimen* form no unimportant part of the treatment. The diet should be light and nutritious, and care should be taken not to allow the patient to eat so much at a time as to load the stomach. For infants, the milk of the nurse is sufficient; but she should be healthy, and fed upon digestible and nutritious food, and her bowels carefully regulated. Children who are weaned should have a small quantity of animal food; and be debarred from all acescent vegetables. Change, particularly from the close parts of a city, to a country air, which is warm and dry; and frequent exposure to the open air and to sunshine, in mild weather, are very serviceable. Many children have ravenous appetites, especially as the disease advances; these require sufficient nourishment, but more than that is injurious. In these cases, the terebinthinated medicines, more than any others, allay the insatiable craving, symptomatic of the malady, and tending to aggravate it when indulged; whilst they exert a very favourable influence on the disease. The drink allowed to the patient should be ordered with strict reference to the treatment pursued at the time, and should be as much as possible adjuvant of it.

316. *f. The prophylactic Treatment* may be comprised in a few words.—When any one of a family has had the disease, particularly if there exist a scrofulous or rickety diathesis, the state of the secretions and excretions ought to be carefully watched, and the earliest deviation of them from health combated by appropriate means. Cutaneous eruptions should not be interfered with, unless with great caution; all external medicaments to them should be avoided, and internal remedies, of an alterative, deobstruent, and diuretic kind only, be prescribed. The skin ought to be kept clean and perspirable. External injury of the head, and premature exertion of the mental faculties, must be avoided. Free and daily exposure to the open air and sunshine; moderate, light, and suitable diet; an open state of the bowels; a healthy nurse, whose mind is not liable to anxiety; and what has been already advanced above (§ 279, 280.); are all requisite to the prevention of the malady, particularly under the circumstances alluded to.

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DRUNKENNESS — Intoxication. — Syn. *Temulentia*, Pliny, Plater, &c. *Paraphrosyne temulenta*, Sauvages. *Ebrietas*, Lat. *Ivresse*, Fr. *Trunkenheit*, *Rausch*, Germ. *Ebbro*, Ital. *Ebriety*, *Inebriation*.

Classif. III. Class, I. Order (*Author*).

1. Defin. — *Mental excitement, followed by stupor or coma, from the excessive use of fermented or distilled liquors.*

2. The frequent occurrence of intoxication, either casually or as a confirmed habit, would justify the notice I am about to take of it, even independently of its influence in causing and modifying disease. But it is chiefly to the more complete states of intoxication, and especially those demanding medical care, that attention will be here directed. Drunkenness, in its various phases — from the daily indulgence in more vinous or spirituous fluids than is required, but short of affecting the nervous system in a very evident manner, up to that degree of excess by which the senses and intellects become obscured or entirely lost — predisposes to many diseases, and directly causes others. Slighter excesses in the use of fermented liquors — particularly wine and malt liquors — occasion plethora, with all the consequent ills, especially gout, apoplexy, paralysis, and congestion of the abdominal viscera. Greater excesses, and the too free use of spirits, exhaust nervous and vital power, inducing tremors, nervousness, delirium tremens, encephalitis, paralysis, and insanity; occasion affections of the digestive organs, particularly anorexia and dyspepsia, diarrhœa and dysentery, inflammation, and structural changes of the biliary organs; and produce disorders of the urinary and sexual functions, even sterility and impotency; and, ultimately, lesions of the kidneys, and dropsies.

3. Drunkenness is not a vice of recent date, although it may have become more common with the progress and diffusion of luxury. We find it mentioned in the early history of the Jews; and Tacitus informs us that it was prevalent amongst the ancient Germans. It is tolerably evident, from the ancient lyric and dramatic poets and satirists, that it was by no means infrequent amongst the higher classes in Greece and Rome. Hippocrates notices its worst states, both in his *Aphorisms* and in his *Prognostics*: and it does not appear to have been considered a very culpable sort of indulgence even by some of the sages of antiquity. Plato cautions against allowing wine to youths at an earlier age than eighteen years, and against becoming intoxicated before forty; but, after this age, he considered some degree of indulgence in this way pardonable. This was possibly, also, the opinion of Socrates.

> "Hoc quoque virtutem quondam certamine, magnum
> Socratem palmam promeruisse ferunt."
> Corn. Gall. Eleg. i. ver. 49.

And Horace states, that Cato the Censor often warmed his virtues by wine.

> "Narratur et prisci Catonis
> Sæpè mero caluisse virtus."

It is evident that the vice increased amongst the ancients with the diffusion of luxury; until, at last, even the ladies occasionally followed the example so generally set them. Valerius Maximus (l. ii. cap. i.) states, that, in the earlier periods of Roman history, the women seldom drank; and Seneca (*Epist.* 95.) remarks, that, at a later period, they indulged so freely in this way, that they became nearly as subject to the diseases occasioned by the practice as the men. Erroneous opinions as to the effects of intoxication upon the frame seem to have been very early entertained, and were generally prevalent in the fifteenth and sixteenth centuries. Montaigne mentions, that the celebrated Sylvius informed him that an occasional debauch was beneficial, inasmuch as it roused the energies of the stomach; an opinion long entertained by medical men, but zealously combated by MM. Hommets and Langlois. There can be no doubt, however, that, as expressed by the late Dr. Gregory, an occasional excess is, upon the whole, less injurious to the constitution, than the practice of daily taking a moderate quantity of any fermented liquor or spirit.

4. i. Causes. — This destructive habit, not many years ago but too prevalent even in the upper classes in the more northerly countries of Europe, fortunately now no longer exists, or not nearly to the same extent as before: but it is still as general as ever amongst the lowest orders, and those of weak constitutions, who have been indulged in youth, or uncontrolled, or accustomed at that age to taste cordials and spirituous liquors, or who possess little force of character or firmness of resolution. The unfortunate and unhappy, those of uncertain occupations, or whose homes are made miserable; also tavern-keepers, coachmen, commercial travellers, singers, working mechanics, persons whose parents have been drunkards, and those who are idle and unoccupied, and frequent clubs or meetings of lodges, &c.; often have recourse to it. The weak, good-natured, and social, not infrequently become addicted to it, from the manners and indulgences of those with whom they associate, until the want of the accustomed stimulus becomes distressing, and the resolution gives way before the desire of gratifying it, and thus the habit is confirmed.

5. ii. Symptoms. — *A. The earlier phenomena* of ebriety are, mental exhilaration, joyousness, dissipation of care, with talkativeness, flushed countenance, increased animation of the features, especially of the eyes; a more copious transpiration from the cutaneous and pulmonary surfaces, and secretion of urine; augmented thirst; and full, frequent, and strong pulse. If the intoxicating fluid be more largely partaken of, vertigo, tinnitus aurium, double vision, and unconnected trains of ideas, generally uncontrolled by the will, supervene. During slight intoxication, the prevailing disposition and pursuits are made manifest; and hence the saying, "*In vino veritas.*" The irritable and ill-tempered become quarrelsome; the weak and silly are boisterous with laughter and mirth, and profuse in offers of service; and the sad and hypochondriacal readily burst into tears, and dwell on mournful topics. In a more advanced state, the excitement approaches nearly to that of delirium: the conceptions become disordered, the ideas confused, and various hallucinations sometimes are observed; the voice is thick; the eyes vacant; the face pale; the voluntary motions imperfect and unsteady; and the limbs tremulous, or incapable of their offices. Vomiting occasionally occurs in this state, and either diminishes or shortens the consecutive state of stupor. In a still more advanced stage, all the phenomena about to be described sometimes occur — occasionally with convulsions, and signs of dangerous coma, or even of asphyxy. The phenomena of drunkenness are happily and briefly expressed by Lucretius: —

> ——— "Cum vini penetravit —
> Consequitur gravitas membrorum, præpediuntur
> Crura vacillanti, tardescit lingua, madet mens,
> Nant oculi; clamor, singultus, jurgia gliscunt."

6. *B. The phenomena of deep Intoxication* have been very closely and accurately studied by Dr. Ogston; whose opportunities of witnessing them, particularly in their more dangerous associations, and as following the use of ardent spirits, have been unusually great. I shall, therefore, follow, in great measure, the description he has given of them. It should be recollected that the effects of spirits or other intoxicating liquors on the frame will vary with the habits of the individual; with his state of body, especially as respects vascular plethora; with the kind of inebriating agent indulged in; and the existing condition of stomach, chiefly as respects the presence of alimentary matters. But the most powerful modifying agent is temperature. Warmth increases the nervous and vascular excitement characterising the early stage; and diminishes the consequent exhaustion. Cold suppresses and shortens the early excitement, and hastens as well as augments the oppression and exhaustion of the advanced stage. — *a.* In the larger proportion of cases, however, after a longer or shorter period of unusual mental vigour, nervous excitement, and increased action, varying according to the surrounding temperature, the brain becomes oppressed; the powers of voluntary motion, which are early impaired, fail entirely; the mental manifestations are suspended; and, in the most severe cases, sensation is lost completely. In most instances, this state supervenes gradually; but sudden exposure to cold will often induce it rapidly. The person feels drowsy, and appears to fall into a sound sleep; but it is discovered, when the attempt is made, that he cannot be aroused to consciousness by any effort, or, if it partially succeed, he is hardly sensible of surrounding objects, and immediately lapses into his former state; the limbs remaining in whatever position they may be placed. At this period the face is pale, with or without nausea; or it is flushed; the eyes are vacant and suffused, sometimes glazed; the pupils dilated, and contracting very imperfectly, or not at all, by exposure to light. The temperature of the head is generally above natural; but that of the extremities, and often of the surface generally, is considerably lowered, or but little affected in the milder cases. The pulse, which was at first quick and excited, becomes feeble, small, and ultimately slow, and entirely wanting at the wrist, according to the degree of intoxication. Respiration is usually infrequent; the separate acts of inspiration and expiration, particularly the former, occupying a very short time; and is wholly or chiefly abdominal. The breathing is often laborious in the most advanced states; and, in these, the inspirations are convulsive, the chest expanding by the rapid contractions of the associated muscles of respiration. Strabismus, or tetanic convulsions, or spasms of particular parts, sometimes supervene in the more advanced states, and are unfavourable signs.

7. *b.* Such is the more common state or form of drunkenness: but alcohol occasionally causes modified effects; and, without much previous excitement, but always with more or less mental disturbance, produces prostration of the functions of the brain; the intellects, volition, and sensation failing almost simultaneously. In these cases, the face is pale, the eyes are more or less lively or injected, the pupils contracted; the pulse frequent, full, and soft; the respiration laborious or stertorous; the temperature uniform, and either at or above the natural standard, but seldom below it. The circulation, respiration, and generation of animal heat, may go on for a considerable time, in these, notwithstanding the paralysis of the brain; or continue until this organ has

recovered from its torpor, provided the body be not exposed to a cold atmosphere, or placed in unfavourable circumstances.

8. *C. Appearances after death.* — These very nearly resemble those produced by asphyxia. The countenance presents marks of anxiety or of convulsion; the eyes are prominent, the pupils dilated; the face livid or swollen; the lips blue; the cellular tissue injected with dark fluid blood; the air-passages reddened; the lungs dilated, and loaded with fluid dark blood, and more or less frothy mucus in the air-cells. The right cavities of the heart, the venæ cavæ, and the pulmonary artery, are filled with blood of a similar appearance. The left ventricle, aorta, and coronary veins, also contain a little dark blood; and the liver and kidneys are loaded with it. Blood possessing the same characters also fills the sinuses, veins, and even the smaller vessels of the encephalon. The cerebral structure is generally firmer than usual. More or less serum is found in the ventricles and between the membranes of the brain. Dr. OGSTON confirms the testimony of WEPFER, VOIGHT, CARLISLE, and others, as to the effused fluid being impregnated with alcohol. In describing the appearances in one of his cases, he states, that about four ounces of fluid were found in the ventricles, having all the physical qualities of alcohol; as proved by the united testimony of two other medical men, who saw the body opened, and examined the fluid. He thinks that the effusion takes place previously to the coma of intoxication; as he found it in considerable quantity, in two cases of drowning in the stage of violent excitement from spirits. MÜLLER states, that he found air in the sinuses of the encephalon. The mucous coat of the *stomach*, particularly in habitual drunkards, is thickened and softened; this latter change sometimes existing throughout the whole extent of the small intestines. In rarer cases, the coats of the stomach are remarkably thickened and hardened. Injection, and sometimes ulceration, of the *small intestines*, are also met with. The *liver* is frequently mottled, enlarged, and otherwise diseased. The *kidneys* are often enlarged, softened, paler than usual, granulated, &c.: the *urinary bladder* greatly enlarged and thickened.

9. iii. PATHOLOGY. — That a portion of the alcoholic constituent of the intoxicating fluid is absorbed and carried into the circulation, is proved by the odour of the expired air, and by the physical properties of the fluid effused within the head of persons who have died soon after having taken spirits to excess; and it is probable, if the urine were analysed, that a considerable quantity would be found to have passed off in this excretion. Deep intoxication seems to be occasioned as follows:—During the general nervous and vascular excitement consequent on the stimulus, increased determination to the head takes place, attended by excited vascular action; which soon terminates in congestion, as the excitement becomes exhausted, and gives rise to drowsiness, sopor, or coma. With this state of disorder, effusion of serum takes place in the ventricles and between the membranes, heightening the sopor and coma. When the congestion or effusion amounts so high as to impede the functions of the organs at the base of the encephalon, and of the respiratory nerves, respiration becomes infrequent and laborious; and, consequently, the changes produced by it on the blood insufficiently performed. In proportion as the blood is less perfectly changed in the lungs, the circulation through them is retarded, and the phenomena of asphyxy — congestion of the lungs, right side of the heart, brain, and liver; the circulation of the unarterialised blood; the imperfect evolution of animal heat, and sedative effects upon the brain and nervous system generally — follow in a more or less marked degree, according to the quantity of intoxicating fluid which has been taken; and either gradually disappear after some time, or increase until life is extinguished. These phenomena are heightened by cold, which depresses the vital actions in the extremities and surface to which it is applied, and increases the congestion of the above organs. The fatal consequence of intoxication is often averted by the occurrence of vomiting; the stomach thereby relieving itself from a great part of the poison; and the person recovering, after some hours of the above state of comatose intoxication. If the intoxicating fluid has been thrown or drawn off soon after its ingestion, the recovery of consciousness is more immediate. When intoxicating liquors are taken frequently, and to an amount short of intoxication, the digestive canal and liver are the first to suffer:—first in their functions, and subsequently in their circulation and organisation; this being one of the most fruitful sources of all the diseases, functional and organic, of these viscera, as well as of the nervous and vascular systems.

10. iv. The DIAGNOSIS of intoxication is not always easy. It is difficult to distinguish it, in its more profound states, from — (*a*) *apoplexy*, or *concussion of the brain*; (*b*) *asphyxy*; and (*c*) the extreme *effects of cold*. The odour of the breath is one of the best means of diagnosis; but is not to be depended upon alone: for a person may be apoplectic, asphyxied, or exposed to severe cold, after having taken only a small quantity of spirits; and apoplexy, asphyxy, and the effects of cold, often come in aid of the intoxicating agent, and heighten its effects: apoplexy, in those of a plethoric habit; asphyxy, from positions interrupting respiration, in addition to the operation of the poison as above explained; and cold, in the manner already mentioned. It will be very difficult to distinguish those cases of intoxication, where stertorous breathing is present, from apoplexy, unless by the smell of the breath, and of the matters thrown off the stomach. (See APOPLEXY, § 67.) It will readily be distinguished from *syncope*, by the laborious, infrequent breathing, by the smell of the breath, by the suffused eyes, and the livid or tumid features.

11. v. The PROGNOSIS is unfavourable, when the pulse is indistinct, or nearly gone from the wrist; when the respiration is laborious, stertorous, or puffing; when the countenance is pale, or livid and tumid; the pupils either much dilated or much contracted; the coma profound, and the extremities cold. Strabismus and tetanic spasms are also very dangerous symptoms; the former having been observed in three out of four fatal cases recorded by Dr. OGSTON. When these symptoms do not appear, the ill effects pass off, in a great measure, within twenty-four hours, although it is often much longer before all the functions regain their healthy tone.

12. vi. Treatment. — *A. Of deep Intoxication.* — *a.* The propriety of immediately *removing* the intoxicating liquor from the stomach cannot be disputed. This ought to be instantly done by the stomach-pump; for, in extreme cases, the stomach has become too torpid to be readily acted on by emetics. Mr. Macnish advises the fauces to be tickled, and the sulphate of copper, or the sulph. of zinc, to be used as an emetic. Pressure on the epigastrium, when this organ is full, will insure the effect of emetics, when the pump is not at hand. When the stomach is not distended, the introduction of warm water will be often necessary before its contents can be withdrawn by this instrument; and, when it contains much solid food, the same measure will be requisite; the distension thus produced, often of itself causing the reaction of the organ, which may be assisted by pressure on the epigastrium. Sometimes the glairy state of the contents will render their removal by the tube somewhat difficult; but this may also be overcome by dilution, and the mechanical means now noticed. When the temperature of the head is high, or not below natural, and that of the surface generally not greatly reduced, the *affusion* of cold water on the head is both a safe and efficacious remedy.

13. *b.* I agree with Dr. Darwin, Dr. Trotter, Mr. Macnish, and Dr. Ogston, in reprobating indiscriminate *bleeding* in deep intoxication. Cases which seemed urgently to require it, were injured by it in the practice of this last physician. Dr. Darwin remarks, that, when drunkenness "is attended with an apoplectic stupor, the pulse is generally low; and venæsection has sometimes destroyed those who would otherwise have recovered in a few hours." The *antidotes* most to be relied upon are the preparations of *ammonia* (Masurer, Broomley, Macnish, and Ogston), particularly the carbonate and *liquor ammoniæ acetatis*, and cold or tepid affusion on the head. M. Gerard prescribes the *liquor ammoniæ*, in repeated doses of seven or eight drops. *Vinegar* has little effect; and it, as well as other acids, are considered injurious by Alberti. *Coffee* and *green tea* are much more efficacious; and have been very generally recommended. Alberti advises the application of camphorated spirit to the crown of the head.

14. *c.* When the *temperature* of the surface is at all reduced, means should be used to raise it. In many cases, the removal of the contents of the stomach, and the preservation of the natural temperature, with elevation of the head and a proper position of the body, all ligatures being removed from it, are the only measures required. In the more profound states of intoxication, however, external warmth to the extremities and epigastrium must not be dispensed with. It should always be kept in recollection, that a degree of cold which would not be injurious in other circumstances, may prove fatal to a person in this condition. As long as coma continues, the patient should not be left, lest he get into a position that may induce asphyxy. When violent delirium follows drunkenness, the shower bath, or cold affusion, and afterwards the exhibition and frequent repetition of tartar emetic, will often calm the patient.

15. *d.* The removal of the distressing *symptoms consequent upon intoxication* is sometimes a matter of medical duty. The principle contended for by the celebrated Brown, and but too uniformly practised by him, of keeping up the excitement, was inculcated, and no doubt followed, by the monks of the *Schola Salernitana*; they, good souls, recommending —

> "Si nocturna tibi noceat potatio vini,
> Hoc tu mane bibes iterum, et fuerit medicina."

If there be no sickness, black and green tea, mixed, may be taken, as advised by Alberti; but where nausea exists, soda water, spruce beer, Seidlitz powders, the citrate of ammonia in a state of effervescence, and any neutral aperient salt in effervescing and aromatic draughts, will speedily remove disorder. Afterwards, moderate doses of sulphate of magnesia in compound infusion of roses, with a little additional sulphuric acid, will restore the digestive functions. If diarrhœa exist, the liquor ammoniæ acetatis, and spirit. ammoniæ aromat., with infusum calumbæ, and tinct. camphoræ comp., will soon remove disorder. When headach is distressing, and the skin hot and dry, the shower bath, cold sponging the head, saline aperients in an effervescing state, and tea, are, upon the whole, the safest means. Tonics, in conjunction with purgatives, may also be taken.

16. *B. Prophylactic means.* — *a.* The propensity to drunkenness, or even to that degree of excess which falls far short of intoxication, is seldom or ever removed when once established. In early life, and when the evil begins to manifest itself, the possibility of checking it may be indulged; but even then it is a difficult matter to succeed. Success will mainly depend upon the constitution and character of the individual, and the society he is allowed to keep. But instances have occurred, where there appeared to have been a growing addiction to it, of the evil having been arrested, by tartar emetic and other nauseous matters having been given to persons in a state of intoxication, or soon afterwards. I have, in several cases, advised some tartar emetic to be put into a glass in which soda water was about to be taken, in order to remove the disorder and sickness occasioned by extraordinary excess. The distressing sickness thus induced, and which may, in the helpless state of such persons, easily be prolonged, has occasioned such disgust at, and dread of, all intoxicating beverages, as to cause them to be shunned for a long time afterwards. But this plan, or even repetitions of it, will generally fail with those who have become habituated to this species of indulgence; particularly those who drink spirits, and who resort to it before dinner, and when unallured by conviviality: these are either altogether irreclaimable, or to be reclaimed only by careful management, and a very gradual diminution of the daily quantity of the intoxicating agent. The use of sulphuric acid in tonic infusions is sometimes of service in such cases as are checked at their commencement, the mind being actively and agreeably occupied. But medical means cannot be much relied upon, unless in conjunction with a judiciously managed moral restraint.

17. *b.* It may be gathered from Plutarch, Pliny, and others, that various substances were sometimes taken by the ancients, with a view of counteracting the intoxicating effects of wine. Some of these were both disgusting and ridiculous enough. Others, as olives and olive oil, absinthium, crocus, and resinous purgatives, were, perhaps, not altogether destitute of some influence. The Greeks

are said to have used common salt for this purpose; and the Romans surrounded their heads by wreaths, formed of various refreshing plants. Nothing further, however, may be said on this topic, than that intoxication, and perhaps various consecutive ill effects, will not so readily be produced when wine is taken upon a very large meal; but if this become a habit, it will very speedily induce gout or apoplexy. Cold applications, or cold sponging the head, will also delay or prevent intoxication, unless excess be carried to a worse than beastly length.

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DUODENUM — ITS DISEASES. — 1. That the duodenum performs an important part in various diseases, and that it is itself the chief seat of serious ailments, which are with great difficulty, or not at all, distinguishable from disorders of the stomach, pancreas, gall-ducts, liver, or right arch of the colon, cannot be doubted. Some writers, especially Dr. YEATS, BROUSSAIS, and his followers, suppose that affections of this viscus may be ascertained by attentive observation. They may in some cases; but with no degree of certainty; for, after the most diligent investigation of a train of phenomena apparently emanating from this organ, the inferences we shall arrive at will often possess only a certain degree of probability; for the same, or very similar symptoms, may proceed from the other viscera now named. It must, however, be admitted, that serious disorder of the duodenum will seldom exist without the functions of these organs being more or less disordered, as well as those of the stomach and small intestines; and ultimately organic change may be propagated to a greater or less extent from this viscus to one or more of them. It becomes, therefore, a matter of great importance to be acquainted with the symptoms occasioned by the more common pathological conditions of the duodenum, although we are at the same time convinced that these symptoms may be produced by changes in some one or more of the immediately adjoining organs. With all this uncertainty, however, the experienced observer will often come to just conclusions as to the seat and nature of the disease, founded on his knowledge of the functions and morbid relations of this and the surrounding parts. The duodenum is liable to all the functional and organic changes described in the article DIGESTIVE CANAL; but in different relative degrees of frequency.

I. FUNCTIONAL DISORDER OF THE DUODENUM.

CLASSIF. — I. CLASS, I. ORDER (*Author*).

2. i. PATHOLOGY. — (*a*) It is extremely probable that *impaired function* of this viscus gives rise to various symptoms of *indigestion*; warranting the designation of *duodenal dyspepsia*, if they could be distinguished from those proceeding from the stomach. But, granting that they can, we have no proof that the duodenum is the sole, or the chief seat of disorder, even in those cases which seem to admit of the least degree of doubt of such being the case. For, owing to the intimate structural connection — by continuity of tissues, blood-vessels and nerves — even functional disorder cannot exist to any sensible amount in it without being extended to the stomach, intestines, pancreas, and biliary organs. *Asthenia*, or deficient vital action of the duodenum, may be inferred in cases characterised by an unimpaired, irregular, or ravenous appetite; by constipation, and a deficient secretion and excretion of bile, the stools being light-coloured, greyish, or fœtid; by a loaded sedimentous urine; by a feeling of languor and drowsiness, with fulness at the right epigastrium, and oppression and sense of distension towards the right hypochondrium, or right shoulder-blade or loin, two or three hours after a full meal; occasionally by headach or vertigo; by absence of fever, and a pale, or foul lurid appearance of the cutaneous surface. But, in this state of disorder, the collatitious parts are coetaneously, and some of them even co-ordinately, affected. In attempting a fine series of pathological analysis, let us not be carried away either by flights of imagination or by efforts at mathematical precision, and attribute to a single organ what proceeds from several. But let us merely endeavour to interpret the phenomena of nature aright, according as they actually exist, and not as we suppose, or would have them to be. (See INDIGESTION.)

3. (*b*) Accumulations of *sordes*, the presence of *acid* and *acrid matters*, of *worms*, or of *morbid bile*, may very probably take place in the duodenum as a consequence of indigestion, or atony of the stomach, or of torpor of the liver, or even of the preceding affection; may irritate more or less its mucous surface; and, from its nervous and other structural connections, disorder the functions of digestion, chylification, assimilation, and fæcation; but the *ensemble* of symptoms that result can seldom be distinguished from those proceeding from disease of the stomach, pancreas, and biliary organs, owing to the reasons already assigned. These reasons will also explain the fact, that irritations seated primarily in this part may be propagated, along the digestive tube, to the stomach on the one hand, and to the intestines on the other; and along the ducts, to the liver and gall-bladder on the one side, and to the pancreas on the other: and I believe further, that frequent repetitions of such irritations, occasioned either by the nature of the ingesta, or by the state of the secretions poured into it, may take place without this viscus suffering materially in structure; and yet the disorder propagated from it to its collatitious organs may terminate in structural change of them. Such results are most likely to supervene in those who partake of a highly seasoned and stimulating diet; who indulge in vinous or spirituous liquors, or take too much or improper food. Irritation of the duo-

denum very probably constitutes a part of certain forms of dyspepsia; and even *pyrosis*, and other ailments frequently imputed to the stomach and the biliary apparatus may, with equal justice, be referred to this viscus; but it cannot be said to be the only part in fault, or even that primarily disordered; for it may be affected simultaneously with its related organs by changes primarily implicating its nerves and circulation.

4. ii. Treatment. — But little need be here added to what is advanced on this topic in the article Indigestion. It is obviously of importance to promote the functions of the duodenum by those means which are the best calculated to procure a due secretion of bile; as this fluid is essentially requisite both to the performance of those functions, and to the preservation of the tissues of the viscus in their healthy condition. But at the same time accumulations of fæcal or morbid matters in the bowels should be removed. A full dose of blue pill, or of hydrargyrum cum creta, should be given at bedtime with the common purgative extracts, and in the morning any of the aperient medicines in the Appendix, particularly F. 266. 382. 872. Dr. Yeats recommends either the infusion of chamomile flowers with the wine of aloes and liquor potassæ, or an infusion of quassia and senna with sulphate of potass, taken morning and mid-day. These, or F. 506. 547. 562., will be appropriate in most cases. But in those in which irritation is presumed to exist, I have preferred the following, which may be given daily, or on alternate days, until the evacuations become natural.

No. 196. ℞ Pilul. Hydrarg. gr. iij.; Pulv. Ipecacuanhæ gr. ss.—j.; Extr. Colocynth. Comp.; Extr. Hyoscyami, ãã gr. ij.; Saponis Duri gr. j. M. Fiant Pilulæ duæ horâ somni sumendæ.

No. 197. ℞ Sodæ Sub-carbon. gr. xij.; Extr. Taraxaci ʒj.; Infus. Calumbæ et Infus. Sennæ Comp. ãã ℥ss.; Spirit. Ammon. Arom. ʒss.; Tinct. Cardam. Comp. ʒj. M. Fiat Haustus primo mane capiendus.

5. When these fail of fully evacuating the bowels, the stools still continuing unnatural, or devoid of healthy bile, it will be advantageous to exhibit a full dose of calomel at bed-time, with the extracts of colocynth and hyoscyamus, and a grain of ipecacuanha; and a draught with the compound infusions of gentian and senna, with some neutral salt, in the morning. Having evacuated morbid matters, it will be requisite to give tone to the digestive organs, and to preserve a healthy secretion of bile, by prescribing two or three grains of hydrargyrum cum creta, or one or two of blue pill, at night, with extract of taraxacum, or with soap; and the infusion of columba or any other tonic, or the decoction of sarsaparilla with taraxacum, in the course of the day. When the mercurial is relinquished, small doses of the nitro-muriatic acids, with the spiritus ætheris nitrici, or the chloric æther, may be taken in the infusion of cinchona. A course of Carlsbad, or of any other alterative and aperient waters, either alone or assisted by the above alterative pill, particularly when the biliary secretion continues disordered, will often be adopted with advantage.

6. As much benefit will often accrue from a well-ordered *diet* and *regimen*, as from medicine in this complaint. The patient should be careful to partake only of light food, in moderate quantity, and at regular hours. He should masticate slowly and perfectly, avoid malt and spirituous liquors, and partake sparingly of wine. He ought to establish regular and habitual evacuations of the bowels, and take active exercise in the open air. Horse exercise, and the energetic employment of the muscles of the trunk and upper extremities, are preferable to walking. The shower-bath, or cold plunge bath, followed by frictions of the surface, will also prove of great service.

II. Inflammations of the Duodenum, and their Results.

Classif. — III. Class, I. Order (*Author*).

7. i. *Inflammatory Irritation of the Duodenum.* (*a*) The uneasiness or sense of fulness and weight which sometimes follows a meal in the course of two, three, or four hours, occasionally with a deep-seated, dull pain, or feeling of distention in the right hypochondrium, and extending to the right epigastrium, and backwards to the right shoulder-blade, may depend upon *chronic* or *sub-acute inflammatory irritation* or action in the duodenum; and, if nausea or vomiting, or pain on firm pressure directed towards the situation of the intestine, accompany these symptoms, the latter state very probably exists, either as a primary affection, or as a consequence of the disorders already noticed, and of affections propagated from the stomach or adjoining organs. The above inference will be further confirmed, if the tongue be loaded or furred at its root, its edges and point being red, and the papillæ erect; if the appetite be unimpaired, or even sometimes ravenous; if the palms of the hands and soles be hot, and the countenance and cutaneous surface more or less unhealthy; and the bowels relaxed, griped, and the stools crude or offensive. *Chronic Inflammation* of the duodenum, especially affecting its mucous surface, is generally *associated* with disorder of the stomach, biliary organs, and intestines; and often with chronic eruptions of the skin, particularly *herpes*, *psoriasis*, *pityriasis*, and *acne*. The bowels are in these cases usually irritated or irregular, the evacuations offensive and otherwise disordered, very rarely natural, occasionally containing much unhealthy bile, or evincing a deficiency or obstruction of this secretion. The skin is dry or harsh. There are also frequently slight fever, sometimes with chilliness, increased thirst, a gnawing sensation at stomach, or cravings for food, and variable capricious appetite. The spirits are often dejected, and occasionally disturbed by hypochondriacal or fanciful feelings. This state of disorder is not infrequent in females, and is in them often complicated with scanty, painful, and difficult menstruation, especially in unmarried females; and with headaches and various nervous complaints. (See Indigestion — *Irritative and Inflammatory States of.*)

8. (*b*) It has been supposed that *cholera* and *bilious diarrhœa* are chiefly owing to the acute inflammatory irritation of the internal surface of the duodenum by the morbid secretions poured into it; and doubtless such is the case in a great measure. But it should not be overlooked, that the organic nerves supplying the digestive tube are morbidly impressed at the same time by these secretions, and that the same agents quickly affect, by their presence, the whole canal, although the impression is more directly and powerfully made upon the mucous surface and nerves of this part. In *cholera*, and certain kinds of *poisoning*, therefore, where the internal coats of the stomach are violently irritated, the consequent phenomena are not to be imputed altogether, or even chiefly, to

this circumstance; but in a great measure, and sometimes chiefly, to the change produced in the nerves of the organ, and propagated throughout the system to which they belong, as well as to the parts which they directly or indirectly influence.

9. ii. *Acute Inflammation of the Duodenum.*— *Duodenitis* (*Duodenite*, Fr.) may be inferred with much probability, but with no certainty; for acute disease of the liver and of the gall ducts, or of the pancreas or of the pylorus, will give rise to very nearly the same phenomena. I believe that acute inflammation is not frequent in this viscus, or, if it be, that it does not so often give rise to disorganisation, as in other parts of the digestive canal. There can be no doubt that acute, sub-acute, and chronic inflammations are sometimes propagated to it from the stomach on the one side, and from the intestines on the other, as well as from other adjoining parts; and it would appear, from cases which I have examined, and from some recorded by M. Andral (*Archives Gén. de Méd.* t. vi. p. 161.; and *Clinique Médicale*, t. iv. p. 344.), that inflammation may commence in the mucous surface of the duodenum, extend along the ducts, giving rise to obstructions of their canals, either with or without *jaundice*, and even advance to the organs to which they belong. We more frequently, however, meet with the consequences of inflammations of these parts, in *post mortem* examinations, than with the early inflammatory appearances themselves; whilst some of the associated lesions admit of doubts being entertained whether they be the results of inflammations, or of some other state of action; but that inflammation, in one or other of its forms, often attends these alterations, cannot be denied. Thus we occasionally observe thickening and injection of the mucous and submucous coats of this viscus, with obliteration of the common ducts, and these alterations with lesions of the biliary organs, a scirrhous or enlarged state of the pancreas, or adhesions of this last with the duodenum, or of the duodenum to other adjoining parts. Scirrhus of the pylorus not infrequently extends a considerable way along this intestine; and enlargements of its mucous glands, or ulcerations, to which it is less liable than almost any part of the digestive canal, are also observed in some instances in the parts more nearly adjoining it; but we very rarely meet with a case presenting evidence of acute inflammation, and its undoubted results, upon dissection, confined altogether to the duodenum.

10. Symptoms. — *a.* Duodenitis, in any of its forms, is, therefore, very seldom limited, unless at its commencement, to this viscus; and, owing to the varied connections of this part of the canal, it may implicate more than one part of very different structures and functions. It may originate in any of the functional disorders already noticed; or may directly proceed from the kind and quantity of the ingesta, whether food, drink, medicines, or poisons; or from the irritating effects of the secretions poured into it from the liver or pancreas. Admitting, with Broussais, Andral, Boisseau, Abercrombie, Rostan, and others, the difficulty of recognising the disease during life, the existence of a dull, deep-seated, and dragging pain, in a direction from the epigastrium to the right hypochondrium, right shoulder-blade, and loin, increased upon pressure made on these regions, or upon torsion of the spine; sometimes but little felt, excepting in these circumstances, and two or three hours after a meal, when it occasionally becomes severe, and is attended or followed by sickness or vomiting; a sense of heat, or of gnawing, or of a foreign body in the region of the duodenum; great thirst; unimpaired or even a ravenous appetite; and an irregular or relaxed state of the bowels, the evacuations being copious, crude, unnatural, and offensive, are strong evidences of inflammatory action in the duodenum, especially when attended by febrile commotion of the system, similar to that already described (§ 7.), and by emaciation: but, in such cases, the immediately collatitious organs may also be diseased. Even in the more severe states of inflammation of this viscus, the pain and sickness may be very urgent a few hours after a meal, and yet but little complained of at other times, as in the rare case related by Dr. Irvine, where the duodenum only was inflamed and extensively ulcerated.

11. *b.* More frequently, acute duodenitis is *consequent* upon gastritis; or *complicated* either with it, or with a similar change in the jejunum and ilium, or with both. When it has arisen from the extension of inflammation from the inferior surface of the liver, or biliary apparatus, or when this latter proceeds from it, the stomach generally participates in the disorder, at least of function. When an irritative or inflammatory state of action extends from the inflamed duodenum to the liver, the pain rises often high in the right hypochondrium, sometimes to the right side of the thorax, especially after a meal; and is attended by bilious vomiting, occasionally with bilious stools or diarrhœa, followed by constipation, nidorous eructations, prolonged digestion, a bitter taste in the mouth, a yellow coated tongue, and a slight yellowness of the conjunctiva, and unhealthy or yellow appearance of the skin. (See Jaundice.)

12. *c.* The *consequences* of inflammatory action in the mucous surface of the duodenum are, its extension — 1st, to the stomach or small intestines, or to both; and, 2d, to the ducts, occasioning, first, obstruction or obliteration of them; and, ultimately, congestion, engorgement, enlargement, or various other lesions either of the liver or of the pancreas, or of both, with *jaundice*, and other contingent changes. When the inflammatory action attacks the whole thickness of the parietes of the intestine, whether originating in its mucous coat, or extended to its more exterior tunics from collatitious parts, the pancreas, pylorus, duodenum, ducts, and even the liver and colon, not infrequently become accreted or welded into one mass; in which the pancreas is often remarkably enlarged, hardened, or scirrhous, the ducts obliterated or obstructed, and the accreted serous surfaces and cellular tissue hypertrophied, or indurated, or granulated and tuberculated. A case of this description, of which I kept notes at the time, occurred in a dispensary patient, in 1820; since when, I have met with several others — two of them with Mr. Painter and Mr. Byam. In three cases of this description, recorded by Dr. Bright, and in one by Mr. Lloyd, fatty matters were voided in the stools; but this phenomenon either did not exist, or was overlooked in those which occurred in my practice. The instances adduced by Dr. Bright presented ulceration of the duodenum, which this able

physician considered of a malignant kind; the pancreas presenting the same diseased appearances as in the cases observed by me.

13. *d. Thickening* is one of the most frequent lesions to which the coats of the duodenum are liable; and occurs often in connection with a similar or more remarkable change in the pylorus. *Softening* of the interior tunics is equally if not more common. *Gangrene* is very rare; as also are *thinning* or atrophy of the coats, *ulceration*, and *erosion* or destruction of the villous membrane. Although enlargement of the mucous glands is more common in the duodenum than in the stomach, yet ulceration is, according to M. Boisseau, ten times more frequent in the latter than in the former.

14. *e.* In the cases of *ulceration* of the duodenum on record, most of the symptoms accompanying chronic inflammation (§ 7.) were present, with diarrhœa; and, in Dr. Bright's cases, a discharge of fatty matters from the bowels. In M. C. Broussais's case, fatal hæmorrhage took place into the intestinal canal, owing to the extension of the ulcer to the coats of a large artery. In a case detailed by Dr. Hastings, the patient had complained, for two months, of occasional vomiting and costiveness; with pain and tenderness, on pressure, in the epigastrium and right hypochondrium, below the margins of the right ribs, and extending to between the shoulders. The pulse was ninety-six, the countenance anxious, and the skin yellow; and the body much emaciated. The liver and stomach were healthy. In the duodenum, beyond the part into which the ducts entered, a cancerous ulcer was found, larger than a crown-piece, with ragged and everted edges. Its surface was irregular from fungous excrescences. The coats of the intestine, around the ulcer, were much thickened. The rest of the bowels were natural.

15. *f. Perforation* of the duodenum may occur from ulceration, and give rise either to fatal peritonitis, as in the cases adduced by Dr. Abercrombie and M. Roberts, or to adhesions and communications with other viscera; but these occurrences are rare. A case has been described by Dr. Streeten, in which a communication took place between this viscus and an external opening between the seventh and eighth ribs, through which articles of food and drink were frequently discharged. The duodenum was found much contracted beyond the perforation in it, which communicated by a canal, two inches and a half in length, through thickened cellular tissue to the external aperture. This lesion was complicated with extensive disease of the liver and thoracic viscera. The most common changes consequent upon inflammatory action in this viscus, are, jaundice, and adhesions to the adjoining parts (§ 12.); its coats becoming thickened, hardened, and otherwise changed; the morbid mass forming a tumour, which sometimes may be recognised towards the right of the epigastrium, near the end of the eighth rib, upon a careful examination.

16. iii. Treatment. — *A.* In the *slighter forms of duodenitis*, local depletions by cupping or leeches will frequently suffice; but when they are associated with manifest plethora and congestion of the portal circulation, a moderate bleeding from the arm will be preferable, in the first instance. A blister, or rubefacient plaster, applied over the epigastrium and hypochondrium, after depletions have been carried sufficiently far, will act beneficially on the seat of disease, and will favour the secretion and excretion of bile. A full dose of calomel may also be given, and be followed either by a moderate dose of castor oil, or by a purgative enema. The effect of calomel upon the upper part of the alimentary canal is satisfactorily shown, both by direct experiment and therapeutical observations, to be sedative of inflammatory action in that situation. As the bowels are generally freely open in this disease, the object will be rather to correct than to increase the secretions from them. With this view, small or moderate doses of hydrargyrum cum creta, with pulv. ipecacuanhæ comp., or pulv. Jacobi, may be given at night; and the nitrate of potash, with subcarbonate of soda in the infusion lini comp., or decoctum althææ comp., with either extractum humuli or extr. taraxaci, according to the state of the bowels, during the day. After the alterative pills have been continued a few nights, a teaspoonful each of fresh castor oil and olive oil may be taken on the surface of some aromatic water; and, if the stomach does not nauseate it, this dose may be repeated at bedtime, or in the morning, for some days. If the biliary secretion be not improved after a few days, a full dose of calomel should be given again, and the milder preparations continued in small doses for some time, and conjoined with ipecacuanha, extract of hop, or hyoscyamus, or taraxacum, according to the state of the bowels. Where the bowels are very irritable, and the secretions morbid, the mercurials may, at first, be given with the extract of lettuce, or opiates, or Dover's powder; laxatives being subsequently resorted to for the removal of morbid collections.

17. *B.* In the more *acute states of inflammation*, one or more of the allied organs are often implicated, and both general and local bleedings, blisters, and other counter-irritants, and a full dose of calomel, or of calomel and opium, are requisite; after which purgative and emollient enemata may be thrown up, and gentle and cooling laxatives be given internally with anodynes, demulcents, and diaphoretics. If fever, or a sense of heat, be felt, the nitrate of potash may be given, with the subcarbonate of soda and the sweet spirits of nitre, in camphor mixture, to which either the extract of taraxacum, or of hop, or of lettuce, may be added, according to the state of the bowels; the mild mercurial alterative being taken at bedtime. Afterwards the solution of acetate of ammonia and camphor mixture, with the wine of ipecacuanha, and tincture of henbane, in small doses, may be resorted to through the day. If diarrhœa prevail, or supervene, the hydrargyrum cum creta should be given twice or thrice in the twenty-four hours, with small doses of rhubarb, or of compound ipecacuanha powder, in the form of pill; with small doses of magnesia in the compound infusion of orange-peel, or in any aromatic water. If costiveness occur, a full dose of calomel, with rhubarb or jalap, may be taken at bedtime, and the oils, as directed above, or the compound jalap powder, the following morning; their operation being assisted by enemata, or by any gentle aperient conjoined with emollients and anodynes, as may be found requisite. If much disorder still continue, especially of the biliary and other se-

cretions, a large plaster, consisting of the ammoniacum plaster with mercury, and the compound pitch plaster, in equal proportions, or of the former only, should be placed over the epigastrium and right hypochondrium, and renewed after a week. In some cases, the opium plaster may be substituted for the latter; particularly if the bowels be irritated. When there is much irritation of the nervous system accompanying the disorder of the digestive canal, much benefit will accrue from the hydrocyanic acid exhibited in demulcent or diaphoretic vehicles, as the camphor or almond mixture, or in both; and from the following, especially after morbid secretions have been evacuated by the foregoing means: —

No. 198. ℞ Camphoræ rasæ et subactæ gr. vj.—viij.; tere cum Magnes. ustæ ʒj., et Sodæ Subcarbon. (vel Potassæ Subcarb.) ℈ ij.; dein adde, Infus. Valerianæ (vel Aq. Menth. Virid.) ℥ vij.; Spirit. Colchici Ammoniati ℥ ss.; Syrup. Papaveris ʒ iij M. Fiat Mist. cujus coch. ij. larga bis terve quotidiè sumantur.

18. Having removed the inflammatory state, by these and other medicines appropriate to the peculiarities of the case, a similar treatment to that recommended in functional disorder of this viscus (§ 4.) may be adopted, and nearly the same *diet* and *regimen* pursued. At first, however, very light, and chiefly farinaceous, articles of diet should be taken, and the beverage should consist of small glasses of spruce beer, or Seltzer or soda water, and the bowels regulated by an aperient and tonic pill (F. 558. 561, 562.), or by lavements of warm water. As the general health improves, a more generous diet, and a small quantity of wine, may be taken; regular and active exercise in the open air being enjoyed. After the more protracted cases, or when the secretions and alvine evacuations still continue, or readily become disordered, a course of taraxacum, with minute doses of a mild mercurial, subsequently of the nitro-muriatic acids, with compound decoction of sarsaparilla; or a course of either the Harrowgate, or the Marienbad, or the Carlsbad mineral waters may be tried.

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DYSENTERY. SYN. — Δυσεντερία, Gr. *Dysenteria* (from δύς, *difficultly*, and ἔντερον, *an intestine*). *Difficultas Intestinorum; Tormina*, Celsus. *Rheumatismus intestinorum cum Ulcere*, Cælius Aurelianus. *Fluxus Cruentus cum Tenesmo; Fluxus Dysentericus; Flumen Dysentericum; Tenesmus*, Auct. Var. *Dyssenterie, Flux de Sang*, Fr. *Die Ruhr*, Germ. *Dissenterie*, Ital. *Bloody Flux*.

CLASSIF. — 1 *Class*, 5 *Order* (Cullen). 3 *Class*, 2 *Order* (Good). III. CLASS, I. and II. ORDERS (*Author*, in *Preface*).

1. NOSOL. DEFIN. *Tormina, followed by straining and scanty mucous and bloody stools, containing little or no fæcal matters; and attended by febrile disturbance.*

2. PATH. DEFIN. — *Inflammatory action of a sthenic or asthenic kind, seated in the mucous surface of the intestines, chiefly of the large intestines, accompanied with more or less constitutional disturbance, and retention or disorder of the natural secretions and excretions.*

3. *Litt. Hist.* — Dysentery, owing to its prevalence in ancient as well as in modern times, has attracted a large share of the attention of medical writers. HIPPOCRATES (*Opera, edit.* VANDER LINDEN, vol. i. p. 252., vol. ii. p. 101. 176. *et passim*) notices it in various places, both as a sporadic and as an epidemic disease; and in such a way as shows that he was acquainted with several of its pathological states and relations, and even with its complication with functional and organic disease of the liver. CELSUS (*De Med.* l. iv. cap. 15.) mentions it by the name of tormina, as distinct from tenesmus, from lientery (*levitas intestinorum*), and from diarrhœa. ARETÆUS (*De Sig. et Caus. Morb. Diut.* l. ii. cap. 9. ed. Boerhaave, p. 59.) attributed the complaint, with HIPPOCRATES, to ulceration of the intestines; and was the first to describe it in an accurate and connected manner. GALEN (*De Caus. Sympt.* l. iii. cap. 7.), although, perhaps, not the first to distinguish the different forms of the disease, has furnished us with the earliest attempt of this kind that we possess. He particularises a *sanguineous*, an *hepatic*, an *atrabilious*, and an *ulcerated* variety. Subsequent writers, — Greek, Latin, or Arabian, — down to the commencement of the sixteenth century, when the writings of the celebrated FERNEL first appeared, added but little to the materials scattered through the works of GALEN. From FERNEL to the present age, the disease has been nearly as well understood, as respects both its nature and treatment, as at the present time. The numerous epidemics, however, that have occurred, and been described by experienced writers, from the time of this physician, have furnished diversified facts, illustrative of its varied forms, and of its treatment.

4. I. SEAT AND FORMS OF THE DISEASE. — *A.* The ancient writers, from HIPPOCRATES to AVICENNA, considered dysentery to be *seated* in the internal coats of the intestines — particularly the large intestines — and attributed it too generally to erosion and ulceration. CÆLIUS AURELIANUS, AËTIUS, ALEXANDER TRALLIANUS, and others, who wrote between GALEN and AVICENNA, entertained the same view as to its nature and seat, and imputed the modifications it presented to the particular part of the bowels chiefly affected. They even attempted, and not without some degree of justice and even of accuracy, to point out, from the character of the discharges and the appearance of the blood in the stools, its seat in the small intestines, in the colon, or in the rectum. AËTIUS (*Tetrabibl.* iii. s. i. cap. 43.) believed that the jejunum is sometimes the part chiefly diseased, and described the symptoms — many of them really concomitants of inflammation of the mucous surface of the small intestines — that characterised this variety. Similar views were

entertained, also, by Alexander Trallianus, Paulus Ægineta, and Actuarius. An attentive consideration of the various manifestations of the disease, especially in an epidemic form, will show that these opinions are not without foundation. How far they are consistent with the results of modern researches, will appear in the sequel.

5. *B.* The *forms* of dysentery are extremely diversified: — (*a*) As respects its *Origin*, it is — *α. primary*; *β. consecutive*; and *γ. symptomatic.* — (*b*) In regard of the *Circumstances* under which it occurs, it is — *α. sporadic*; *β. endemic*; *γ. epidemic*; and, *δ.* both *endemic* and *epidemic*, in the same locality, on certain occasions. — (*c*) As to its *Type*, it is — *α. remittent*; and, *β. continued*; most commonly the latter, especially in temperate climates. — (*d*) As regards its *Character*, it is — *α. inflammatory*; *β. bilious-inflammatory*; *γ. simply asthenic*; *δ. bilious-asthenic*; *ε. adynamic* or *typhoid*; *ζ. malignant* or *putrid*; *η. scorbutic*; and, *ϑ. complicated.* — (*e*) As to *Intensity* and *Duration*, it is — *α. hyperacute*; *β. acute*; *γ. subacute*; and, *δ. chronic.* These modifications, or *varieties of character and intensity*, are, however, merely arbitrary distinctions, founded on the more prominent symptoms of the malady, and adopted chiefly in order to guide us in the appropriation of remedial measures. Indeed, it should not be overlooked in this, more than in other diseases which possess very specific and distinct features in a majority of cases, that it will frequently assume forms intermediate between *cholera* on the one hand, and *diarrhœa* on the other; between *fever* with enteric characters, and *colic* or simple *tenesmus*; that it may be but very slightly different from some one of these complaints; and that, in one or other of its forms, it may be *consecutive of*, or *lapse into*, any one of the maladies now named. This connection between disorders of parts intimately associated in function and structure, is merely what may be expected *à priori*, conformably with the pathological principles developed in the article Disease. The diversified forms and close relation of dysentery to other maladies are readily explained on these principles; especially if considered in connection with the nature of the different causes in which it originates; with the condition of the vital actions, the circulating fluid, and the secretions and excretions, at the time when its causes make their first impression; with the changes which concurrent causes induce from the commencement, and with the circumstances modifying the state of the circulating and secreted fluids in the progress of morbid action.

6. In describing the *varieties* or *states* of the disease, it is of the utmost importance — considering its great prevalence and fatality in certain circumstances, on many occasions — not to multiply distinctions beyond such as are well ascertained and are practically important; nor to neglect to notice such as have been accurately described — as are contingent on certain combinations of causes of occasional, but not of common occurrence; and, although neglected or overlooked, from an injurious spirit of simplifying or generalising, as nevertheless exist, and may be manifested in a prominent manner whenever the causes in which they originate prevail. Taking my own experience merely as a guide since 1812, when I first treated the disease — as I subsequently observed it in the tracks of the great armies which traversed Europe at the close of the Continental war — and as I was brought in constant intercourse with it for a time, in the most sickly climate within the tropics, in both European and native constitutions — independently of the graphic delineations of it in many of the works referred to, I consider dysentery neither so simple in its nature, nor so unvarying in its seat and forms, as some recent and contemporary writers in this country have stated. That writer will but imperfectly perform his duty who, in giving a history of a most prevalent and dangerous malady, confines himself to the particular form it has assumed during a few seasons, within the single locality or the small circle of which he is the centre, and argues that it is always as he has observed it; thereby affirming as true of the genus, what may be hardly true of the species, and even of it only under certain circumstances.

7. The different forms of dysentery are so entirely dependent upon certain states of the organic or vital actions, and of the secreted and circulating fluids, that these constitute the true basis of all distinctions between them, and of all rational indications of cure. These states, which are so important, are so difficult to ascertain and estimate truly, even by the most profound and experienced observers, and are so continually varying, that attempts to describe them must be received as approximations only to some of those which will frequently present themselves in practice: for the one will so insensibly pass into the other, both in different persons, and even in the same person at different stages, when certain agents are in operation, that the forms of the disease are not to be viewed as constant, but as changing according to circumstances, so as frequently to assume characters intermediate between those which are described. Although the features of the disease are so numerous and so changeable — as may, indeed, be expected from the operation of numerous agents in ever-varying states of combination upon the economy — yet the necessity of delineating certain of them which are the most prominent and the most common, as guides for the inexperienced, must be apparent. In our inquiries into the nature of, and the means of removing, morbid actions, the conditions of life are the chief subjects of interest; for these conditions constitute not only the chief changes, but also the sources, whence those which are organic spring. They are, moreover, the most directly and energetically impressed by remedial agents, and are the chief media by which structural lesions are removed. I shall, therefore, describe the forms of this malady, conformably with these views. It was evidently with a conviction of the practical importance of early and exactly recognising the states of organic or vital action, that J. P. Frank and Horn divided the acute states into (*a*) *sthenic*, and (*b*) *asthenic*; the former comprising the *simple*, the *inflammatory*, and the *bilious* varieties; the latter the *malignant* or *putrid*, the *scorbutic*, and the *nervous* of Richter, Kreysig, and some other authors. Without adverting to the divisions by Sagar and Sauvages, which are formed upon no consistent principle, but chiefly upon the causes that produce the disease, I will notice such as have been adopted by some of the most experienced writers. Whilst they agree in the more general division into *acute* and *chronic*, they differ mate-

rially in the arrangement of the acute states. ZIMMERMANN particularises the *inflammatory*, *malignant*, *putrid*, and *chronic* states. RICHTER describes the *simple*, *inflammatory*, *bilious*, and *nervous* forms; and KREYSSIG adds to these the *pituitous* or *mucous*, and the *putrid* or *malignant*. MM. FOURNIER and VAIDY adopt nearly the same division as KREYSSIG, but they adduce, in addition, the association of the disease with *typhus* and *ague*. SCHMIDTMANN distinguishes the *simple*, the *inflammatory*, the *bilious*, and *bilious-inflammatory*, the *nervous*, and the *putrid* varieties. M. VIGNES, one of the most recent and experienced writers on dysentery, considers, first, its *benign* or *purely inflammatory states*, under the denomination of *mucous* and *bilious*; and, next, its *malignant forms*, comprising the *typhoid*, *adynamic*, *ataxic*, and *complicated*. In the description I am about to give of the disease, I shall follow a nearly similar arrangement to the most approved of those adopted by the ablest and most experienced of my predecessors. In the *first* place, those *acute* forms will be noticed which are the most simple, which are more or less *sthenic* or *inflammatory*, and in which the vital energies are either not materially affected, or not perverted to the extent of subduing the natural tendency of the economy to resolution and to a restoration of the healthy action. *Secondly*, the *asthenic*, or more unfavourable and complicated states, which have been variously denominated, according to the predominance of certain characters, arising out of particular circumstances and epidemic influences, will be considered. Thirdly, the *chronic* and *complicated* forms will be described.

II. OF ACUTE DYSENTERY.—i. ITS SIMPLE, STHENIC, OR PURELY INFLAMMATORY STATES.

CLASSIF. —III. CLASS, I. ORDER.

8. DEFIN.—*Tormina, tenesmus, mucous or bloody stools, and a sense of heat or pain in the colon and rectum, with tenderness on pressure, and symptomatic fever; the nervous, circulating, and muscular functions not indicating vital depression until late in the disease.*

9. *A.* CAUSES.—(*a*) The *predisposing causes* of the sthenic states of the disease are chiefly high ranges of temperature following wet and cold seasons; whatever favours the production and accumulation of morbid secretions in the biliary apparatus and *prima via*; debility of the digestive organs, particularly of the intestinal canal; a plethoric state of the vascular system; unnatural flexures of the colon favouring fæcal accumulations in the bowels; neglect of the functions of digestion and fæcation; the habitual use of spirituous liquors, or other inebriating beverages in excess; rich food, and highly seasoned cookery. Dysentery is generally most common in autumn and in the beginning of winter; in persons of the rheumatic diathesis; and in those who have undergone great fatigue; or who have been recently affected by continued, remittent, or intermittent fevers; but, in such circumstances, it is as often of an asthenic as of a sthenic kind.

10. (*b*) The *exciting causes* of the sthenic forms of the disease are drunkenness; exposure to vicissitudes of climate or of temperature, and especially to cold and moisture, or to the night-dews; sleeping in the open air, and more particularly on the ground, without sufficient protection intervening, or without requisite covering, as in the case of armies in the field; wearing damp or wet clothes, or too thin clothing; acerb, acid, unripe, or over-ripe and stale fruit and vegetables; raw, cold, and indigestible fruit, &c., as cucumbers, melons, pine-apples, &c.; the stones and seeds of fruit; unwholesome food, especially unripe or blighted corn or rice; and acid or unwholesome drink, as sour or bad beer and wine. The exhalations from wet, cold, and clay soils and marshes, or from the banks of lakes, rivers, and canals; and the use of marsh, stagnant, or brackish water for drink, with many of the causes mentioned in connection with the other forms of the disease (§22. *b.*), will also produce this form in persons of a sanguineous and plethoric constitution. Mr. ANNESLEY states, that dysentery became, at one time, remarkably prevalent amongst the British troops in India to which he was attached, and that, upon investigation, he traced it to their eating the pork of the country with their breakfasts. Upon a stop being put to this practice, the disease altogether disappeared.

11. *B.* SYMPTOMS AND PROGRESS.—Sthenic dysentery presents various states and grades of severity, depending upon the nature of the cause, the state of the secretions, and the degree of inflammatory irritation or of spasmodic action of the bowels resulting therefrom. It is often preceded by constipation when occurring sporadically, and frequently by diarrhœa when arising from endemic or epidemic causes; but in many instances the dysenteric symptoms appear from the first, and are attended by chills or rigors. When it is caused by endemic causes, or is epidemic, the inflammatory symptoms may be very slight, and yet the constitutional disturbance and morbid action of the bowels very considerable; or the irritation and inflammation may be along the small as well as the large intestines.

12. (*a*) The *milder state* of the complaint, especially as it occurs sporadically in Europe, commences either with liquid and feculent, or with mucous stools, the latter being occasionally streaked with blood, and always becoming so in a few days. Generally, horripilations or chills precede, accompany, or follow these evacuations, which are consequent upon gripings and a sense of increased action in the course of the colon; and are often passed with heat or scalding in the rectum, followed by straining or tenesmus. The stools are frequent; commonly from eight or ten to more than double this number in twenty-four hours, and are streaked with more or less blood. They subsequently become less mucous, more watery, and sometimes contain traces of fæculent matter. There is little or no pain in the abdomen between the calls to stool, but often an irksome sensation is felt in the situation of the sigmoid flexure of the colon and of the rectum. The pulse is either very slightly affected, or quick and small; the tongue is generally loaded or furred; and the thirst increased. The appetite is frequently not much, or even not at all impaired. This slightest grade of the disease may terminate favourably in from six to nine days, or it may pass into a *chronic* form.— *Relapses*, and organic changes in the large bowels, sometimes also follow it.

13. (*b*) In its *more severe states*, dysentery is preceded either by diarrhœa, or by disorder of the stomach and bowels; or by nausea, flatulence, constipation, and occasionally vomiting. These

symptoms may be of two or three days' duration, before the characteristic evacuations are observed, or be accompanied or followed by distinct chills or rigors, ushering in increased heat and frequency of pulse. In other cases, very frequent, scanty, mucous, and gelatinous motions, streaked with blood, preceded by gripings and tormina, and attended by straining, at once introduce the disease. Frequently the horripilations or chills continue to alternate for some time, with increased heat, and other febrile symptoms. The pain at first is often limited to the rectum and sigmoid flexure of the colon, occasional griping only being felt in the abdomen. The pulse is slightly accelerated, and the tongue white and loaded. If the disease be not subdued or mitigated in this early stage, the calls to evacuation become more frequent; are preceded by more severe griping and tormina; are attended by greater straining; and are sometimes ineffectual. The tongue is more loaded, and the pulse more frequent and small. In many cases, however, little or no pain is felt, excepting when the patient is about to pass a motion, although the matters discharged are most morbid, and the constitutional affection severe. This, however, is no evidence of the absence of inflammation; for the mucous surface of the large bowels may be inflamed, and even ulcerated, and yet but little uneasiness, unless upon firm pressure, will be complained of. Often, where pain in the intervals between the tormina is absent, a sense of heat in the course of the colon, or of soreness in the abdomen, is felt, and indicates, even more than acute pain, the existence of inflammatory action. As long as disease has extended no farther than to the mucous surface of the large bowels, the patient seldom feels more than the above sensations, or a dull aching pain, not increased on pressure, which he describes as shooting, at times, through the abdomen; but when the region of the cæcum is minutely examined, pain or fulness is generally detected in that situation, even when neither can be felt over the sigmoid flexure.

13. As the disease proceeds, the stools become more frequent, the tenesmus more severe, the discharges of blood greater and more mixed with the matters evacuated, which gradually pass from a mucous, slimy, or gelatinous, to a watery and dark muddy appearance, either with an intimate admixture of feculent matter, or occasionally with hardened fæces, and even with pure and unmixed blood. The tenesmus is now attended by a feeling as if the bowels themselves would pass off; and, in children and delicate persons, *prolapsis ani* not unfrequently occurs. In some instances, as the disease advances, substances resembling fat or pieces of flesh, and consisting chiefly of masses of coagulable lymph, or of the fibrine of the blood poured out in the bowel, come away. The *urine* is now, and often early in the complaint, of a high colour, voided frequently, always with scalding pain, or difficulty; and sometimes the dysuria amounts to strangury, owing to the vicinity of the chief seat of disease. The tongue is at this period loaded towards the base, and its papillæ are excited. The pulse is quick and small; the skin harsh, hot, and dry, especially over the abdomen; the tormina and tenesmus increase, and the calls to stool are more incessant, especially during the night and early in the morn- when the febrile symptoms are also much augmented. The thirst is urgent and the appetite lost; every thing taken to assuage the thirst being followed by tormina, and a desire of evacuation, as if it had rapidly passed through the bowels; and the patient desponds. Subsequently pain becomes more fixed in the hypogastrium, the abdomen more tense, full, or tender; the strength sinks; and dyspnœa sometimes supervenes,—indicating the extension of inflammatory action to the peritoneum. If no amelioration take place before the appearance of these latter symptoms, the pulse becomes more quick and feeble, the extremities cold; the tongue either brown, or dry and hard, or glazed, red, and aphthous; the strength more reduced, the emaciation great; the discharges dark, watery, offensive, cadaverous, and like the washings of flesh; and the spirits dejected. Hiccup sometimes occurs; with delirium, relaxation of the *sphincter ani*, leipothymia, and death, at a period varying from a fortnight to three or four weeks. In other instances, the disease is arrested some time before dangerous symptoms supervene, or is mitigated only, and thence passes into the *chronic* form.

14. Simple dysentery presents every grade of severity between the two now described; and such are the most common appearances which it assumes in this and in temperate climates; but the symptoms often vary much, according to the causes, the age, and strength of the patient; the parts of the canal first affected; the pre-existence of collections of morbid secretions or fæcal matters, the external agents operating during treatment, and the means employed. To some of these *modifications and their pathological relations* it is necessary to advert. When it arises sporadically, febrile action, ushered in by chills or rigors, seldom is observed until the dysenteric symptoms are formed, and is merely symptomatic of the local disease, which may commence in the cæcum, or in the colon and rectum, or in this last, and be there in a great measure limited, or may extend more or less to other parts. Thus patients are frequently affected with diarrhœa, uneasiness and fulness of the abdomen, particularly in the region and vicinity of the cæcum, several days before mucous and bloody stools or straining are complained of, especially when the disease is consecutive of fever; and occasionally they experience tenesmus some days before the disorder is fully formed. In these cases, the progress of affection from the cæcum, or even from the small intestines, along the colon to the rectum, as well as in the opposite direction, may be traced by the symptoms, when the patient comes early under treatment. In other instances, especially those consequent upon fever, and in some epidemics, febrile action may co-exist with, or even precede, the earliest symptoms. It is, therefore, important, in a practical point of view, to ascertain the early seat and extent of morbid action, as well as its constitutional relations; as, together, they furnish the chief basis of therapeutical indications; for, in proportion as constitutional disturbance is great, previously to the formation of the bowel affection, the less should antiphlogistic or depletory measures be relied upon in the treatment. In general, although the straining be severe, and the calls to stool frequent, yet if uneasiness or pain be not occasioned by pressure over the region of the cæcum and sigmoid flexure of the colon, if heat in the course of the colon be not felt, and if tormina be not

violent, nor the abdomen tense or tender, the rectum may be considered the chief seat of the disease; the secretions poured out in the upper parts of the intestinal canal having produced, first, irritation, and afterwards, inflammation of this part. But, if there exist much primary constitutional disturbance, this inference should not be drawn; for, in such cases, the mucous surface of both the small and the large bowels may be seriously affected, and yet these symptoms may not be present in any evident degree. Cases will also occur, characterised by tormina, twisting pains about the umbilicus, borborygmi, tension of the abdomen, more or less febrile commotion, and frequent calls to stool; the evacuations being mucous, bloody, and subsequently watery, &c.; and yet little or no tenesmus will exist. In these, the seat of disease is chiefly the ilium, the cæcum, and upper part of the colon; which often become speedily ulcerated if the morbid action be not arrested. When, in addition to these symptoms, tenesmus is urgent, the rectum and sigmoid flexure of the colon are also affected.

15. In this form of disease, the quantity of matters evacuated from the bowels is extremely various. In severe or advanced cases, from twenty to thirty, or even forty, efforts at stool are sometimes made in the twenty-four hours, and often without any further discharge than a little mucus and blood; but occasionally much serous or watery matter, with broken-down fæces, slime, mucus, and blood, is voided, exhausting and emaciating the patient. In some instances, the evacuations are muco-puriform, more or less streaked with blood, without the least trace of fæces; and in others, they contain scybalæ. It would seem, that the retained fæces are frequently broken down or semi-dissolved by, and mixed up with, the serous and sero-sanguineous fluid exhaled from the irritated mucous surface; and hence the infrequency of scybalæ in many states of the disease. The evacuations are often very offensive from the commencement, but as frequently they are not manifestly so. They generally become fœtid, or have a peculiar raw cadaverous odour in the last stage of the worst cases; especially when portions of the mucous surface are sloughed off. They are sometimes of a singularly variegated hue; consisting of glairy mucus, with a greenish or gelatinous substance, resembling morbid bile; seldom with pure bile; often without any trace of this secretion; occasionally with large pieces of albuminous concretions of coagulated lymph or fibrine, formed upon the internal surface of the bowel, and afterwards detached; and either with streaks of fluid blood, or with small dark coagula. When the blood is in large quantity, and is fluid and distinct from the other matters, it is evidently poured out by the lower parts of the large bowels. When consisting of dark grumous clots, intimately mixed with the discharges, it probably proceeds from the cæcum, or upper portion of the colon. It may, or may not, even when most copious, depend upon ulceration; but it most commonly is exuded from the irritated mucous surface, especially early in the disease. It may be very abundant, even at this stage, and continue so till death, particularly in drunkards; or it may be trifling throughout; or be copious only at the close of the disease.

16. The state of the *abdomen* also varies. In some, tension with fulness, proceeding generally from fæcal accumulations; and flatus is much complained of from the commencement. In others, the abdomen is natural in size. *Pain* and tenderness on pressure are uncertain symptoms in the early stage of the disease. When it is fixed in one place, we should suspect inflammation or disorganisation to be proceeding there. It is, in the plethoric, most frequently complained of in the hypogastrium and region of the cæcum; and it may often be traced up the right side and in the course of the colon. Often there is little or no pain, nor even soreness; the patient bearing pressure without expressing any uneasiness, and yet, upon examination after death, the morbid appearances will be as extensive, in respect of the inner surface of the bowel, at least, as in those who complained of the greatest pain; the chief difference being in the more complete limitation of the lesions to the mucous surface in those cases wherein no pain was felt. It is chiefly in the last stage, when inflammatory action has extended to the serous surface of the bowels, that fulness, pain, and tenderness of the abdomen have been complained of.

17. (*c*) *Hyper-acute dysentery*, or *dysentery in Europeans removed to warm countries*, is generally *occasioned* by a too rich and stimulating diet, and a regimen entirely unsuited to the climate; by the too free use of ardent and intoxicating liquors; by exposure to the night air, or to cold and moisture; and by the endemic and other causes mentioned above (§§ 9, 10.). It often assumes the severe character now described; and, in persons who are plethoric, who have neglected their bowels, have lived highly, or are of a phlogistic diathesis, or who possess rigid fibres and great irritability, it puts on a still more violent or a *super-acute form*. In them, the sense of heat and soreness; the tormina, fixed pain of the hypogastrium, the tension of the abdomen, the continual calls to stool, and the straining, are most distressing. The region of the cæcum is full and tender. The tongue is white, loaded, excited; sometimes clean and natural, but afterwards dry. The skin and pulse are frequently, at first, and for some time, very little affected; the constitutional disorder not being commensurate with the severity of the local symptoms; but the former subsequently becomes dry or hot, and the latter quick, hard, and small. In many cases, the disease begins as common diarrhœa; in others, it comes on suddenly, and rapidly reaches its acmé; and then the thirst is excessive; the urine scanty, voided with great pain, or altogether suppressed; the testes drawn up to the abdominal ring; the stools mucous, slimy, streaked with florid blood, sometimes attended by *prolapsus ani*, and rapidly passing to watery, serous, or ichorous discharges, resembling the washings of raw beef, in which float particles, or even large shreds of coagulable lymph, thrown off from the acutely inflamed surface, often with copious discharges of blood. Great depression of spirits, nausea, vomiting of bilious matters, and distressing flatulence or borborygmi, which aggravate the tormina, are also present, and, in many of the fatal cases, continue to the last. In some of these the inflammatory action extends to the submucous coats, and detaches portions of the mucous tissue, which come away in the stools, in the last stage, or even hang from the rectum; any effort

to withdraw them occasioning a remarkable increase of suffering. The constitutional disturbance has now become very severe, and a fœtid or cadaverous odour proceeds from the patient. Detached portions of the mucous membrane will be recognised by their sloughy appearance; by the ichorous character and putrid smell of the discharges which contain them; and by the period at which they are observed, the albuminous exudations that resemble them being thrown off at an earlier stage.

18. In somewhat less violent and more protracted cases, especially as the disease approaches an unfavourable close, the motions are sometimes streaked with a puriform sanies, or with a whitish, opaque, or greyish matter, apparently depending on ulceration; and they frequently are involuntary, owing to the paralytic state of the sphincter, the anus being excoriated, livid, relaxed, and widely open. The surface of the body, also, is shrunk, occasionally yellowish; the superficial veins deprived of blood, and the extremities moistened with a cold sweat. At last, the patient is affected by leipothymia, or stupor, or by delirium, and other nervous symptoms, and dies in from four, five, or six days, to three weeks, unless the disease is of a milder or more chronic form, or is arrested by treatment.

19. In Europeans, long resident in an intertropical or hot country, the disease assumes either a less inflammatory form than the preceding, or some one of the asthenic states about to be described; it also frequently becomes chronic in them, and is often consequent upon, or associated with, ague, remittent fever, or with diseases of the liver, spleen, and other abdominal organs. (See § 20. *et seq.*, and *Complications.*)

ii. The Asthenic Forms of Dysentery.

Classif.—III. Class, XI. Order (*Author*).

20. Defin.—*Depression of the organic actions; of the tone of the circulating, nervous, and muscular functions, preceding or accompanying the occurrence of tormina and tenesmus, with mucous, bloody, and offensive stools, and giving rise to fœtid exhalations, and infection in confined places and predisposed persons.*

21. The asthenic forms of the disease have been variously denominated, according to the more prominent features assumed by them under certain circumstances, endemic as well as sporadic, and especially in different epidemics. Whilst the foregoing states are generally attended, especially in their early stages, by sthenic vascular action, those about to be noticed are usually characterised by *fever*, of a low, nervous, or adynamic kind; by greater prostration of the constitutional powers than the preceding; by an earlier manifestation of febrile commotion or constitutional affection, which may even precede the dysenteric symptoms; and by a much more remarkable affection of the whole economy: and while the above forms are generally sporadic, sometimes endemic, and seldom epidemic or infectious, those about to be described are commonly epidemic and infectious, under circumstances favourable to this mode of propagation; sometimes endemic; and more rarely sporadic, excepting in the darker races of the species, in which it is extremely apt to become infectious, when occasions promote its spread in this manner.

22. *A.* Causes.—(*a*) The *predisposing causes* of the asthenic forms of dysentery are, chiefly, epidemic states of the atmosphere; cold and variable weather after long heats, or after hot and moist seasons; prolonged heat and humidity; accumulations of morbid secretions in the *primæ viæ*; a cachectic habit of body; deficient and unwholesome food; pre-existing debility, especially that caused by low fevers; an impure and miasmatous state of the air, especially when connected with humidity; worms in the *primæ viæ*; and the predisposing causes already enumerated (§ 9.).

(*b*) The *exciting causes* are, famine or prolonged fatigue; exposure to a moist cold; the excessive use of intoxicating liquors; exhalations from animal and vegetable matters in a state of decay; the use of marsh, stagnant, or river water holding decomposed animal and vegetable matters in solution, or containing, either with or without these, animalculæ and minute insects, or of brackish waters; the flesh of diseased animals, or meat kept too long, or tainted; stale fish; blighted, unripe or ergoted rice, rye, &c.; unwholesome or insufficient food; breathing the stagnant or infected air of low, crowded, and ill-ventilated places, especially when a case of the disease occurs in such circumstances—as in hospitals, camps, prisons, ships, barracks, &c.; and the exhalations proceeding from the discharges, and from the sick, either confined and concentrated in a stagnant, or floating in a warm, moist, miasmatous, or epidemic atmosphere. But there is reason to suppose, that the concurrence of two or more of the causes enumerated in connection with the sthenic states of the malady will also produce some one of its asthenic forms, during certain conditions of the air which have been called epidemic, especially in persons of a weak frame and depressed vital and mental powers. The least energetic, also, of the above causes, acting on persons already affected by the preceding form of the disease, will convert it into some one of the asthenic states. Owing chiefly to the diversity of the exciting causes, to their concurrent operation, and to the difference in the state of constitutional predisposition, &c. are to be imputed the modifications which the disease presents when epidemic, or at different seasons.

23. *a.* Of the influence of exhalations from animal bodies in a state of decomposition, in causing the low forms of dysentery, I could produce, if my limits would permit, numerous proofs. One of the authors of the article *Dysentery*, in the *Dictionnaire des Sciences Médicales*, states, that, having been detained on horseback in a field of battle, in August, 1796, where several hundred men and horses lay in the first stage of decomposition, he was seized with a dangerous dysentery on the following day; that three out of four of those who accompanied him were similarly infected; and that his horse died of the same disease soon after. Similar facts are adduced by Zimmermann, Osiander, Desgenettes, and others. Of the agency of impure water, in producing dysentery, proofs are likewise numerous. I have myself seen several instances, in a warm climate, where it was the cause of the disease being endemic there. In temperate countries, waters containing decayed animal matters, or an excess of uncombined alkali, cause diarrhœa more frequently than dysentery, or the former passing into the latter. But in warm climates, especially where water is collected and

preserved in tanks, and in autumn, after warm summers, in colder countries, dysentery is the most common result. The water of the Seine at Paris, from this cause, often produces the disease; and Dr. M. BARRY states, that such of the inhabitants of Cork as used the water of the river Lee, which receives the contents of the sewers, and is, moreover, brackish from the tide, are subject to a very fatal dysentery; and that, at the time to which he especially refers, at least one in three of those affected died of it. I have no doubt that the dysentery epidemic in London, during several successive autumns after the great plague, was owing to the same causes, as well as to the exhalations from the burying-grounds, which received the bodies of those who died of that pestilence; and that the prevalence of the disease in besieging, as well as in besieged armies, is caused by the exhalations from the decomposition of the dead; by the impure state of the water, from decomposed animal matter carried into it; by night exposure; irregular living, deficient food or clothing, and the other contingencies on encampments and operations in the field; and by crowded and ill-ventilated barracks, &c. The frequent occurrence and fatality of dysentery in fleets, in former times, evidently arose from the putrid state of the water, and the foul and stagnant air between decks, sometimes breathed by several hundred persons. During the slave trade, dysentery was, and even now is, among the numerous small vessels engaged in this disgusting traffic, the chief pestilence; one half of those conveyed in these floating receptacles of misery, on some occasions, having died of it during the passage across the Atlantic. It may be here mentioned, that the dark races, particularly negroes, are more liable to dysentery than to any other disease; that it assumes an extremely low or putrid form in them, when confined in ill-ventilated situations; and that, when a number, even of those in health, are shut up in such places, the cutaneous secretions, which are so abundant and offensive in these races, accumulate in and vitiate the surrounding air, so that if it be not frequently renewed, the systems of those thus circumstanced are thereby infected, and, instead of an infectious typhus, which would be the result in the European constitution, a putrid dysentery, spreading rapidly through all breathing the impure air, is developed. I had, in 1817, an opportunity of witnessing what I now state. The disease is considered by the native Africans as infectious as small-pox, and is dreaded by them equally with it; these two being the most fatal diseases to which they are liable.

24. *β*. The *contagion* of dysentery has been much disputed; chiefly owing to the circumstances of the different forms of the disease not having been distinguished with any degree of precision, and of the loose notions attached to the words contagion and infection, by those who espoused different sides of the question. In the article INFECTION, these terms, and their true value, are attempted to be estimated with more precision than heretofore. As respects this malady, it may be stated, as the result of observation and acquaintance with what has been written, that the sthenic forms are seldom or never infectious — and chiefly for this reason, that the circumstances in which they occur are unfavourable both to the generation of infectious emanations, and to their accumulation, concentration, and operation in healthy persons — that, in short, they, like all other sthenic maladies, do not evolve infectious effluvia, because the vital energies are not depressed nor perverted to such a degree, even in their advanced stages, as to give rise to the depravation of the circulating and secreted fluids requisite to the production of infectious emanations, these changes taking place only when some one or more of the causes which produce these effects — the causes of the asthenic states — come into operation; — that febrile diseases, attended by depravation of vital power and of the fluids, evolve effluvia capable, under favourable circumstances, of infecting or contaminating those disposed to be impressed by them; — and that, as the asthenic forms of dysentery are characterised by these properties, and as the emanations disengaged in their advanced stages become cognisable to the senses, as well as by their effects, it must be inferred, that these forms are infectious on occasions favourable to the action of the emanations which proceed from them. These inferences, founded on an important pathological principle, are confirmed by enlightened and most numerous observations; and, independently of such confirmation, this principle must be shown to be unfounded before the inferences drawn from it can be denied. Thus it will appear that the great difference of opinion that has existed on this subject is to be referred, first, to the fact that certain states only of the disease are infectious, and these chiefly in circumstances favourable to the development and operation of the infectious emanation; and, secondly, to the incorrect notions entertained respecting contagion and infection; many believing, because the disease is not propagated by mediate or immediate contact of the diseased person, or of a palpable secretion or virus, that therefore no contagion nor infection is produced by it. But the spread of dysentery very closely resembles that of scarlatina or measles, which cannot be propagated by inoculation, or by the application, either direct or indirect, of the morbid secretions to a confined part of the external surface; and yet the effluvium from the sick or the fæcal evacuations, floating in a close or stagnant air, will readily induce the disease, in persons who, constitutionally, or from the influence of concurrent causes, are disposed to it, and who breathe the air thus contaminated. In such cases, the effluvium operates, as in other infectious diseases, chiefly through the medium of the respiratory organs; the system being affected, although not very manifestly, before the dysenteric symptoms are developed. Several respectable authors, however, have conceived it to be propagated, when persons repair to the water-closet or night-chair used by dysenteric patients, by the action of the infected air or effluvium upon the anus, the affection extending upwards, along the rectum. HUFELAND and some others state, that they have seen the complaint communicated by the pipe of an enema apparatus. But, in most of the instances of the infectious disease that I some years ago had an opportunity of seeing, constitutional disturbance, and often diarrhœa, preceded the fully-formed dysentery.

25. *B*. FORMS AND SYMPTOMS. — *a*. *The simple sthenic* or *adynamic dysentery*. This variety is one of the most common, particularly in this country. It may occur sporadically in delicate

owing chiefly to the more debilitating causes assigned above. It is also frequently epidemic, especially among the poor in times of scarcity, and after very wet and warm seasons; it often follows attacks of adynamic fevers, or prevails at seasons when they are prevalent. It was epidemic in Glasgow in the autumn of 1827; and is described by Mr. Wilson, Mr. Brown, Dr. Macfarlane, and Mr. Weir (*Glasgow Med. Journ.* vol. i. pp. 39. 48. 99. 223.) It generally commences with diarrhœa, succeeding a constipated state of the bowels; and very frequently, especially in the more severe cases, coldness, chills, or rigors are observed, attended by griping pains about the lower part of the abdomen, with frequent calls to stool; and sometimes followed by fixed pain in the hypogastrium, particularly at its right and left sides. Want of appetite, increased thirst, furred tongue, clamminess of the mouth, and acceleration of pulse, usually are superadded. As the disease becomes fully formed, the pulse is more or less frequent, small, weak, and soft; the skin is sometimes but little warmer than natural, or only hotter over the abdomen: it is commonly harsh and dry. The countenance is pale, shrunk, and anxious; sickness and vomitings occasionally occur; and singultus is not infrequent in the latter stages, when the tongue, from being white, slimy, furred, and yellowish, generally becomes red, glazed, and chapped, and occasionally dark red and dry. The stools sometimes are not mucous, slimy, or bloody, although very frequent, until the second, third, or fourth day; but, in other instances, they present these characters from the first. They are always of this description as soon as chilliness or rigors are felt. The evacuations vary greatly in frequency and quantity; but they are generally characterised by a deficiency of bile, by great fœtor, and by the absence of scybala, excepting in a very few cases. Remissions of the symptoms, and of the urgent calls to stool, often occur about the middle of the day. The tormina and straining are sometimes followed by prolapsus ani, especially in children and delicate females. In a few instances, a puriform fluid is voided towards the close of the disease. The urine is usually scanty, passed with pain, and rarely retained. This is the least infectious of any of the states of the disease comprised under this species; unless in close and crowded places; and then it manifests this property, and passes into some one of the states next to be described, particularly the typhoid.

26. *β. The nervo-adynamic, or typhoid.* — Asthenic dysentery sometimes appears in a modified form under certain circumstances, especially where numbers are collected in a close and impure air, as in barracks, garrisons, crowded ships, &c.; and in years of scarcity among the poor. The patient complains at first of general depression, vertigo, violent headach, increased sensibility to light, pains in the limbs and joints, and of gripings and purgings; followed by anxiety at the præcordia, stupor; foul, clammy tongue and mouth, which soon becomes dry and covered by a brownish coating; a penetrating, offensive odour of the breath; and intense thirst. The pulse, at first, is very quick and small; and, afterwards, weak and irregular. The stools are, from the commencement, very frequent, in small quantity, preceded by tormina and tenesmus; and glairy, or serous, very fœtid, and contain more or less dark blood. The urine is scanty, thick, and dark-coloured. About the fourth or sixth day, a miliary eruption, or petechiæ, sometimes appear about the neck, breast, arms, or abdomen; and, occasionally, epistaxis occurs, between the fourth and eighth days, in young and robust subjects, but without becoming critical. The intensity of the tormina and tenesmus generally diminishes with the progress of the disease; and often, about the ninth or eleventh day, is replaced by a colliquative diarrhœa. The stupor is now attended by low delirium; the soft solids waste and become flaccid; the surface assumes a dirty hue; and an offensive penetrating odour issues from the body and the evacuations. If not ameliorated, or arrested in its progress, this form terminates fatally from the sixth to the twenty-fourth day, the symptoms described (§ 13. 18.) as indicating a fatal issue supervening. Such are the characters it usually assumes; but they are modified by age, constitution, and concurrent causes. It is less frequently epidemic than the other asthenic states, but is more evidently infectious than they.

27. *γ. The malignant, or putrid.* — This form is most common amongst the poor, especially in years of scarcity; in soldiers, during campaigns; in besieged towns, and in countries laid waste by war, &c. It also arises from the existence of endemic causes in full force, especially those which occasion malignant fevers — as animal and vegeto-animal exhalations floating in a warm and moist air; foul water, and other septic agents. It usually *commences* with a general feeling of debility, lassitude, and aching pains, referred particularly to the limbs and joints; with anorexia; foul, loaded tongue; sometimes nausea, borborygmi; relaxed bowels; pale, sunk, or anxious countenance; giddiness; and with a small, soft, frequent, and sometimes slow or natural pulse. To these supervene griping pains in the abdomen, followed by foul, offensive, scanty, and bloody stools; sometimes without tenesmus, particularly at first. Horripilations, or chills, rarely rigors, sometimes occur, at irregular intervals, during the early progress of the disease; but they are often absent. The mental energies are greatly depressed, especially as the disorder advances; when the tongue, which was moist and slimy, becomes covered by a dark, mucous, or fuliginous sordes; the breath is fœtid; and a dark mucus occasionally collects about the sides of the tongue and on the lips; or aphthæ form in this situation. Tenesmus is now complained of; and the stools are cadaverous, watery, dark, and bloody; the soft solids flaccid; and the skin harsh, dry, and of a sickly, dirty, sometimes approaching a yellowish, hue. The patient afterwards sinks into a state of complete apathy; but stupor or delirium seldom comes on until shortly before dissolution: the position in bed is supine; the dejections are involuntary, frequent, and mixed with dark blood, often followed by syncope or leipothymia; the temperature of the extremities sinks rapidly, whilst it continues much higher over the abdomen; the urine is scanty, dark, and fœtid; and the body exhales an infected odour. Anxiety at the præcordia, singultus, and difficult deglutition supervene; and the patient sinks in from five to sixteen or twenty days, according to the violence of the symptoms. This form of the disease is frequent in the most miasmatous

localities in hot climates, both among natives and seasoned Europeans, particularly when remittent fevers are prevalent or malignant; and it occasionally assumes a remittent type, when it may be be prolonged to twenty-eight or thirty days. I saw many cases of it in Africa, in 1817 and 1818.*

28. δ. *The bilious adynamic.* — When bilious, remittent, and gastric fevers are prevalent, a form of dysentery often also prevails, very nearly resembling the first or simple variety; and differing from the foregoing or third form, chiefly in presenting more evident attempts at vital and vascular reaction than it. The present variety sometimes appears, sporadically, in autumn and winter; it is often endemic, in hot climates, among Europeans, arising from the same causes as endemic fevers, aided by cold and moisture; and it occasionally prevails, or becomes epidemic, in temperate countries, during autumn and the beginning of winter, especially after hot summers. This and the immediately preceding variety frequently co-exist, in the same localities, in warm climates, or after hot seasons in temperate countries: this, in the plethoric, sanguine, and robust; that, in the debilitated, ill-fed, and weakly constituted. Bilious adynamic dysentery is generally *caused* by a less intense operation, relatively to the powers of the constitution and to the predisposition, of the same exciting causes, particularly such as are endemic, as those which occasion the malignant form. I have seen it prevalent in Europeans, in warm climates, in the same locality and in the same season as when that form was most destructive in the dark races. Many epidemics recorded by authors belonged to the present variety; although, during an epidemic dysentery, more than one form or state of the disease will be met with, owing to the different circumstances, intrinsic and extrinsic, as respects those affected, in which it will occur.

29. This variety generally *commences* with bilious or serous diarrhœa, which may continue for several days; with debility, pain in the forehead, vertigo, and a mucous yellow coating on the tongue. To these supervene horripilations, chills or rigors, tormina, very frequent calls to stool, a sense of scalding at the anus, and tenesmus. The chills often return during the early stages, and are followed or accompanied by a frequent, hard, or irritable pulse, great thirst, and an acrid heat of the trunk, especially over the abdomen. Nausea, sometimes vomiting, want of appetite, loathing of animal food; a sense of heat in the abdomen; fulness in the seat of the cæcum; pain above the pubis; complete prostration of strength, referred chiefly to the spine and lumbar region; and scalding on the passage of urine; are commonly present at an early period. The pulse, from being quick and irritable, becomes soft; subsequently, small, irregular, and very weak. The stools sometimes continue copious and yellowish for two or three days; but they are usually streaked with blood at the time when tormina and tenesmus are complained of, or soon afterwards. As the disease advances, the blood is more abundant: either mixed with the stools, or fluid and distinct, or in large coagula, and usually of a dark colour; and the abdomen becomes tense, or tumid and tympanitic. The frequency and the quantity of the stools vary greatly; but the distress and tormina are worst at night, the abdominal pain and uneasiness occasionally remitting in the morning, or subsiding for a short time after each evacuation. The odour of the discharges is, from the first, fœtid; and, in very severe cases, it becomes putrid and cadaverous. With the progress of disease, emaciation proceeds rapidly, the surface being harsh, and of a dirty appearance. Towards an unfavourable state, the temperature sinks; the tongue being dry, dark-red, or raw; and anxiety, restlessness, singultus, delirium, leipothymia, with other symptoms described as characterising the last stage of the preceding variety (§ 27.), supervene. This form is seldom prolonged beyond twenty-six or thirty days; unless it assumes a milder aspect in its progress, when it often passes into the *chronic* state. It is frequently epidemic after hot and moist seasons.*

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* Most of the crew of the ship in which I was a passenger to that country were treated by me, for seasoning and remittent fevers, soon after their arrival. They all recovered before I reached my destination. The vessel subsequently went in pursuit of traffic up one of the rivers in the bay of Benin, where the crew there became ill of this form of dysentery; of which all died excepting the second mate and carpenter, whom I chanced, long afterwards, to meet in England. Not one third of the crews of the many vessels that proceed up these rivers survive this disease and fever. The men, who are often deceived into undertaking the voyage, have not even the benefit of medical aid; for none of these vessels is provided with, or is within reach of, this kind of assistance.

* Epidemic dysentery often presents various modifications, in respect both of violence and of the occurrence of phenomena not commonly observed. Of these latter, the most frequent are burning pains or great heat in the abdomen; whilst the extremities and surface are cool or even cold, and the pulse sometimes not much affected; boulimia; very copious, mucous, bloody, or gruelly and frothy, or, more rarely, oleaginous, evacuations; great weakness of the lower extremities; gangrenous eschars; a parchment-like or scaly state of the skin; hæmaturia, or entire suppression of urine; an aphthous state of the mouth and throat; retraction of the abdomen, or the great tension, fulness, or meteorismus of this cavity; frequently the excretion of worms in the stools or by vomiting; miliary, petechial, phlyctenous or tubercular eruptions on the trunk; catarrhal or pneumonic symptoms; and rheumatic pains in the muscles and joints. Generally, as the quantity of fluid matters evacuated from the bowels are increased, the excretions by the kidneys and skin are diminished. In most epidemics, especially those of the asthenic forms, constitutional symptoms, characterised by lassitude, debility, foul tongue, disordered state of the stomach and bowels, unhealthy aspect of the countenance and skin, and weak, quick, and soft pulse, with evident disorder of the circulating and secreted fluids, precede the pathognomonic symptoms, which appear after these have continued a longer or shorter time. It will be instructive to review the characters of, and the remedies employed in, those epidemics of which we have authentic accounts, as valuable illustrations of the nature and treatment of this destructive malady will be thereby furnished. It will, moreover, appear, even from the very meagre account to which my limits oblige me to confine myself, that our knowledge of the disease, even at the present day, is but little in advance of what existed two centuries ago; and that even the most recent writers on the subject are distinguished rather by confined or exclusive ideas as to its nature and treatment, than by comprehensive views of its forms and manifestations, as well as of the means of removing it, in connection with the various combinations of causes producing it, and the diversified circumstances in which it prevails. Exclusive notions of a disease are the result of a knowledge merely of what has occurred within the sphere of the author's observation; whilst more extended ideas are acquired from what he has remarked in various climates, on different occasions, and at distant periods, and from an acquaintance with what has been observed by others: believing, truly, that nothing is constant but change; that what has occurred or prevailed formerly will recur again; and that one form is as likely as another to appear in future, whenever the concurrence of causes, of which it is a necessary or contingent result, shall take place.

1. Gregory of Tours states that dysentery ravaged the whole of France in 334.

2. Its destructive effects in the army of Henry the Fifth, before and after the battle of Azincourt, are well known.

30. *s.* *In the Dark Races*, dysentery is perhaps the most prevalent and fatal disease; and in negroes it generally takes the place of fevers; being, in the language of Sydenham, a low fever turned

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3. Fernel says, that, in 1538, it was so general through Europe, that neither village nor town escaped, although the seasons had been regular.

4. Camerarius observed it, in the autumn of 1583, in Germany, where it was malignant and destructive. The preceding summer had been hot and dry.

5. Zacutus (*Curat.* cent. iii.) notices an infectious and destructive dysentery in Lisbon, in 1600, for which fumigations were employed.

6. Lammoniere describes it as it occurred in Lyons, in 1607, 1624, and 1625, where it had been imported with the troops from Italy. In proof of its infectious nature, he states that the medical attendants and nurses were nearly all attacked. Marks of inflammation and gangrene were found from the pylorus to the anus, the liver and omentum being also disorganised.

7. Sennert (*Méd. Pr.* l. iii.) mentions an epidemic which pervaded all Germany in the summer and autumn of 1625; and Hoffmann states, that it reappeared in autumn 1626, after a wet and warm spring, and a dry and hot summer; that it was contagious; and was best treated by bleeding at the commencement, in some cases, by laxatives and demulcents, by nitre and absorbents, and by milk with Seltzer water.

8. Diemerbroeck records, that the disease was most fatal in Brabant, in 1635, then the seat of war. It first appeared amongst the troops, and afterwards among the inhabitants. The prostration of strength was great; and infection was proved by the attendants having been all affected. The most successful remedies were rhubarb, and, afterwards, one or two drachms of wax melted in warm milk.

9. Bartholin relates, that a malignant dysentery succeeded to ague in Copenhagen, in 1652, and carried off many thousands. The odour of the evacuations was most offensive.

10. The plague of London, in 1665, was followed, in the autumn of 1666, by an epidemic and infectious dysentery. Morton was attacked, and escaped with difficulty. It appears to have been occasioned by the infected air emanating, in the summer, from the numerous bodies buried in and about London during the preceding year. The fatality was very great; and cinchona seemed to have been the chief remedy.

11. In an epidemic described by W. Wedel (*Act. Nat.* dec. ii.), and which occurred, in 1669, at Gotha, the evacuations were fœtid and sanguinolent; and yet, in many instances, unattended by pain or tormina. Those in whom the tormina was most severe, recovered; but those who experienced no pain, died suddenly, the disease having passed rapidly into gangrene.

12. Sydenham states, that the cholera which prevailed in London, in the summer of 1670, having ceased, dysentery took its place. The disease commenced with chills or rigors, followed by increased heat. The treatment was directed to remove inflammation, and evacuate morbid humours.

13. Brandt notices the occurrence of dysentery, in an epidemic form, in the Danish army, and in Copenhagen, in the summer of 1677; and attributes it to the use of stagnant water and of bad beer, and to an atmosphere loaded with impure exhalations.

14. Dysentery prevailed in Zurich in August, in 1680, after a hot summer. It appears from Muralto to have been of an inflammatory type.

15. An epidemic, observed by F. Hoffmann, in 1684, in Westphalia, was also inflammatory. Favourable cases terminated by the fourteenth day; those that were prolonged beyond it, generally terminated unfavourably. Persons in communication with the sick were infected. Bleeding at the commencement, and nitre with camphor, were the chief remedies: astringents and stimulants were injurious.

16. Loescher states that the epidemic dysentery of 1709, in Misnia, was attended by acute fever, petechiæ, lividity of the countenance, meteorismus of the abdomen, and depression of strength and of the pulse; followed, in many instances, by delirium, convulsions, and death. Clysters, ipecacuanha, laudanum, and sometimes bleeding, were employed.

17. In August, 1718, the disease appeared, in a malignant form, among the Prussian military in Berlin and Pomerania, and extended to the inhabitants. Aphthæ were a common and an unfavourable symptom. A change usually occurred towards the fourteenth day. Relapses were fatal. Evacuants and diaphoretics, followed by tonics and antiseptics, were the most successful means.

18. Margraaf details the history of an epidemic which, in some cases, was mild and remittent; but, most commonly, of the bilious-adynamic and malignant forms. Ipecacuanha was the most useful medicine.

19. A similar visitation took place at Nimeguen, in 1736 (Degner). The malignant cases were frequently fatal on the third or fourth day, and were contagious. Ipecacuanha, rhubarb, and, subsequently, simarouba, were chiefly confided in.

20. Dysentery was epidemic in Plymouth, in 1744 (Huxham), in an inflammatory form. Early bleeding, ipecacuanha, rhubarb, and, at the close, opiates, were the chief remedies.

21. It prevailed in Zurich, in 1747, and was attributed to bad water (Gruber). Diaphoretics, emollients, opiates, and tonics were most generally prescribed.

22. It was the most destructive disease in the British army in Holland, in 1748; and was acutely inflammatory, often rapidly terminating in gangrene (Grainger, &c.). Bleeding, emetics, and purgatives were employed.

23. The epidemic, in several parts of France, in 1750, was chiefly of the simply asthenic and malignant forms. Astringents were injurious, evacuants, emollients, and antiseptics being most serviceable (Marteau and Navier).

24. That which occurred in Hanover (Lentin) was attended by a burning heat in the abdomen, without much attendant general fever; and by fœtid or purulent stools. Antimony, rhubarb, mucilages, and, afterwards, simarouba or copaiba in the yolk of egg, were usually directed.

25. Strack states that the French army brought with them, and communicated to the inhabitants of the parts of Germany through which they passed, in 1757, dysentery of a malignant form; which was entirely similar to the description I have given of that variety. It was also prevalent in various other quarters of Germany. Women in the puerperal state, and their infants, were also attacked. Ipecacuanha, followed by rhubarb, the tartrate of potash, and, lastly, simarouba, was chiefly employed. The too early use of astringents, absorbents, and narcotics were said to have been dangerous. Isolation of the affected, and lime, as a disinfectant, were resorted to.

26. Dysentery was epidemic, in the autumn of 1760, in Gottingen; and of an inflammatory and asthenic character, the local inflammatory action being attended by deficient vital power. The cæcum and rectum were ulcerated and gangrenous. Bleeding, vomits, laxatives, emollients, and antiseptics, with opiates and bark, were principally trusted in (Roederer).

27. According to Grimm, the same epidemic was observed in Thuringen, where it was infectious. A similar treatment to that now stated, with the addition of camphor, was adopted.

28. Leclerc describes the dysentery to which the Tartars of the Ukraine were subject, in consequence of a meagre and indigestible diet, consisting of much salted or smoked fish and meat, and the use of ardent spirits. It seems to have been simply asthenic or malignant; and to have been most successfully treated by ipecacuanha, rhubarb, nitre with camphor, opium, mucilaginous clysters; and, in the last stage, balsam of tolu, &c. *Procidentia ani* was cured by conveying to the part the vapour from turpentine thrown upon burning coals.

29. Dysentery succeeded, in July and August, to the catarrh which prevailed in London in 1762; attacked chiefly the poor and children; and assumed the bilious adynamic form. Bleeding, at the beginning, in the more inflammatory cases; emetics and diaphoretics; laxatives and emollient injections; mucilages and astringents, &c., were successively prescribed (G Baker).

30. This disease also followed catarrh, at Vienna, in the autumn of 1763 (De Mertens); and was attributed to cold and moisture consequent upon great heat. Blood-letting was borne by very few. Ipecacuanha, rhubarb, mucilages, and, afterwards, bark, were exhibited.

31. The epidemic in Berne, and adjoining parts, in autumn, 1765, was in all respects the same as that which I have denominated the bilious adynamic, according to the description of Zimmermann; who states it to have been infectious in circumstances favouring the action of this property; and that females, far advanced in pregnancy, in some instances gave birth to infants affected by it. Ipecacuanha emetics, gentle purgatives, diluents and emollients, mucilaginous enemata; subsequently, camomile tea and opiates, were chiefly confided in: astringents were injurious.

32. In an epidemic observed, in the same year, by M. Chevssiol, camphor, blisters, sinapisms, dry-cupping, and cinchona were most beneficial.

33. According to Dr. Sims, the disease was very prevalent in London in the autumn of 1768; it having succeeded rheumatism, and continued during 1769 and 1770. One form proceeded chiefly from cold, was ushered in by rigors, and required bleeding and ipecacuanha emetics. The second and most common form prevailed among those who lived on poor diet. The pulse was low, quick, and unequal; the skin cold; the face pale and haggard; and the stools fœtid and putrid. In this, ipecacuanha, opium, astringent bitters, bark, aromatics, and claret, proved most successful.

in upon the bowels. It commonly *arises, sporadically*, from cold and moisture — from suppression of the function of the skin, which is in them a much more important excreting organ than in the

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34. Malignant dysentery was prevalent in Jamaica, in 1771. Dr. Wright found antiseptics, especially a saturated solution of common salt in lime-juice, taken in aromatic or sweetened water, most serviceable.

35. MM. Marét, Durand, and Caile state, that the epidemic throughout France, in the autumn of 1779, was an illustration of the aphorism of Hippocrates,—"Hiems sicca et aquilonia, ver autem pluviosum et australe; necesse est fieri febres acutas et dysentarias maxime," — and assumed an inflammatory, bilious, and malignant form; the second and third being very infectious. In many places, children, females, and the aged were principally affected. Blood-letting, which was repeated in some cases; laxatives, with tamarinds and manna; mucilages and emollients, in the form of drink and in clysters; camphor and anodynes, lime, and gum-water; cinchona, with camphor and the anodyne liquor, were prescribed according to the form and stage of the disease.

36. Birnstiel records that diarrhœa prevailed, in the spring and summer of 1780, on the Rhine; and was followed, in autumn, by a violent dysenteric epidemic of a bilious adynamic form — the symptoms being entirely the same, but more intense than I have described them. Evacuations by ipecacuanha and rhubarb, mucilages and diaphoretics, and, towards the close, cascarilla and opium, were confided in.

37. In the years 1785 and 1786, the disease, in simply asthenic and malignant forms (§ 25. 27.), was general through the Venetian states — chiefly in females and children (Capovilla). Fomentations, mucilaginous injections, emollient drinks, ipecacuanha, rhubarb, almond oil, absorbents, and, afterwards, cinchona, wine, opiates, and astringents, were most beneficial.

38. The epidemic in Champagne, especially in the French, Prussian, and Austrian armies, during the autumn of 1792, assumed inflammatory, bilious, malignant, and typhoid forms, according to the causes and circumstances in operation; and was remarkably fatal among both men and horses (Chamseru). Bleeding in some; ipecacuanha, antimonials, emollients, cinchona, rhubarb, tamarinds, lemonade, &c., were principally employed.

39. The dysentery that prevailed in the army of Italy (Desgenettes) was rarely inflammatory; but very generally malignant, arising from endemic causes concurring with extreme fatigue and exposure. Aromatics, vegetable acids, and opiates; antiseptic and anodyne enemata, cinchona, and simarouba, were most frequently prescribed.

40. Hufeland states that it was epidemic at Jena, in 1795, in the simply asthenic and malignant forms. He treated it most successfully by ipecacuanha and extract of nux vomica. It was infectious in favourable circumstances.

41. Schmidtmann states that dysentery was epidemic, through the north of Germany, in 1800; and so prevalent in the town in which he resided, that very few escaped. It assumed inflammatory, bilious, nervous, and malignant forms, according to circumstances, and the constitution, &c., of those affected. Bleeding in some cases; gentle emetics in others; opium nearly in all; and camphor, decoction of bark, various astringents, tonics, and antiseptics were employed. Arnica was given in the malignant cases, but with little benefit; and tamarinds, cream of tartar, manna, or other mild purgatives, were also exhibited.

42. Dysentery, chiefly in the bilious-inflammatory, passing into the adynamic form, was remarkably prevalent and fatal, at the Cape of Good Hope, in 1804 (Lichtenstein); and was often associated with inflammation and structural change of the liver. This epidemic was at first very injudiciously treated by stimulants, astringents, and antispasmodics; and one in four died. The mortality was subsequently reduced one half, by means of small doses of calomel and opium, given every hour or two; sometimes with camphor and rubefacients.

43. This disease was very prevalent in Holland, in 1809, particularly in the British troops composing the Walcheren expedition; and proceeded chiefly from endemic causes, and often either followed, or was converted into, intermittent or remittent fever (Davis, Dawson). It was frequently associated with disease of the liver and spleen; and presented the inflammatory, asthenic, and bilious forms. Bleeding, purgatives, calomel, and sudorifics were chiefly employed; but the disease was too generally injudiciously treated.

44. Dysentery became epidemic, in and around Vienna, in autumn, 1809, particularly in the French army; and assumed, according to circumstances, an inflammatory, bilious, adynamic, typhoid, or malignant form (Vignes). It often was infectious; and few of the medical officers escaped. Ipecacuanha, opium, emollients, clysters, sinapisms, and blisters; camphor, æther, arnica, serpentaria, cinchona, valerian, and aromatics, variously combined, appear to have been chiefly employed.

45. The more simple asthenic states of dysentery were prevalent in Flanders, in July, 1810 (Tonnelier); and, in the summer of 1811, in various parts of the north of France (Caron). In some villages, nearly all the inhabitants were attacked the same day. Ipecacuanha, gentle purgatives, rhubarb, calumba, simarouba, mucilaginous clysters, opiates with diaphoretics, warm baths, arnica, aromatics, Hoffmann's anodyne, &c., were generally employed. Favourable changes occurred between the tenth and fifteenth days. The disease sometimes passed into entiritis, and was occasionally followed by dropsy.

46. Dr. Pisani states, that dysentery of an asthenic kind, but presenting either inflammatory, malignant, or nervous symptoms, was so prevalent in the garrison of Mantua, in 1811 and 1812, that about 1000 cases were received into the hospital. It first appeared in some felons; from whom it extended to the soldiers in the wards, and by them was conveyed into the barracks. The medical attendants and assistants were attacked; but those who had no communication with the sick escaped. Small depletions, ipecacuanha, laxatives, emollients; with nitre, fomentations, mucilaginous clysters, neutral salts, rhubarb, Hoffmann's anodyne, camphor, and wine, according to the features of the disease, were most employed. Ventilations and fumigations were also resorted to.

47. In the expedition to New Orleans, dysentery, owing to cold, moist, and miasmatous air, wet clothing, and the use of foul brackish water, and fatigue, was the most fatal disease, assuming inflammatory, bilious, asthenic, and malignant forms. Bleeding, emollients, fomentations, opium, Dover's powder, and very large doses of calomel, appear to have been principally confided in. In fatal cases, the liver was frequently found diseased; and the colon very slightly ulcerated, but not sphacelated. — (*Edin. Med. Journ.* vol. xii. p. 136.)

48. Dysentery, although it may not be said to have been epidemic in the strict sense of the word, was the most fatal disease in the British army during the Peninsular war. It was often connected with intermittents and remittents, and frequently supervened on these and other forms of fever (Sir J. M'Grigor); and attacked convalescents. It assumed inflammatory, bilious, typhoid, or malignant and chronic forms, according to the causes and concurrent circumstances. It was most prevalent and fatal at Ciudad Rodrigo, which was obliged to be made an hospital station for a time; and where, shortly before, "nearly 20,000 bodies were calculated to have been put into the earth, either in the town or under its walls, in a few months." It was unhealthy, independently of this circumstance. It was commonly treated by venesection, in the first stage; and by the warm bath, full doses of Dover's powder every hour, calomel and opium at night, sulphate of magnesia, in broth, in the morning: in the second stage, by demulcents, aromatics, opium, astringents, tonics, and flannel rollers.

49. This disease has been more or less prevalent in some part or other of Ireland, owing to the presence of endemic and even of epidemic causes. During 1817, 1818, and 1819, it was, conjointly with fever, epidemic throughout the island. The seasons were cold and wet; and, with this cause, famine, unwholesome food, and infection concurred. It was very often consequent upon the early stage of fever, or it appeared as a crisis of fever, or it occurred during convalescence. It was infectious in circumstances favouring this property; and presented inflammatory characters, but often associated with the asthenic diathesis. It was treated chiefly by moderate bleeding, ipecacuanha, the warm bath, opium in doses of four or five grains, calomel with opium, copaivi mixture, and farinaceous diet (Cheyne).

50. It was prevalent in several parts of Ireland, in 1722, at the same time with low fever, owing to scanty and bad food. It commenced with debility, pain about the umbilicus, mucous dejections, general cachexia, rapid and weak pulse, &c.; on which the pathognomonic symptoms supervened in an adynamic form. It was very fatal until wholesome and nutritious food was obtained (Dr. Graves, in *Trans. of Irish Col. of Phys.* vol. iv. p. 429.)

51. It was again prevalent in Dublin and the vicinity, in the autumn of 1825, after great heat and drought: affected first the better classes; sometimes appeared as fever for two or three days, and then passed into dysentery; or it occurred during convalescence from fever, and was infectious (Dr. O'Brien). It was of an asthenic and complicated form; the skin being of a dirty or dark hue, and harsh to the touch; and was very generally *treated* by bleeding, in robust persons, at an early stage; by the warm bath, and friction of the surface with camphorated oil; by calomel gr. x., and opium gr. ij., repeated in eight hours, and followed by purgatives, especially castor oil with a few drops of laudanum; by flannel rollers around the abdomen; and by Dover's powder, and the repetition of one or more of these means, according to circumstances,

white races; from insufficient and unwholesome food; and, *endemically*, from bad water, marsh effluvia, and animal and vegetable emanations floating in a moist atmosphere. It assumes some one of the asthenic forms, according to the causes which produce it, and the circumstances which influence it in its progress. Even when it appears sporadically, it is more liable to become infectious than in Europeans, owing to its passing more readily into a low, malignant, or putrid form, on occasions of imperfect ventilation or crowding of the sick. In such circumstances, it is sometimes quite pestilential in the rapidity of its dissemination and the extent of its fatality. In its sporadic states, it is frequently *associated* with rheumatism, or the one passes into the other; both generally arising from the same exciting causes — from cold and moisture. It is also very often *complicated* with worms, especially the round worm, in the *primæ viæ*; these being passed with the stools in the advanced stage of the more severe and dangerous cases; and, in its less severe grades, it sometimes assumes intermittent or remittent types.

31. When dysentery attacks the dark races *sporadically*, and sometimes, when it seizes Europeans who have resided very long in a warm climate, it frequently commences with chills and much febrile reaction or irritation, the vascular excitement rapidly passing into an adynamic state — into great prostration of the vital and animal actions, and depression of spirits. The pulse is, at first, more or less quick and irritable — sometimes sharp and full; but it always becomes, in the space of one, two, or three days, small and soft. The rapidity of the change is seldom owing either to the loss of blood from the bowels, or to the quantity of matters evacuated, but rather to these conjoined with the exhaustion produced by the causes of the complaint, by the severity of the tormina, the want of sleep, and by the febrile irritation of the system, in less vigorous constitutions than those of the white race. In this class of patients, flatulence, nausea, sometimes porracious or bilious vomiting, quick small pulse, and occasionally scybalous evacuations, often containing worms, are very early observed; the surface of the body being shrunk, the superficial veins deprived of blood, and the extremities moistened by a colliquative sweat. In these persons, however inflammatory the disease may be at its commencement, it soon exhausts vital power, and passes into the asthenic form; and, in seasoned Europeans, is sometimes contingent on, and *complicated* with, disease of the liver, or of the spleen, or even often of the absorbent glands; or is consequent on fevers, both periodic and continued, either in their course, or during convalescence from them.

32. III. Of the Type of Dysentery. — The inflammatory typhoid, and more malignant forms of the disease, are generally continued, or obscurely remittent. But the other forms may assume an obviously remittent, or even an intermittent type, owing rather to the concurrence of those causes to which periodicity in fever is owing, with those on which the dysenteric phenomena are more immediately dependent, than to the production of two distinct kinds of disease. We have seen, that dysentery often arises from endemic causes, very nearly similar to those which produce periodic fevers; the causes of the latter chiefly impressing the nervous system, those of the former vitiating the secreted and circulating fluids, and disordering the functions of the bowels. Therefore, when both kinds of causes concur, as they frequently do, in unhealthy situations and seasons, a form of disease is directly produced, in which many of the characters of both disorders are blended. In such cases, the ingestion of foul water, or of unwholesome food, and cold and moisture, contaminate the fluids, determine them to, and irritate, the *primæ viæ*; whilst malaria, concurring with these causes, impresses the nervous system so as to impart a certain degree of periodicity to the morbid actions resulting from the combined agents. It also not unfrequently occurs, that, during the progress of agues and remittents, the secretions accumulated in, or poured into, the intestines will acquire such irritating or morbid properties as to superinduce dysentery, which will often for a while retain the periodic character; but, in most instances, a continued or obscurely remittent type will be the consequence of this change. A distinctly intermitting type is incompatible with either a considerable extent of inflammation, or much depravation of the circulating fluid; and one or other, or even both, of these changes, obtains in those forms of this disease which I have stated to be generally exempt from this character. It is frequently observed, that, when animal or infectious emanations enter largely into the causes of this disease, it assumes a continued and more or less of a malignant character. Numerous instances, illustrative of these views, came before me in warm climates; and the histories of the epidemic occurrences of the disease, when examined in their details, further confirm them. Sir J. M'Grigor, in his excellent review of the diseases of the army during the Peninsular war, states, that, in the hospitals in the Alemtejo and Estremadura, the type of dysentery was intermittent; that it became remittent in July, August, and September, when the army advanced rapidly, and remained some time stationary in the two Castiles; and that it was continued, typhoid, and very fatal, at Ciudad Rodrigo, where the sick were exposed to the effluvium extricated by 20,000 dead bodies. Here we see the disease pre-

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52. The disease was epidemic, in some parts of France, in the autumn and winter of 1825 (MM. Denoyer, Lemercier, and Bienvenu); and was, in several places, propagated by the exhalations from the sick and the evacuations; children, females, the weak, ill-fed, the aged, and those living near unhealthy and moist localities, being chiefly attacked. It assumed inflammatory, asthenic, and malignant forms; and, in several places, the small intestines and stomach were also affected. It was treated chiefly by local depletions, opium, repeated application of blisters, and demulcents. Tonics and antiseptics were required in the advanced stages and chronic states.

53. It again prevailed, in some parts of that kingdom, in October, 1827; and was, in several localities, attributed to the water, which abounded with decayed animal and vegetable matters, animalculæ, &c. (M. Compagny). It presented either inflammatory, mucous, asthenic, and malignant characters; and was treated by leeches, opiates, demulcents, and, afterwards, by camphor and cinchona.

54. The disease was epidemic in Glasgow, in the autumn of 1827, in a simply asthenic and mild form. Opiates, calomel and opium, ipecacuanha, demulcent enemata, blisters, warm baths, astringents, and bitter tonics were most serviceable. Bleeding, unless by leeches, was very seldom required, and was often injurious (Wilson, Brown, and Macfarlane).

55. Infectious dysentery, in adynamic or typhoid forms, has frequently appeared in ships, in prisons, and wherever many persons have been collected in ill-ventilated, and particularly in moist and miasmatous, situations. Instances of such occurrences are so numerous, have been so often noticed, and are so well known, that it is unnecessary to refer to them.

senting increased grades of severity as the causes augmented in intensity.

33. IV. COMPLICATIONS. — Having considered the forms of dysentery depending more directly upon the nature of the predisposing, exciting, and concurrent causes, I now proceed to notice those complications occasionally observed, especially in unhealthy seasons and localities. Many writers conceive that the asthenic varieties described above are complications of simple dysentery with different kinds of fever; and that, when they are infectious, it is not the dysentery but the fever which possesses this property. Some authors suppose that the typhoid variety especially is a complication of this description. But, if such be the case, wherefore should the disorder which is communicated be always dysentery and not fever? Moreover, this form of dysentery is often present where a case of typhus cannot be found. The fact is incontrovertible, that the asthenic forms, some of which are considered as complications by many writers, are direct, and necessary, and uniform results of certain diversified but concurrent causes; and not contingent associations of two diseases capable of separate existences, such as those about to be described: thus, cold and moisture will of themselves sometimes occasion simple inflammatory dysentery — as frequently occurs, where no other causes can be in operation; but when, with cold and moisture, there concur malaria, unwholesome food or water, or emanations contaminating the fluids, as is often the case, the disease assumes some one of the more severe and asthenic forms; the nervous and circulating functions having been thereby more seriously impressed. The local affection is occasioned, in these cases, by the nature of the ingesta, or by the morbid secretions consequent upon the action of the exciting causes, or by the retention of morbid or fæcal matters, or by two or all of these combined. (See § 70—72.) The complications of which more particular notice will be here taken are most commonly occasioned by the endemic causes of dysentery, and are those — (*a*) with diseases of the liver, spleen, and some other abdominal viscera; — (*b*) with jaundice; — (*c*) with scurvy, or scorbutic dysentery; — (*d*) with worms in the *primæ viæ*; — (*e*) with hæmorrhoids; — and (*f*) with rheumatism.

34. *A: Dysentery complicated with Disease of the Liver, Spleen, &c.* — *Hepatic Dysentery* of writers on intertropical diseases. — (*a*) I have already noticed an asthenic form in which the bile is excreted more or less in excess, or is otherwise disordered. In this form, which is frequently epidemic, there has generally taken place, for some time previously, an accumulation of this fluid in the biliary apparatus, without any actual disease of the liver; the discharge of much altered or acrid bile contributing, probably, with other morbid secretions and actions, to the production or perpetuation of the dysenteric symptoms. But, in the complication now about to be considered, the liver is generally inflamed, enlarged, or otherwise altered in structure, either previously to, coëtaneously with, or consecutively on, the dysenteric affection. Although this association of diseases of distinct but related organs is most frequent in the sub-acute and chronic states, it sometimes also occurs in any of the acute forms, as well in temperate as in warm climates; but oftener in the latter than in the former. It is also consequent upon agues, remittents, and continued fevers; and it is evidently often produced by endemic causes, especially in persons addicted to ardent spirits. When hepatic dysentery proceeds from these causes, the spleen is sometimes also diseased, as well as the pancreas, and mesenteric glands. Sir J. M'GRIGOR states, that, in the fatal cases of dysentery that occurred in the Peninsula, the spleen was as often diseased as the liver; and that both the pancreas and mesenteric glands were also frequently enlarged or otherwise changed. When acute dysentery is *complicated* with disease of the liver, this latter is frequently, likewise, of an acute or sub-acute character; and consists chiefly of inflammation of the substance of the organ; abscess and the chronic changes of this viscus being more commonly associated with sub-acute and chronic dysentery than with the acute.

35. *a. Acute hepatic Dysentery* generally commences with horripilations, chills or rigors, followed by pains in the forehead; bilious vomiting; bilious and variously coloured stools, voided with scalding at the anus, and urgent tenesmus. The discharges are often at first greenish, greenish black, or reddish brown and ochre-like; or watery, with a greenish frothy slime on the surface. A fixed pain, weight, or uneasiness, increased on pressure, is generally felt in the epigastrium, frequently extending to the right hypochondrium, right scapula, or top of the right shoulder; with a sense of pressure or tension in the right side of the thorax, anxiety at the præcordia, fits of dyspnœa, or a dry teasing cough, vertigo, and an accelerated and irritable pulse, particularly at night, when the patient becomes very restless, and the calls to stool more frequent and distressing. The tongue is at first white, the papillæ erect, or covered by a yellowish fur. At an advanced stage, it is clean, dry, smooth, red, or lobulated; or it is covered at the root with a dark crust. The skin is dry, harsh, of a dirty appearance, and hot; or it is covered by a greasy perspiration, copious sweats sometimes occurring in the last stage of the malady. There is great thirst, and desire of cold fluids. In other respects, the progress of the disease is similar to the more inflammatory form described above (§ 13.); but it often presents a greater range of symptoms in different cases, or at different stages of the same case.

36. *β.* In the above form of hepatic dysentery, the affections of the large bowels and liver seem to be nearly coëtaneous; but, more frequently, the hepatic disease follows dysentery, or does not appear until this latter begins to decline. In these cases, the patient is irritable, the cheeks present a hectic flush, and, upon examining the abdomen, the right *rectus abdominis* muscle resists pressure by an involuntary action. Little or no enlargement of the organ is at first felt; but either enlargement or tenderness becomes manifest, especially when blood has entirely disappeared from the stools, which are generally scanty, viscid, and dark. This form of the complication is evidently caused by the sudden cessation of the dysenteric affection; which, being very intimately dependent upon the excretion of morbid matters from the circulation and the economy in general, cannot be abruptly suppressed, without inducing continued or remittent fever, or inflammation, congestion, or enlargement of excreting organs. Both these

difications of hepatic dysentery are often attended by much pain about the umbilicus, by irritability of stomach, and other indications of severe associated disease of the internal surface of the small intestines, and even of the stomach; particularly in warm climates, or in hot seasons when dysentery is epidemic, and in persons addicted to spirituous liquors. In some cases of hepatic dysentery, the liver is the only viscus, besides the large bowels, which is diseased; but, in many, the spleen, or the pancreas, and the mesenteric glands, are also affected.

37. (*b*) The *complication* with enlargement, thickening of the envelopes, or softening or other *disorders, of the spleen*, is of frequent occurrence where dysentery depends chiefly upon endemic causes, and when it is consequent upon agues or remittents. Thus, in places abounding with malaria, the *splenic association of dysentery* is much more frequent, especially among the natives of India, than the hepatic; the pancreas and lacteal glands being often also changed, and the disease assuming an intermittent or remittent type. Like the hepatic, the splenic affection may precede, may be coëtaneous with, or consequent upon, the bowel disease; but it is a more common result, particularly when the dysentery presents a periodic type, of the suppression of the discharges by means of astringents, before evacuants have been carried sufficiently far, or morbid matters evacuated. Thus I have seen dysentery consequent upon ague or remittents, when abruptly suppressed, to have been followed by a return of these forms of fever, and by enlargement of the spleen, in localities abounding with malaria; and nearly similar occurrences appear, from the comprehensive account furnished by Sir J. M'Grigor, to have been observed in the peninsular war. In this complication, the symptoms are but little different from the simple states of dysentery above described; but they more frequently assume a sub-acute and chronic, than an acute, form. In the cases that have come before me, the splenic affection could seldom be detected unless it consisted chiefly of enlargement, when a careful examination readily disclosed the state of disorder. In all endemic maladies, where we suspect disease of the spleen, the examination should be made with caution, as this organ may be most seriously injured by roughness. In some cases, as well, indeed, as in those in which the *pancreas* and *mesenteric glands* have been enlarged, the countenance and skin have presented a dirty or leaden hue, and the limbs have been much emaciated. But these complications are more common in chronic dysentery.

38. *B. Jaundice* is sometimes observed associated with dysentery, especially when the liver is diseased. But it may occur without any structural change of this viscus, owing to obstruction of the ducts, or to occlusion of the orifice of the common duct by inflammatory tumefaction of the mucous surface of the duodenum. It may possibly also arise from the absorption of morbid bile from the intestinal canal; or from the state of the soft solids themselves; these having acquired during disease the power of separating the colouring principles of the bile from the blood. (See Disease, § 108., and Jaundice.)

39. *C. With Scurvy, or Scorbutic Dysentery.* — This complication of dysentery was formerly much more frequent than at the present day; particularly in ships on long voyages, before lime juice was introduced as an antiscorbutic. When, however, the particular concurrence of causes whence it proceeds takes place, and is not counteracted by appropriate means, we must expect this form of the disease to prevail. Its destructive prevalence among the troops — British and native — employed in the Burmese war; and its occurrence in a modified form in the Penitentiary at Milbank; prove this position. On occasions of long navigation, and the transport of troops; in campaigns, sieges, or active military services, when there is a scarcity of fresh and wholesome provisions, with the usual causes of dysentery; this complication sometimes presents itself at the same time as the more malignant states of the disease; and in such circumstances, it is occasionally the prevailing and most destructive form.

40. *a.* The *Causes* which usually give rise to the disease are generally the concurrence, or subsequent operation, of those which produce dysentery, with such as occasion, or have already occasioned, scurvy, — especially living long on salted provisions, particularly pork, without a due supply of vegetables or farinaceous substances; innutritious, deficient, or unwholesome food, or the prolonged use of a fluid and greatly diluted diet; debility from previous disease; excessive fatigue; stagnant and foul water; concentrated marshy exhalations, or night-fogs in low situations and places bordering on the sea, or banks of rivers or lakes; confinement, or want of exercise in the open air and in the light of day, especially in miasmatous localities; nostalgia; anxiety of mind, disappointments, and depression of spirits; and, in some circumstances, particularly in the natives of warm climates, an insufficient supply of salt, or of warm spices and aromatics; or living on a poor, watery, and vegetable diet. Persons who have had dysentery, are very liable to this complication when subjected to the causes of scurvy. These causes lower the nervous and vital power, contaminate the circulating and secreted fluids, and ultimately deteriorate the vital properties of the soft solids; favouring serous or sanious exudations from the mucous surfaces, and those capillaries which derive the least support from the cohesion or density of the tissues they supply. Hence result the phenomena of this complication, when the weakened bowels are irritated by the morbid secretions poured into them from the collatitious viscera, and from their own glands and mucous surface; or by injurious ingesta.

41. *b. Symptoms.* — In this complication, very evident signs of scorbutic cachexia generally precede, for a longer or shorter time, the dysenteric symptoms, which, when they are developed, resemble the malignant variety above described (§ 27.), excepting that they are not attended by any febrile commotion; the antecedent contamination of the system being much more manifest than in the variety referred to, and symptoms indicating increased vascular action being usually absent: the countenance is pale, heavy, dark, dejected; in some cases sunk, in others slightly œdematous; the abdomen is drawn inwards, or sore upon pressure; the lower extremities are œdematous, with livid patches extending to the hams, frequently with ecchymoses, or petechiæ, or the breaking out of old ulcers, and with coldness of the sur-

face. The gums are spongy, dark, livid, tumid, and bleed upon the slightest pressure; the tongue is flabby, often raw, red, or reddish brown. The pulse is small, weak, and soft; and afterwards quick, feeble, and undulating. Sometimes, nearly coëtaneously with the above appearances, but more frequently after they have commenced and proceeded some length, diarrhœa occurs. The evacuations soon assume a serous or sanious appearance, with mucus, and grumous dark blood, mixed with feculent matters; and they are usually accompanied by griping and tenesmus, but in a much less degree than in the more simple forms of dysentery. Fæcal matters are seldom retained, the stools being free and sometimes copious. The biliary secretion is often more or less disordered; it being either copious or morbid—and then it increases the excoriation of the intestinal mucous surface; or diminished, or altogether obstructed. The urine is scanty, of a dark muddy appearance, or sanguineous; and a peculiar fœtor is often exhaled from both the alvine and cutaneous excretions. In the more severe cases, or towards the close, there is occasionally vomiting of a bilious, bloody, or dark and grumous fluid, with distressing flatulence, and pain or soreness in the hypochondria. The functions of the stomach are generally disturbed; and there is much disrelish of salted meat, or of the food on which the patient has been subsisting, with great desire for vegetable acids, vegetables, fruits, warm spices, fresh meat, milk, &c. In the progress of the more dangerous cases, copious effusions of fluid dark blood, with detached portions of the mucous surface, are seen in the dejections; with coldness and lividity of the surface, leipothymia, and sometimes with paralysis of the *sphincter ani*, and excoriations about the anus. Discolouration of the surface, breaking out of old sores, falling out of the teeth, great loss of flesh and prostration of strength, and extreme despondency, further characterise the advanced stage.

42. *D. Dysentery is so frequently complicated with Worms in the prima via*, that many writers consider them to predispose to it; and with much probability. The large round worm is the species most frequently observed; but others are occasionally seen. The excretion of worms has been viewed by many as an unfavourable symptom; and I believe that it often is so, as it indicates a grave affection of the system, or the extension of disease to the small intestines. When dysentery is prevalent among the inhabitants of unhealthy localities, or the natives of hot climates, this complication is observed in a large proportion, sometimes in more than one half, of those attacked; and, in the latter class of subjects especially, it is characterised by more or less asthenia, and assumes some one of the forms arranged under this head, according to the nature of the exciting and concurrent causes.

43. *E. The disease may also occur in a person liable to, or affected by, Hæmorrhoids*; especially in those of a plethoric or sanguine constitution, or who are subject to vascular determination to the prostate gland and rectum, from too frequent sexual congress. In such cases, the tenesmus is often the chief symptom; and, in consequence of the tumefaction of the vessels, and coats of the rectum, a complete retention of fæcal matters and constant straining are present. The disorder is commonly local, chiefly simple, and inflammatory, and often subsides upon a copious discharge of blood from the internal hæmorrhoidal vessels, which takes place after longer or shorter suffering, and frequently oftener than once. In some cases, *prolapsus ani* occurs, and aggravates the symptoms. In other respects, this complication differs but little from the mild or inflammatory forms (§ 12.) described above.

44. *F. The association of Rheumatic Symptoms with Dysentery* has been so frequently observed, that many authors (§ 74. *e.*) have contended for the rheumatic nature of the disease. The connection of rheumatism with dysentery occurs in one or other of the following ways:—1. Rheumatism may be prevalent either before, or at the same time as, or subsequently to, dysentery:—2. It may also precede, accompany, or follow, the bowel disease in the same person. In all these forms the connection has been observed by authors, and in some of them by myself,—but chiefly in the slighter or more inflammatory forms, which are most frequently occasioned by the same causes as those which produce rheumatism, viz. cold and moisture, or vicissitudes of temperature, with terrestrial emanations: dysentery attacking those who are predisposed to it by the accumulation and stagnation of morbid secretions or acrid fæcal matters in the digestive viscera, &c.; and rheumatism, those who possess the rheumatic diathesis, or in whom the morbid secretions are not set loose, or the balance of circulation and exhalation is not thrown in upon the intestinal canal. Conformably with this view, it will be evident that both affections may occasionally coexist, and that either may supervene upon the disappearance of the other, especially when the above causes continue in operation.

45. V. SUB-ACUTE AND CHRONIC DYSENTERY, AND CHRONIC DIARRHŒA.—i. Dysentery may occur primarily in the mild and *sub-acute* form described above (§.12.); and yet, in consequence of neglect, or of the continued exposure of the patient to its endemic or other causes, it may run on to a very chronic duration, or assume the form of chronic diarrhœa or lientery. It may lapse into either of these forms from the acute, in a gradual manner; or either of them may commence as diarrhœa; the characters of sub-acute or *chronic* dysentery appearing gradually, or more or less suddenly, in their progress. When the disease arises chiefly from malaria or other endemic causes; or follows agues, remittents, and diseases of the liver or spleen; it more generally assumes a sub-acute and chronic form, or passes into chronic diarrhœa, than in other circumstances. In other respects, the *causes* of the chronic states of dysentery, even when occurring primarily, are the same as those that produce the acute forms. These states, however, are oftener met with in those who have had disorders of the stomach, liver, or bowels, in long residents in warm climates or unhealthy localities, and in the natives of such places, than in others; and they are more frequently complicated with diseases of the liver, spleen, omentum, pancreas, &c. in persons thus circumstanced. In most cases, these states of the disease differ from the acute, chiefly in the greater mildness of the symptoms, in the absence of a few of the more violent phenomena, and in the much more uncontrollable and persistent nature of such as are present. Besides following upon, or being rather prolon-

of, the acute, they may be the sequelæ of any of the forms of diarrhœa, of common or pestilential cholera, and of fevers that have been neglected in their early stages, or improperly treated. When it occurs primarily, which is comparatively rare, it may, after a considerable time, assume the acute characters.

46. α. The *Symptoms* of chronic dysentery differ chiefly in degree from those characterising the more simple inflammatory form of the acute disease (§ 12, 13.). The fever of the latter generally subsides, especially during the day; and the appetite and strength frequently return for a time. Tormina and tenesmus either altogether disappear, or are present in a slight degree; but sharp griping pains, and soreness in the abdomen, are often complained of. The stools are more or less serous, mucous, muco-puriform, or gelatinous; contain some fluid feculent matter, or ill-digested substances; and vary from a white albuminous, or white of egg, appearance, to a dark olive green or greenish black; being sometimes marbled; or one day like chalk and water, and on another like a dark jelly, or the green fat of a turtle. Blood is often either so intimately mixed with the evacuation as to give it an uniform brick-red colour, or is quite distinct and fluid, or partially coagulated. The puriform or muco-puriform matter generally exists as small streaks; but this matter may not be detected, although ulceration of the large bowels is present. The discharges are more copious than in acute dysentery, but much less frequent; being commonly from three or four to ten or twelve in the twenty-four hours. The pulse is not accelerated in the early part of the day, but it usually becomes quicker towards evening; and is feeble, unequal, sometimes slow, or intermitting. The tongue is often dark red or glossy; the countenance sunk and anxious; the surface cold, lurid, dirty, harsh, dry, or even scaly; the body emaciated; and the abdomen hard, tumid, not very painful on pressure, excepting about the cæcum or sigmoid flexure of the colon, with griping pains in the course of the colon. In the more advanced stages of the disease, the feet and legs become œdematous; the lips and surface exsanguineous; the surface and the evacuations exhale a peculiar, offensive, and subacid odour; sometimes jaundice or ascites supervenes, and the patient at last sinks under the irritation and hectic symptoms, after many weeks or even months of continued or remittent suffering.

47. β. Chronic dysentery sometimes assumes a modified character, which is essentially the same as the ulcerated and lienteric forms of DIARRHŒA (§ 11, 12.). In these cases, the mucous follicles and coat of the small, as well as of the large, intestines are affected; but in warm climates and unhealthy situations, disease extends much further, and generally comprises lesions either of the liver, spleen, pancreas, mesenteric glands, or of two or more of these. Repeated attacks of dysentery, in these places, frequently terminate in chronic dysenteric diarrhœa in a simple or complicated state; and I have seen cases where it has continued for years, with slight remissions; the stools being lienteric, copious, and crude, and the appetite ravenous. In some cases of this protracted state of disease, especially where the stools are gleety or mucous, and voided with tenesmus, but without tormina, the rectum only is affected; one or more ulcers being seated at a greater or less distance from the anus. The sub-acute and chronic forms are not infrequent in *children*, are in them often accompanied by *procidentia ani*, and are generally inflammatory, particularly when occurring sporadically. *Chronic dysentery* in the *dark races* assumes the appearance of a gleety discharge from the bowels, and depends upon deficient tone of the vessels and follicles of the intestinal mucous surface, rather than upon inflammatory action.

48. ii. *Complications of Chronic Dysentery* are most frequent in countries within the tropics, and in places abounding with terrestrial emanations. — (*a*) When chronic dysentery is complicated *with disease of the liver*, the symptoms often approach those of diarrhœa; and the hepatic affection is generally latent, insidious, and also chronic; the internal structure of the organ being chiefly implicated. In this state of disease, the evacuations are frequent; attended by griping pains about the umbilicus; and are of a dark green colour, indicating a morbid state of the bile; or of a pale clay colour, showing torpor of the liver or obstruction of the ducts. In some cases, they are dirty, watery, and offensive; and in others, of a whitish appearance: whence has arisen the term "*white flux*." These last seem like chalk or lime mixed in a dirty fluid, or intermediate between this and whites of eggs; occasionally they resemble cream or yeast; and they are often slimy, and contain broken down, clay-coloured fæces, and half-digested substances. These sometimes continue for a long time; or they change to a darker colour, apparently from a partial discharge of bile or the medicines taken; and afterwards return to their former hue. This state of the dejections is evidently owing to the obstruction of bile, to the consequent impairment of chylifaction, and to the increased and morbid secretion of the follicular glands and mucous surface. In addition to these, the patient complains of tightness, fulness, or oppression at the epigastrium and lower part of the thorax, particularly on the right side; and of slight evening exacerbations of fever. The eyes have frequently a pearly appearance; and the countenance is livid or sallow. This complication is often caused by the excessive use of spirituous and other intoxicating liquors; and by the concurrence of the causes of hepatitis with those of dysentery; and it frequently is *consequent* upon hepatitis; upon intermittent, remittent, or continued fevers: and upon the acute disease, when it arises from endemic causes. The dysenteric symptoms are manifestly occasioned or perpetuated either by a morbid condition, or by deficiency, or total obstruction, of bile: this secretion being indispensable to the due performance of the assimilating processes, and to the healthy state of the mucous surfaces and follicles. In other cases of this complication, the enlargement of the liver, or the symptoms of hepatic disease, are less equivocal, and approach more nearly those stated above (§ 35.). (See, also, LIVER — *Abscess in.*)

49. (*b*) — α. When chronic dysentery follows the diseases just now mentioned, or the prolonged or intense operation of endemic causes, it may become associated with *scorbutic* symptoms; or

dysentery, in a sub-acute or chronic form, may be consequent upon scurvy, as in the scorbutic complication already described (§ 39.). The chronic states of the disease may also associate with them changes of other viscera beside those of the liver. In the hepatic complication, especially in hot countries, the internal surface of the *small intestines* is very frequently also inflamed or ulcerated, and the *spleen*, *pancreas*, *mesenteric glands*, or *omentum*, may be affected in addition. When chronic dysentery follows periodic fevers, the spleen and mesenteric glands seldom are altogether sound. I have never witnessed an inspection of a case, either in temperate or in warm climates, that did not present lesions in one or more of these organs, beside those in the bowels; but some of these were manifestly consequences of the disease, and not associated with its early stages. With the exception of the complications with disease of the liver and spleen, the exact pathological state can seldom be ascertained during life. When the patient is very much emaciated, enlargement of the pancreas or of the mesenteric glands may be suspected, from hardness and fulness in the abdomen — usually between the pit of the stomach and umbilicus; and from aching pains in the back. — β. In the *dark races*, the complication of chronic dysentery or diarrhœa with disease of the liver is very rare; but those with enlargement of the *spleen* and of the *mesenteric glands*, with *worms*, and with *rheumatism*, — especially the last two, — are very common. — γ. In *children*, the association of the complaint with enlargement of the mesenteric glands, or with worms, is not infrequent; and the complication of the slighter or sub-acute states with *bronchitis* is sometimes also met with among them.

50. VI. Terminations and Prognosis. — i. *The Acute varieties* of the disease may terminate — 1st, in a return to health; — 2d, in periodic or continued fever, or some visceral disease; — 3d, in ulceration, and the extension of inflammatory action to the peritoneum, or perforation of the bowels; — 4th, in sloughing of the internal tunics, and gangrene of portions of the intestinal tissues; — and, 5th, after having assumed a *chronic form*, in constriction of the colon, and other organic lesions; or in gradual exhaustion of the powers of the constitution. — (*a*) A *favourable issue* may be expected, if the stools become less frequent, more copious and feculent, and the biliary secretion more natural; if the tormina and tenesmus abate, and the patient be less disturbed in the night; if the abdomen be less painful, especially on pressure; and if tumefaction or tension be not present; if the febrile phenomena be alleviated, the pulse, tongue, and skin becoming more natural, between the sixth and seventeenth days in the asthenic forms; and if the symptoms indicating the other terminations be not observed.

51. (*b*) When the disease is suddenly arrested by astringents, or otherwise injudiciously treated, particularly when it arises from endemic and epidemic causes, it may pass into ague, remittent or continued fever; or into inflammation and abscess of the liver, or into peritonitis or enteritis. These results evidently arise from the stoppage of the discharge of morbid matters that require elimination from the system, and the consequent irritation these matters produce upon the nervous and circulating systems, or upon the organs chiefly concerned in excreting them. But, on some occasions, these maladies may supervene, without any aid from the practitioner. When dysentery occurs in the *puerperal state*, particularly soon after delivery (and, when the disease is epidemic, females thus circumstanced are very liable to it), it is very apt to pass into peritonitis; or to be followed by effusion into the peritoneum, and even by inflammation of the womb. In 1832, I treated a case of sporadic dysentery in a lady who had not been pregnant for several years. It was followed by hysteritis; which, in its turn, was followed by phlegmasia dolens, first in one thigh, and then in the other. She is now in good health. In some instances, particularly in hot climates and in young children, introsusception of portions of the intestines may take place, and give rise to grumous or feculent vomitings, and all the symptoms of ileus. I have sometimes seen children seized, during dysenteric complaints, with convulsions, obstinate vomiting, distressing colicky pains in the abdomen, and stupor, followed by various sympathetic phenomena, and death; and, upon dissection, the only lesion, besides signs of irritation in the digestive mucous surface, has been invagination of more or less of the intestinal tube, and the usual consequences of this occurrence. In a case of this kind, which was supposed to have died of acute hydrocephalus by the medical attendant, and which was opened by Mr. Alcock in my presence, the greater part of the ilium had passed into the cæcum; and the cæcum, with its contents, into the transverse arch of the colon.

52. (*c*) If a favourable change take not place, in the more sthenic varieties, before the twenty-fourth day; and in the asthenic states, previously to the eighteenth or nineteenth days; or if only a partial change be observed; the disease usually either passes into the *chronic form*, or assumes still more severe characters.

53. (*d*) *An unfavourable termination* may be looked for, if the foregoing symptoms (§ 50.) be aggravated; or if no impression have been made upon the complaint, about the time stated above; or between the ninth and fourteenth days in the severe asthenic forms; if the abdomen become enlarged, tense, or tender, or preternaturally hot, especially about the umbilicus; or if pain increase rapidly, and be constant and fixed in one part; if the watery discharges, loss of blood, or the harassing frequency of the calls to stool, particularly at night, sink the powers of life, or be attended by cramps in the lower extremities, leipothymia, or syncope; if the face be anxious, or Hippocratic, and the body emaciated; if stupor, delirium, picking of the bed-clothes, startings of the tendons, supervene; if the extremities or surface be discoloured, or the former be cold or clammy, or the latter of a lurid hue, or exhale a cadaverous or an offensive odour; if drinking be followed by tormina and a desire to go to stool; if the tongue be raw, glossy, or very dry, and dark red; or dark sordes collect about the teeth, or aphthæ appear in the mouth or on the lips; if the pulse be very weak, irregular, or intermittent, or rise in frequency to upwards of 120; if respiration be rapid, laboured, or difficult; if the breath be fœtid and cold; if the matters vomited be offensive or grumous; if ecchymoses or sphacelating ulcers appear on the surface; if sight or hearing be partially lost; if paralysis of

the *sphincter ani* take place, and the stools be involuntary, or grumous, or like washings of meat, cadaverous, or mixed with small black coagula, or with light muco-puriform streaks, and especially if they contain sphacelated portions of the mucous coat; if the stomach be so irritable as to reject whatever is taken; and if complete strangury or suppression of urine take place. Hiccup is not an unfavourable symptom, if it occur early in the disease; but when it comes on at an advanced stage, it is often an indication of the extension of the disease to the peritoneum, or of the sphacelation of the mucous membrane.

54. *α*. *Ulceration* may take place early, even in the mildest forms of the disease, without causing any decided change. Most frequently, however, it is attended by aggravation of the symptoms; the stools passing from a mucous to a serous, sero-puriform, or grumous state. At its commencement, especially in the less inflammatory cases, little fixed or constant pain is felt; but as it advances through the coats, pain, in some form, is experienced. At an advanced period, especially when sphacelating ulcers exist, the stools become dark brown, muddy, or watery, and smell like washings of meat. The blood discharged is often of a darker colour, and sometimes mixed either with an ichorous sanies, or, in the more sub-acute or chronic cases, with purulent streaks. When the blood is in large quantity, and unmixed with the rest of the dejection, ulceration low in the canal may be inferred.

55. *β*. *Extension* of inflammatory action to the *peritoneum*, or the *omentum*, or to the *mesentery*, is generally owing to ulceration, and may occur either previously, or subsequently, to *perforation* of the intestinal parietes. If great increase of pain, with heat, fulness, and tension of the abdomen, distressing anxiety, restlessness, inability to sleep, frequent retchings, and copious discharges, *per anum*, of morbid secretions and fæcal matters which had been retained while the spasmodic action of the bowel was in full force, supervene at an advanced stage, extension of inflammation to the peritoneal coverings may be inferred; and, if these symptoms take place suddenly, and are quickly followed by very painful meteorismus, hiccup, cold sweats, sunk countenance, jactitation or delirium, rapid and laborious breathing, a very wiry or small, irregular, and weak pulse, cold extremities, &c., they may be imputed to perforation of the bowel. Inflammation may also extend, generally with ulceration of the tunics, from the cæcum to the *appendix vermiformis*, and thence to the peritoneum; or to the external connecting cellular tissue, giving rise to abscesses in the right iliac fossa, that may open either into the cæcum, or externally. (See Cæcum, § 19. 21.) A case of this description was treated by me in a warm climate, in 1817. It had been neglected in its early stages, and a very large abscess had formed and burst into the cæcum; extensive ulceration and sphacelation of this part being found on dissection.

56. *γ*. *Gangrene* seldom proceeds, even in the most severe cases, further than the mucous and submucous tissues; excepting in warm climates, where sloughing ulcers, sometimes of large size, penetrate all or most of the coats. This change is commonly occasioned by the extension of the inflammatory action to the tissues underneath, and the consequent detachment and death of the portion of this coat covering the parts particularly affected; as the cuticle is detached by the effusion of fluid underneath it, when the vascular tissue of the skin is acutely inflamed. In such cases, portions of the partially sphacelated membrane hang loose in the canal, whilst the more external tunics are altered in colour, and softened. The *symptoms* indicating the commencement of sphacelation of portions of the mucous coat, are those detailed in the preceding paragraph, followed by leipothymia, or syncope when the patient is raised; a sudden remission of the tormina, abdominal pain or heat; singultus; cold, shrunk, and bedewed countenance and extremities; sense of cold in the abdomen; involuntary motions; lividity of the lips and cheeks; partial convulsive movements; extreme prostration, and the supine posture; glassy, inexpressive state of the eyes; cadaverous or very fœtid smell from the evacuations, and the body; and, lastly, insensibility.

57. ii. *The Chronic forms*, besides terminating in ulceration and extension of inflammatory action to the serous surfaces, often superinduce thickening of the coats, and stricture, in some part of the colon or rectum, or of both, frequently with dilatation of the portion above the contraction; ultimately terminating, in some instances, in rupture of the more dilated and attenuated or ulcerated part, and effusion of the intestinal contents into the peritoneal cavity. In some cases, ascites comes on, or œdema of the lower extremities, or both, and the patient sinks in an exhausted and dropsical state.

58. VII. Appearances on Dissection vary with the form of the disease. In the inflammatory varieties, they are limited to the large bowels, and parts immediately connected with them; but in the asthenic and complicated states, especially in the scorbutic, the changes are much more extensive. —*a*. Upon opening the abdomen, the *omentum* is sometimes adherent to the superficial convolutions of intestines, or to the brim of the pelvis, or to some part of the abdominal parietes; but it is oftener drawn up to the arch of the colon, or to one side. The *bowels*, externally, present merely changes of capacity and colour, unless partial or general peritonitis have supervened. They are commonly distended by flatus, and variously coloured in different cases or parts, and frequently without the external colour having reference to the state of internal change. The large bowels feel in one place thick and doughy, in another thin and membranous. The colon is sometimes displaced or elongated, from relaxation of the longitudinal bundles of fibres; the transverse arch hanging down in a loop, or the sigmoid flexure passing over to the right side (Annesley, &c.). Contractions of a considerable part of the colon are frequent, and sometimes the constrictions resemble those made by a ligature,—the parts above being distended and thinned; they are firm and almost cartilaginous in some chronic cases, and seated chiefly about the sigmoid flexure and arch of the colon, and more rarely in the rectum. Adhesions of the peritoneal surface of the colon to the adjoining parts, and effusions of lymph, or of serum, into the peritoneal cavity, also, are often seen.

59. *b*. Internally, the bowels present extensive and numerous changes. The villous coat is differently shaded in different parts; and varies

from a pale grey or sea green to a bottle green or violet colour; or from a pale pink to a bright red, or reddish brown, shaded with black. In some, the most opposite colours pass abruptly into one another. Large portions of coagulable lymph are sometimes found partially adherent on this surface. *Excoriations* of the mucous epithelium, the excoriated parts presenting a chocolate tint; detachment of portions of the villous coat, sinuosities existing underneath the parts intervening; *softening* of the internal tunics; *ulcerations*, in all the forms described in the article Digestive Canal (§ 36—40.); and *sphacelation* of portions of the mucous and submucous tissues; are the most frequent appearances, and are met with, in various grades, in all the forms of the disease. The *ulcers* are either small, numerous, and clustered, or large, distinct, and few. They are often dark, extensive, and sloughy; the parts in which they are seated, as well as those surrounding them, being softened, or very easily torn, particularly in the asthenic varieties, and in the scorbutic complication. They are frequently elevated on a thickened or hardened base, in the more chronic cases, as described in § 36. *e.* of the article now referred to; or they present exuberant fungous or fleshy granulations on their surfaces. In some instances, their centres are very dark or blackish (Pringle, Monro, &c.). Deficient vital cohesion of the coats of the bowels, they being occasionally torn as easily as wetted paper, is very common in the more asthenic varieties. In prolonged inflammatory cases, thickening and almost cartilaginous induration of a considerable part of the colon are not infrequent, the thickened or indurated portion being also contracted in calibre. In such cases, the parts above the contractions are greatly distended, the coats being thinned, ulcerated, and even lacerated; the contents of the bowel having passed into the peritoneal cavity, and occasioned rapidly fatal peritonitis. The *cæcum* is extensively disorganised; and the parts surrounding it are, in some cases, inflamed, or in a state of suppuration, or sphacelation (Annesley and myself). The *appendix vermiformis* is also occasionally inflamed and ulcerated. The *small intestines* are very often inflamed, especially in the internal surface; and ulcerated in their lowest third, particularly in the asthenic varieties, and in the hepatic and scorbutic complications. In some instances, the ileo-cæcal valve having been ulcerated, extensive intus-susception of the ilium takes place into the cæcum and colon. Invaginations occur also in other portions of the intestinal tube, especially the ilium. (See Digestive Canal, § 18—48.)

60. *c.* The *collatitious viscera* are generally diseased in the asthenic and complicated states. The *mesentery* and *mesocolon* are more vascular than usual; and the *glands* of the former are inflamed or enlarged, more rarely suppurated, especially in situations corresponding to large ulcers. A dirty-coloured fluid is occasionally affused in the peritoneal cavity in malignant or typhoid cases; and sometimes, also, in the thoracic cavities. The *spleen* is either enlarged or softened in the asthenic varieties, or when the disease is consequent upon periodic fever; and the *liver* is congested, inflamed, suppurated, or otherwise disorganised, in the hepatic and scorbutic complications. Congestion of the portal vessels is very common in both the asthenic and sthenic forms. Injection and changes of colour of the internal surface of the *stomach* and *duodenum*, and accumulations of viscid thick bile in the *gall-bladder*, are frequently observed. The *pancreas* is sometimes enlarged, and presses upon the common duct. The *urinary bladder* is occasionally inflamed about its neck, or in its external tunics; and the *prostate* somewhat enlarged. In the dysentery recently epidemic in Ireland, Dr. O'Brien found the liver diseased in one half the dissections; the spleen in one fourth; the small intestines in two thirds; and the colon and rectum in all. In chronic cases, in the British army in the Peninsula, the spleen, liver, pancreas, mesenteric glands, &c., or any two or all of these, were more or less diseased (Sir J. M'Grigor, Dr. Ferguson, Dr. Somers, Dr. Forbes, &c.).

61. *d.* In the most *malignant varieties*, and in the *scorbutic complication*, the internal surface of the whole digestive tube is of a livid, purple, or dark colour; with patches of ecchymoses, excoriation, ulceration, and sphacelation. The villous coat, particularly in the seat of ecchymoses, may readily be rubbed off; and the ulcers have a foul and dark appearance. The liver is sometimes large, soft, and spongy; at others, pale and soft, especially in cases where the loss of blood has been very large. The spleen is sometimes so softened as to appear semifluid or sphacelated. The heart is often partially softened or flaccid; the pericardium and pleural cavities containing a bloody, dark, and dirty serum. The lungs are often congested; the bronchial lining dark, or ecchymosed; and the blood in all the large vessels is semifluid, black, and of a very loose texture. Indeed, the vital cohesion of all the tissues is, in these forms of the disease especially, more or less lost. In the *dark races*, the digestive mucous surface is usually paler and softer than natural, or discoloured or sphacelated; the follicles enlarged or ulcerated; the coats of the cæcum and colon very easily torn; the liver pale, soft, and small; the spleen enlarged and softened; the pancreas occasionally enlarged, and the mesenteric glands always enlarged, or otherwise diseased.

62. VIII. Diagnosis.— Dysentery often very nearly approaches either *fever*, *diarrhœa*, *cholera*, or *colic*; and it frequently supervenes upon one or other of these diseases; fever, diarrhœa, &c. almost insensibly passing into it. — (*a*) *Fever*, especially some of its endemic and epidemic forms, sometimes assumes an enteric character, closely resembling the asthenic states of dysentery, particularly as respects both the frequency and character of the evacuations; a circumstance which led Sydenham, Blane, Jackson, and others, to consider the latter as fever turned in upon the bowels. Although, in some cases, the one may insensibly pass into the other, yet idiopathic fever, with predominant enteric affection, will be distinguished from dysentery by the more marked constitutional affection before the bowels become disordered, by the much less pain and difficulty in the excretion of urine, by the absence of severe tormina and straining, and by a more feculent state of the evacuations, than in any of the forms of the latter disease. It has been supposed by many writers, that the more asthenic or malignant states are mere associations of dy with adynamic or typhoid fever: but, i

viewing these states as complications of two diseases distinct from each other in their nature and seat, it would be more philosophic to consider them as coexistent results of the operation of certain concurring causes upon the economy; which causes, according to their natures, and the predisposition and habits of the affected, induce effects partaking more or less of the characters of either fever or dysentery. In most instances, where the disease seems to have been thus mixed, animal emanations, a close and impure air, or other depressing and contaminating agents, acting either internally or externally, and aided by epidemic influence, have manifestly existed. But it is rather to the presence of those agents, in such a form as to act upon the excreting viscera and prima via, or in such combinations as to determine their effects to this quarter, assisted by antecedent disorder or predisposition of the digestive and excreting viscera, that the adynamic states of dysentery are to be imputed. Thus an impure or infected air — either short of inducing, or even sufficient to induce, the worst forms of fever — may produce a malignant or typhoid state of dysentery, when aided by unwholesome water or diet; and this latter cause, unassisted by the former, may also occasion the same disease, in a similar or a less severe form, in those greatly predisposed. Hence, according to the nature and concurrence of causes, will effects upon the frame be induced; which will insensibly approach fever on the one hand, and the most simple and perfect dysentery on the other.

63. This *modification* of the disease, with the nature of the disposing and exciting causes, is further illustrated by the intermitting and rheumatic characters occasionally assumed by it, in both its endemic and its epidemic states of prevalence. In localities where marsh miasmata abound, and where the water or the food are unwholesome, or other causes of dysentery prevail, this disease often either assumes, in both its acute and chronic forms, in warm climates especially, an intermittent or remittent type — most frequently the latter — or supervenes upon or passes into these, or into continued fever. Of this I have seen numerous instances; and similar facts have been recorded by nearly all the writers on the diseases prevalent in the armies engaged in the last wars. In certain of its epidemics, especially those which prevail in cold and moist seasons, dysentery sometimes follows, or is otherwise connected with, catarrhal affections, as observed in those recorded by Ström, G. Baker, and Neumann; and it occasionally is complicated with rheumatism, particularly in one or more of the joints or extremities, the amelioration of the one affection being often followed by aggravation of the other. The association of dysentery and rheumatism, and their conversion one into the other, are stated by Dr. Sims to have been remarkable, in the epidemic in London, during 1769 and 1770. A somewhat earlier and a more distinguished writer,—Dr. Akenside,—likewise alludes to this subject, in a manner worthy of the most philosophic of our poets, and observes: — "Novimus præterea, eadem tempestate et ob easdem causas rheumatismum quoque frequentissimum fieri;" whilst he states, in another place, that, although these diseases prevailed separately, they were, owing to the similarity of their causes, often coexistent, or consequent the one on the other: a circumstance not confined to this climate, and occasionally observed in certain seasons, but also remarked amongst the natives of intertropical regions.

64. (*b*) *Diarrhœa* is so very closely allied to dysentery, that they may be viewed as varieties or grades of the same morbid actions. Nosologists, in their rage for drawing distinctions, which exist only in extreme cases, have wittingly overlooked the fact, that, between both diseases, there often scarcely exists a shade of difference; whilst, between the extremes, the distinction is sufficiently wide, and easily made. Dysentery frequently follows simple diarrhœa, or diarrhœa attended by fever; and is itself also followed by diarrhœa, in some one or other of the forms in which it is described; and both diseases may be merely the sensible phenomena either of the irruption and excretion of morbid secretions, or of inflammatory irritation, affecting somewhat different portions of the alimentary canal. Yet, although thus very closely allied in nature and form, they are very often distinct, as respects — 1st, the seat of disease; 2d, the affection of the system generally; and, 3d, the symptoms resulting from each. — α. *Diarrhœa* is generally sporadic, and never infectious;—β. It occurs at any season, and is more commonly a chronic disease than dysentery; — γ. It is usually neither preceded nor attended by fever; — δ. It is unaccompanied by severe tormina and straining; — ε. In it, the evacuations are more or less abundant, and not bloody; — ζ. It is seldom attended by vomiting or heat of skin, or by early depression of the powers of life, as observed in dysentery; — η. The history of the disorder, particularly in relation to its causes and constitutional disturbance, will point out many points of dissimilarity between it and dysentery.

65. (*c*) *Cholera* differs from dysentery, — α. In appearing only during the latter part of summer, and in autumn; — β. It is a most acute disease, running its course in from one to two or three days; — γ. It is unattended by straining, or blood in the stools; — δ. In it, the stools are abundant, very frequent, and the vomiting almost constant; — ε. Spasms of the legs and abdominal muscles, characterising cholera, are seldom met with in dysentery, excepting towards an unfavourable termination of the super-acute cases. It should not, however, be overlooked, that cholera sometimes runs into dysentery, evidently owing to the irritation excited in the large bowels by the morbid secretions poured into the digestive canal.

66. (*d*) Dysentery can hardly be confounded with *colic*, if due attention be paid to the history of the case. — *Colic from lead, bilious colic*, and *ileus* from hardened substances in the bowels, or from invagination, sometimes present features of resemblance to dysentery; particularly the violent pains in the abdomen, vomiting, and occasionally abortive efforts at evacuation, with very scanty watery or bloody discharges. But, in these, there is neither antecedent diarrhœa, nor attendant fever, nor frequent calls to stool, nor tenesmus, nor any considerable evacuation in the aggregate, nor fixed pain in the hypogastrium, nor scanty, difficult, and painful excretion of urine, or *tenesmus vesicalis*, — all which characterise dysentery. In these, also, vomiting is much more urgent, sometimes becoming feculent, and the paroxysms of

pain more violent, particularly around the umbilicus, than in this disease; the matters received into the stomach being ejected from it without exciting either a desire for stool, or tenesmus. It should, however, be kept in recollection, that the bilious or endemic colic of warm climates (see COLIC, § 16.) in some cases differs but little from dysentery, and that chiefly as respects the more complete retention of the morbid secretions and excretions, as will be seen from the history of both diseases.

67. (*e*) *Internal hæmorrhoids* sometimes give rise to symptoms resembling dysentery, — or rather to tenesmus, an affection entirely of the rectum, the seat of these internal tumours. The tenesmus of hæmorrhoids, whether attended by discharges of blood or not, is strictly a local complaint, is seldom severe or preceded by tormina, or frequent calls to stool, or much constitutional disorder; and is a simple obstruction to the passage of consistent stools, which are not mucous, and not streaked with blood, which, if passed at all at stool, is entirely distinct from the fæcal evacuation; the hæmorrhoidal tumours often protruding at the time. These, independently of the different circumstances under which both diseases occur, and the history of their progress, are sufficient to distinguish them from one another.

68. IX. PATHOLOGICAL INFERENCES.—i. THE MODES OF OPERATION OF THE CAUSES.—There is, perhaps, no other disease which requires a more accurate analysis of its pathological conditions, with strict reference to their causes, than dysentery; for these causes induce so very different states of morbid action in connection with that which especially constitutes the malady, that the practitioner will often attempt in vain either to limit its spread, in circumstances requiring this precaution, or to arrest its progress in particular cases, without being acquainted with the operation of its diversified causes upon the system, and the nature of the effects they induce.

69. 1st. *Operation of causes which dispose to the disease* (§ 9. 22.).—These, when their nature is known, and their mode of operation ascertained, may be sometimes averted, and an attack thereby prevented, especially when the malady is prevalent. — (*a*) High ranges of temperature, and consequently hot seasons (PISO, HILLARY, STRÖM, HUFELAND, &c.) and climates, so very generally predispose to dysentery, that it most commonly occurs either during, or subsequent to, these states of atmosphere. The effects of a high temperature upon the pulmonary functions, and consecutively upon the blood, and the biliary and other secretions and excretions, are such, as fully explained in the article DISEASE (§ 32—34.), as greatly to increase and disorder these latter, especially when the circulation is determined towards the abdominal organs by exposure to cold, or when assisted by other concurrent causes. — (*b*) Peculiar states of air, connected with the epidemic manifestations of the disease (HUXHAM, HORN, SCHMIDTMANN, &c.), and with certain features which different epidemics often present, whether referred to noxious exhalations floating in this fluid, or to extreme humidity, or to electrical conditions of it affecting the electro-motive states of our frames, most probably influence the organic or vital actions, especially the circulating and secreting functions, in such a manner — although slightly or latently — as to render them remarkably liable to this species of disorder upon exposure to any of the exciting causes. And it is not improbable that these states, as well as high ranges of temperature, favour the production and accumulation of morbid secretions in the biliary apparatus and in the primæ via; and that these secretions, aided by consecutive causes, induce that form of action constituting the disease, although tending to their evacuation from the frame. — (*c*) An asthenic or exhausted state of the constitution, and of the digestive canal in particular, insisted upon by MARCUS, has certainly no mean influence as a predisposing cause, as shown by the greater prevalence of the disease in persons of this description in all climates and in most epidemics, in soldiers after very fatiguing marches, and in convalescents from fevers and other diseases. — (*d*) To these may be added the use of intoxicating fluids, as disordering both the digestive mucous surface and the secretions poured into the intestinal canal.

70. 2d. *Of the operation of causes which, either individually or conjointly, excite the disease.* — *A. Those which act locally, or affect chiefly the large bowels.* — (*a*) Many of these irritate or inflame the mucous surface of the cæcum, colon, and rectum. These bowels perform chiefly an excreting function; and consequently, when the excretions which are proper to them, as well as those which are poured into them from the small intestines, are allowed to accumulate, irritation or inflammation of the mucous surface, with inordinate action of the muscular coats, may be expected to occur. Irritating purgatives, injudiciously prescribed; a dose of rancid castor oil; foreign bodies lodged in the intestines; the too liberal use of fruit, especially that which is unripe (HORST, GIRTANNER, M'GRIGOR, &c.), or the fruit of hot climates (BÜCHNER, TWINING, myself, &c.); various indigestible substances; uncooked or imperfectly cooked meat or other food; pork; sour or bad wine; minute insects, or their ova and animalcules, in the water used for drink (LINNÆUS, SEBASTIAN, MAY, LATREILLE); and intestinal worms (constituting the *Dysenteria verminosa* of BONET, MAY, and BAUME); seem to act in this manner. — (*b*) Several agents determine inflammatory irritation of, and an inordinate flux of fluids to, the mucous surface of the large bowels, and their usual results. The causes just enumerated necessarily act in this manner, although not so immediately, nor to the same extent, as the following: — Exposure to cold, or cold and moisture, especially during or immediately after great atmospheric warmth, has been considered by BÜCHNER, STOLL, FISCHER, LARREY, and others, to produce the disease, and at the same time to impose on it a rheumatic character; whilst OSIANDER considers that, of itself, cold will not have this effect; and that the presence of morbid matters in the primæ via, or the concurrence of some other cause, is necessary to its operation. The influence of the causes of common catarrh, insisted on by STRÖM, SCHLEGEL, and NEUMANN, although not so great as these writers suppose, is often well marked, especially in sporadic cases, and in some seasons. These, and several other authors, consider that the disease is catarrh, or catarrhal inflammation, of the large bowels, from remarking its prevalence about the same time as that affection. The sup-

tery, and one often very imperfectly manifested by symptoms, is that with *disease of the liver*. — (*a*) The *hepatic affection* may be *primary*, in which case it is either *functional* or *structural;* the *functional disorder* consisting — *a.* of torpid or suppressed function and passive congestion; or, *β.* of increased secretion, and of the vascular determination requisite to such increase; — the *structural disease* being — *a. acute*, or consisting of active congestion, or inflammation, or of abscess in the substance of the organ; or, *β. chronic*, with various alterations, occasioning obstructed circulation through the portal vessels, and an insufficient as well as a morbid biliary secretion: in these states, the bowel complaint may be viewed as *symptomatic* of the hepatic disease. — (*b*) The affection of the liver may be *a coëtaneous effect*, with that of the bowels, of the same causes: in this case, the former will be of the *functional* and *acute* kinds enumerated above; *abscess* occasionally supervening in the advanced stages of the associated malady. This form of complication is most common in warm countries, where, the causes of both diseases being nearly the same, these associated results may reasonably be expected. — (*c*) The hepatic change may be *consequent upon the dysenteric malady*, especially in its more chronic states. In cases of this description, the substance of the liver is either inflamed, softened, and discoloured; or it contains one or more purulent collections, with or without any surrounding cyst; the matter being sometimes infiltrated into the softened, and apparently not inflamed structure of the organ. Here the hepatic change is contingent upon the bowel disease, in its advanced stages, and is favoured by constitutional vice or injudicious treatment, or both; and occasionally by the nature of the predisposing and exciting causes, as by habits of intemperance. In these three states of this important complication, the symptoms are often obscure. In the *first* and *second*, they are frequently very manifest; but, in the *third* especially, they seldom admit of more than suspicion, arising from the obstinacy of the disease, the lurid and lightly jaundiced appearance of the surface, the morbid state of the biliary and other secretions, and the irregular or hectic form of febrile disturbance; chills, rigors, or even horripilations, being seldom felt. The severity, also, of the dysenteric symptoms sometimes masks, or draws off the attention of both patient and physician from, the hepatic disorder.

77. The frequency of the *third, latent, or superinduced form* (§ 76. *c.*) *of hepatic complication*, especially in the more chronic cases of dysentery, has given it much practical importance; and, as a knowledge of the manner in which it arises is necessary both to its prevention, and to its removal, several attempts at explaining the occurrence have been made. These have been remarkably vague and unsatisfactory. I shall therefore state, with but little reference to them, the only ways in which it can be brought about. — 1st. The irritation and increased vascular action in the intestinal canal must necessarily be followed by augmented circulation through the portal vessels, by a more copious secretion of bile, and, if at this time the liver be congested, or its ducts loaded, and especially if the blood abound with excrementitious elements, by an acrid and morbid, as well as augmented, secretion. — 2d. The absorption of injurious ingesta, or of morbid matters formed or retained in the *primæ viæ;* or of puriform matter from the inflamed or ulcerated mucous surface, into the mesenteric veins and portal circulation, must necessarily be productive of the following effects: — *a.* A vitiated, or an increased, or both a vitiated and increased, secretion of bile; — *β.* Irritation of the structure of the liver, followed by inflammation or softening, often rapidly passing into suppuration, without much tumefaction or previous sthenic or phlogistic action; — *γ.* The deposition or infiltration of puriform matter in the substance of the organ, especially when a puriform fluid is carried from the diseased bowels; — *δ.* Inflammatory action, and its consequences, in the vessels along which the morbid matters pass, and on the blood they contain. — 3d. It is extremely probable that inflammation extends from the ulcerated mucous or submucous membranes to the radicles of the veins, and from thence along their ramifications and trunks, the product of the morbid action mixing with and contaminating the blood which circulates to the liver, as in the foregoing — the 2d — case, and producing the same effects, the inflammatory action extending more or less to the ramifications of the portal vessels. It seems most probable that the above are the chief modes in which disease of the liver is superinduced in the course of dysentery; and that one or all of them more or less obtain, in different cases, or even in the same case. Without, however, denying that the procession of morbid action contended for by some writers, and about to be noticed, sometimes takes place, I may state, in support of the preceding, that M. Ribes (*Révue Méd.* 1825, t. iii. p. 5. *et seq.*) found puriform matter in the veins, and inflammation of their coat, in several cases where purulent collections had formed in the liver after ulceration of the inner surface of the bowels. M. Gendrin (*Hist. Anat. des Inflammat.* t. i. p. 707.) observed similar changes in the veins in the vicinity of intestinal ulcers; and M. Andral (*Anat. Pathol.* vol. ii. p. 421.) detected false membranes lining the ramifications of the vena porta, in a person who died from disease of the bowels and liver. The very frequent collections of pus, and puriform infiltrations in the mesenteric glands, in the protracted states of dysentery, should also not be overlooked, as supporting the above inferences, especially if we take into account the intimate connection of this part of the absorbent system with the veins contributing to form the portal system. — 4th. It has been supposed by M. Broussais and his followers, that inflammatory action extends from the small intestines, along the bile ducts, to the liver; and some cases, that have been observed by him, Mr. Annesley, M. Andral, and myself, where inflammatory action or its results were seen in the common and cystic ducts, would seem to favour this view, if they could not be otherwise accounted for. It may be admitted, that the extension of disease to the small intestines is very frequent in the hepatic complication; but it is most probably excited, as stated above (§ 75. *c.*), by morbid bile, which also may have produced the inflammatory appearances occasionally observed in the ducts by which it is excreted. — 5th. The irritation in the bowels, or the operation of substances given

to cure the disease, may be sufficient to excite a sympathetic irritation, and its occasional consequence — suppuration — in an asthenic state of the system, in an organ so intimately connected, in its circulation and nervous influence, with the bowels, as the liver is. This, certainly, may possibly occur, but we have no proof of it; nor, indeed, does it admit of unexceptionable evidence. It is, however, very likely that the constant, or injudicious, use of calomel and irritating purgatives, when the substance of the liver is congested, and the bowels in a state of irritation, may give rise to abscess or other structural change in the liver; whilst, on the other hand, a similar practice during hepatic disease, may superinduce dysentery, without removing the primary complaint.

78. *D. Chronic* as well as other forms of dysentery may be associated with disease of the spleen, pancreas, or mesenteric glands; either, or even all, of which may occur, and indeed often does occur, in the same case, especially where endemic causes are in operation, — the hepatic complication being sometimes also superadded. — (*a*) As respects the disease of the *spleen* and *pancreas*, the procession of morbid phenomena is not often manifest; but these lesions are most frequently seen where dysentery has arisen from these causes, or has been consequent upon periodic or continued fevers; the splenic enlargement having often preceded the bowel affection. — (*b*) In respect of the lesions of the *mesenteric glands*, there can be no doubt of their being the results of intestinal irritation or ulceration; the most remarkable changes, especially purulent collections, having been seen in those corresponding to the seat of large ulcers.

79. *E. Relapses*, or repeated attacks after the patient has once had the disease, are very common, especially if he remain exposed to the endemic or other exciting causes, as in hot climates and during campaigns or sieges; or if he be addicted to intoxicating liquors. They are also frequent when the complaint has been associated with affections of the liver, or spleen, or consequent upon obstinate intermittents, and when recovery had not taken place until after it had assumed a chronic state. In such circumstances, slight errors of diet, or exposure to cold, and noxious emanations, will often speedily reproduce it. The numerous *relapses* observed in unhealthy localities, and amongst soldiers and sailors, are chiefly attributable to a too early discharge from medical care, and return to irregular habits and injurious exposures; and to the abrupt resumption of a stimulating diet.

80. X. Treatment. — Towards the close of the last century, and at the commencement of this, the treatment of dysentery, as set forth in various papers and works, by authorities confided in at the time, was absolutely below the standard furnished by the ancients, and by writers in the sixteenth and seventeenth centuries, not merely in respect of the knowledge and appropriation of therapeutical means, but even as regards the justness of pathological views; without which, indeed, no medicinal agent can be even safely prescribed. If any one think this assertion paradoxical, let him refer to the sources pointed out to him in the sequel; and, with a slight allowance for phraseology, he will perceive that, as to this disease, as well as to many others, knowledge has not been always progressive; and that the unsound and narrow doctrines in medicine, that sprang up soon after the middle of the last century, have contributed not merely to its retardation, but to its retrogression. The cant about experience, so recently raised, and kept up by those the least entitled to the distinction it should rationally confer, threatens an equal, although very different, obstacle to the progress of medical knowledge, by being made without reference to the fact, that experience in medicine consists not in opportunities, or the number of objects seen, or even in the repetition of the same experiments or observations; but in the qualities of the mind of the observer; in due preparation for the task by literature, philosophy, and science; and in the application of them to the objects successively investigated. Thus qualified, opportunities will seldom be wanting, and the results will soon accumulate so as to enrich the mind of the inquirer to an extent to which the empirically — the ignorantly experienced, will ever remain a stranger; and will be of such a description, as can be attained only by a mind so constituted and so instructed.

81. i. Of Acute Dysentery. — *The general indications of cure*, are — 1st. To remove the causes, predisposing, exciting, and concurring; and, when it is requisite, or circumstances will permit, to place the patient in a pure and open air. — 2d. To subdue inflammatory action by antiphlogistic measures, when its presence is rationally inferred, or when the state of the attendant constitutional affection will admit of them, or to the extent to which it may be benefited by them. — 3d. To promote the excretions of the skin and kidneys, and to determine the circulation to the cutaneous surface. — 4th. To remove, by gentle and appropriate means, the morbid matters that may remain or collect in the prima via, and to dilute and correct them. — 5th. To protect the mucous surface of the bowels from their irritating and excoriating action. — 6th. To correct the morbid condition of the circulating and secreted fluids, in the asthenic and malignant varieties, or whenever this condition may be inferred, conformably with the views explained in the articles Blood, Debility, Disease, and Symptomatology. — 7th. To support vital power, if it fail in the progress of the sthenic forms, and early in the asthenic varieties, as being indispensably requisite to the correction of a morbid state of the fluids. — And, 8th. To palliate urgent symptoms, or to arrest such as are attended by immediate danger, as soon as they appear. An appropriate use of energetic means will generally accomplish, simultaneously, two or more of these intentions.

82. *A.* Treatment of the Sthenic Forms. — (*a*) *Bleeding*, general or local, or both, according to the severity of the disease and constitution of the patient, and repeated accordingly, is generally requisite. The application of a number of leeches to the abdomen, in the slighter cases, or after venæsection in the more severe attacks, and of fomentations, or warm poultices, frequently renewed, after the leeches have fallen off, will give much relief. If tenesmus or dysuria be urgent, and pain be felt along the sacrum, the leeches may be placed there or on the perineum, or cupping on these parts may be directed. Although vascular depletion is most serviceable early in the disease, yet it should not, in these forms, be

neglected in the advanced stages, when it has been either omitted, or directed in too small a quantity, unless the symptoms are such as contra-indicate it. When fixed pain is felt in the region of the cæcum, or in the course of the colon, leeches should be repeatedly applied until it is removed

83. (*b*) *Purgatives and laxatives* have been long recommended, and employed with a most injurious want of discrimination, on the supposition that the disease is caused, and kept up, by the lodgment of fæcal matters in the colon; and yet, notwithstanding the general fallacy of the views which led to their employment, when judiciously selected and combined, they are often of much service. It must be obvious that such purgatives as act principally on the colon and rectum are not suited to an inflammatory disease of these parts; and that, when there can be no collection of fæcal or morbid matters to remove, the exhibition of them will merely aggravate the symptoms. It is, therefore, most important to ascertain, upon entering on the treatment of a case of the disease, as far as may be done, whether or no such matters may exist to the extent of requiring these remedies. If the patient has been seized after a constipated or even natural state of the bowels, if hardness and fulness can be felt in any part of the colon or cæcum upon careful examination of the naked abdomen by the hand; if, together with these, the tongue be much loaded, and the matters evacuated offensive from the commencement; if the patient complain of a sense of stuffing or fulness in the course of the large bowels, and if pellets of fæces be evacuated; suitable evacuants are indicated. But, if the disease has been preceded by diarrhœa, or by free fæcal discharges, as it frequently is, they should either be withheld for a time, or very cautiously employed; the selection, also, being made with much care. When the patient is well informed, his sensations and account of the early symptoms should be duly weighed and attended to. Much mischief may arise, and discredit be reflected on the practitioner, by neglecting this very obvious indication — by following blindly the dictates of either unsound theory or worthless authority, instead of being guided by common sense. I have repeatedly known persons who have been accounted ignorant, but who were not necessarily without sound sense, complain bitterly, and lose all confidence in their medical attendant, and hopes of recovery, when directed to take cathartics, after, as they have expressed it, their insides had been nearly purged out of them. — When, however, the patient has not had any feculent discharges for a considerable time, during the progress of the disease, although they may have been copious and frequent before the accession of the dysenteric symptoms, a mild purgative should be prescribed, as being much less irritating than the retention, even for a short time, of morbid excretions; and its operation should be promoted by an emollient enema. Cooling or oleaginous purgatives are preferable to others: and perfectly sweet castor or olive oil; or the following preparation, recommended by VOGEL, and praised by SCHMIDTMANN; or Formulæ 144. and 790.; or either of the subjoined electuaries; may be tried: —

No. 199. ℞ Extr. Jalap. Resin. gr. xij.; Sap. Venet. gr. vj.; tere probe cum Olei Olivæ (vel Ol. Lini. vel Ol. Amygdal. Dulc.) ℥ij. Capiat ʒss. omni nocte.

No. 200. ℞ Pulv. Jalap. ʒss.; Potassæ Supertart. ʒiij.; Pulv. Ipecacuanhæ gr. j.; tere bene simul, et adde Pulv. Rad. Glycyrrh. ʒjss.; Syrup. Zingiberis (vel Theriac. Commun.) ℥ss. M. Fiat Elect., cujus sumatur dimidium.

No. 201. ℞ Potassæ Supertart. in Pulv. trit. ℥jss.; Potassæ Nitratis ʒj.; Confect. Sennæ ℥ij.; Syrup. Aurantii q. s. ut fiat Electuarium, cujus capiat coch. j. vel ij. minima; super bibendo dose mist. seq.

No. 202. ℞ Magnes. Ustæ ʒj.; Camphoræ subactæ gr. ij.; tere et adde Vini Ipecacuanhæ ʒjss.; Aquæ Menth. Virid. ℥vijss.; Syrup. Aurantii ʒij. Fiat Mist., cujus capiat coch. iij. larga, cum dose Elect. supra præscripti.

If castor oil be employed, it will be advisable to exhibit it on the surface of some mucilaginous or emollient vehicle, and to add to it a few drops of laudanum. Whatever may be the purgative prescribed, it should be assisted by emollient and laxative injections, such as F. 144.; or of tepid water; or fat mutton broth, well strained; or linseed, or sweet, or almond oil. Tenesmus is sometimes aggravated by large enemata. They should, therefore, be of small bulk; or the irritation should be first allayed by an opiate, or an opiated and litharge (see F. 682, 683.), or a belladonna, suppository.

84. (*c*) *Refrigerants* may be exhibited, either alone, or with diaphoretics and diuretics, and in emollient and mucilaginous vehicles (F. 866.); especially after the above means have been employed, and when there are much fever and sense of internal heat. The nitrate of potash may be given with ipecacuanha and opium (F. 642.), or with small doses of camphor (F. 36. 460.), and of ipecacuanha (F. 39.); or, in solution with spirit. æther. nit. (F. 436.), liquor ammoniæ acet., and opiates. The muriate of ammonia may likewise be exhibited, as in F. 352. and 431.

85. (*d*) *Opiates, &c.* are productive of the greatest benefit, after depletion; and should be prescribed in large doses. If fæcal matters have been carried off, during the diarrhœa often ushering in the disease, they ought to be exhibited directly after depletion; and, in all cases, after the operation of a purgative. But much will depend upon the medicines that may be given with them. Of these, *ipecacuanha* is the most important. From two to four grains of opium with as much ipecacuanha should be prescribed for a dose; and, if not retained, repeated in a short time. These should be taken in the form of pill, which may be washed down by a refrigerant and emollient draught; or the ipecacuanha may be given in a similar vehicle, with from thirty to forty drops of the *tinct. opii comp.* (F. 729.), and repeated according to circumstances. This medicine will ameliorate the symptoms and determine to the cutaneous surface, especially if its action be promoted by the slightly *warm bath*, or semicupium or hip-bath; and by frictions of the surface subsequently. After a decided effect has been produced by these, DOVER's powder may be prescribed at short intervals, so as to keep up the action on the skin; and the abdomen should be swathed in flannel. Opiates may be employed also in the mucilaginous enemata already recommended (F. 143. 147. 152.), and in the form of suppository.

86. (*e*) *External derivatives* and *rubefacients* are sometimes of service after depletion and the above means have been duly employed. A large blister may be placed upon the abdomen; but it should be removed as soon as it has produced redness, and be followed by warm bread and

water poultices. The turpentine epithem will be found still more generally of use, and will not so much increase the irritation experienced in the urinary passages as the blister frequently does. In cases where this symptom is severe, mucilages with soda, nitre, small doses of camphor, and opium, will give relief. When it is urgent, tenesmus is also a prominent feature; the means already advised, especially local depletions, either from the sacrum, or from the perineum, small emollient and cooling injections, and opiate suppositories, being the principal remedies. If the sthenic forms of the disease yield not to the treatment now advised, or if it pass into the chronic state, recourse must be had to such of the methods of cure, and medicines, hereafter to be noticed, as may seem most appropriate to the circumstances of the case. When much debility is complained of, after tormina and tenesmus have been removed by an antiphlogistic treatment, mild bitters, as the infusion of calumba, or infusion of cinchona, with liquor ammoniæ acetatis, tinctura camphoræ compos., and small doses of the vinum ipecacuanhæ, will be productive of much benefit. Costiveness should be carefully guarded against, by the occasional exhibition of a gentle purgative, as directed above (§ 83.), and of aperient and emollient enemata.

87. *Among Europeans in hot climates*, the disease requires a prompt and decided use of antiphlogistic remedies, inasmuch as the inflammatory action is, in these cases, more intense, and arrives more rapidly at an unfavourable termination. The treatment, however, in principle, is the same as that advised above. The good effects of large doses of ipecacuanha and laudanum — from half a drachm to a drachm of each — after bleeding, have been shown by Mr. PLAYFAIR; and of smaller doses — from three to seven or eight, with an equal quantity of some bitter extract — also after requisite depletions, have been found equally beneficial by BALMAIN and TWINING; whilst the impropriety of an indiscriminate use of mercury, especially calomel, in this disease even as it occurs in India, has been acknowledged by these writers, Mr. ANNESLEY, and others. Although dysentery, in persons thus circumstanced, assumes the inflammatory form, or that of *colonitis* (as it has been improperly called by some writers, as the rectum, cæcum, and often the small intestines, are also affected), especially soon after their migration to a hot climate; yet the attendant constitutional affection is not always of a sthenic kind, but frequently assumes either the simple asthenic (§ 25.), or the bilio-adynamic (§ 28.), or malignant forms; especially in those who have resided long in the country, and where the endemic causes abound. In many cases, also, the symptoms are acutely inflammatory at the commencement, and rapidly pass into a very asthenic state, even before either of the unfavourable changes pointed out above have begun. In such, the antiphlogistic treatment should be early employed, and exhaustion met, as soon as its signs appear, by the remedies about to be recommended for the asthenic varieties. In some instances, also, particularly in persons circumstanced as now stated, the dysenteric affection is entirely symptomatic, either of abscess in the liver, or of interrupted circulation through the ramifications of the vena porta, — pathological conditions which should be carefully investigated, as they require very different plans of cure. (See LIVER — *Chronic Inflammation and Suppur. of.*)

88. *B.* OF THE ASTHENIC FORMS. — (*a*) In the *simple asthenic form*, *ipecacuanha* with *opium*, the *warm bath*, and gentle *purgatives* with aperient and *emollient enemata*, conformably with the views now stated (§ 83.), will frequently remove all disorder. In most instances it will be requisite, and particularly if the biliary secretion be obstructed or vitiated, to give a full dose of *calomel* (from ten to fifteen grains) with two or three grains of opium, and one of ipecacuanha, a few hours before the purgative is exhibited; and, when dull and constant pain is felt in any part of the abdomen, or tenderness on pressure, a number of *leeches* should be applied, and be followed by the warm turpentine epithem. Venæsection has been found injurious in this form of dysentery, especially when epidemic during very moist seasons. An ipecacuanha *emetic* will often be of service at the commencement; but if retching become urgent, opium in the form of pill, sinapisms on the epigastrium croton oil rubbed on the abdomen; the warm bath, or hip bath, or semicupium; and nitre, with emollients; will both relieve this symptom, and allay the tormina and tenesmus. Mucilaginous mixtures, with paregoric elixir and vinum ipecacuanhæ, are generally serviceable. Emollient clysters and *suppositories*, with opium, are also requisite. I have seen the preparations of *hop* productive of great relief in this form. They may be prescribed with camphor mixture and liquor ammoniæ acetatis, or with *emollients* (F. 839, 840. 871.) and *diuretics*. In the more severe cases, or when the disease does not yield to the above remedies, full doses of *camphor*, with opium, or with DOVER's powder, or with the addition of *nitre* (F. 36. 39.), may be given every five or six hours, and pieces of flannel made warm and moistened with either of the *liniments*, F. 297. 307. 311., be kept upon the abdomen until relief is obtained. Although fæcal matters and disordered secretions may have been evacuated before the dysenteric symptoms had appeared, yet it will be necessary to have recourse to mild *purgatives*, from time to time during the progress of the disease, in order to excite the functions of the excreting organs, and to evacuate such morbid secretions as may have collected. The purgatives and aperient enemata recommended above (§ 83.) may be exhibited, or the compound infusion of senna with an equal quantity of infusion of calumba or gentian, and a little soluble tartar and compound tincture of cardamoms. If the disease be likely to become obstinate, equal quantities of *turpentine* and *castor oil*, taken on the surface of milk, or of an aromatic water, and repeated every second or third day, will be most efficacious. After the tormina and tenesmus are removed, *mild bitters* and *tonics*; and, in some cases, *astringent tonics* and *absorbents*, with the treatment advised in the article DIARRHŒA (§ 29—33.), will generally remove all remaining disorder, if the state of the secretions and of the bowels be duly attended to. If the complaint degenerate into a *chronic form*; or debility become a prominent feature; and if the excretions indicate, with the state of the surface and tongue, a progressive deterioration of the fluids and soft solids;

the means about to be directed for these conditions must be employed.

89. (*b*) In *the nervous or typhoid, and malignant forms* (§ 26.), the *sixth* and *seventh indications* of cure should be particularly entertained, and with due reference to the *third*, *fourth*, and *fifth*. From one, to three, four, or even more grains of *camphor* may be given every three or four hours, with three of *hydrargyrum cum creta*, two of *ipecacuanha*, and one of *opium*, in the form of pill; and if it be thrown off the stomach, it should be persisted in nevertheless. The patient should also be put into a *warm bath;* the temperature of which ought to be gradually raised while he is immersed in it; and, having been well rubbed upon coming out of it, be placed between warm blankets, in order to promote the action of this medicine on the skin. This intention will be furthered, if the stomach be not very irritable, by draughts containing liquor ammoniæ acetatis, potassæ nitras, or any other appropriate neutral salt.—The action on the skin should be kept up for a considerable time by the medicine, and promoted by *emollient diluents*, such as the decoction of liquorice or of linseed, &c. If these means fail of giving relief, flannel wrung out of hot water, and moistened with spirits of turpentine, should be applied to the whole abdomen, and allowed to remain as long as the patient will endure it. The usual effects of this epithem are, a most copious perspiration, with burning heat of the skin where it is applied; and, consequently on these, a total remission of the tormina and tenesmus, followed by sound repose procured by the pills which have been taken. In advanced stages of the complaint, when the internal congestion or determination is very great, and the skin is harsh, dry, and livid, repeated applications of this epithem, as warm as the patient can endure it, are sometimes requisite to its full effect. In a case which I lately treated under very unfavourable circumstances, it having been consequent upon continued fever, in a lady long subject to disorders of the colon and rectum, a quart of the spirit was thus employed before redness of skin was produced; although it was warmed by immersion in warm water before the flannel was moistened with it. This patient ultimately recovered. To these means may be added, the *emollient* and *anodyne enemata* already recommended; and *suppositories* of opium, if tenesmus and dysuria be urgent, and the rectum very irritable.

90. In these dangerous forms, notwithstanding full evacuations of fæcal matters may have ushered in the disease, it will be requisite to carry off, from time to time, by suitable purgatives, such morbid matters as may have accumulated. To many cases, the purgatives and enemata prescribed above will be appropriate; but where the stools are very offensive, or contain much dark blood; when the powers of life are depressed; or when stupor is present; and more especially if petechiæ or discolouration of the skin be observed; the draught with castor oil and turpentine directed above (§ 88.), or F. 216., should be exhibited, and its effect promoted by either of the enemata, F. 135. 150. and 151. In this state of disease, it is important to evacuate morbid matters by such means as will at the same time restore the tone of the digestive mucous surface, and of the vessels opening on it; and I believe that there is none that exerts this influence more efficaciously than those now named. Next to these, rhubarb in powder, with camphor, and calomel, or hydrarg. cum creta; or cinchona, with senna (F. 86.); or the infusion of gentian and senna (F. 266.); or infusions of cinchona and rhubarb; or the preparations of cusparia and rhubarb; will be found the most efficacious.

91. If the powers of life be much depressed, the circulating and secreted fluids will generally become more and more vitiated. Our chief efforts should then be directed to counteract this tendency. With this view, the decoction or infusion of *cinchona* and *serpentaria*, with *camphor*, and small doses of *nitrate of potash*, or of *muriate of ammonia*, or with the *chlorate of potassa*, or of *soda*, may be prescribed; and either of these, or the *chlorate of lime*, may likewise be administered with camphor in mucilaginous enemata, especially when the stools are very offensive; taking care to prevent the accumulation of morbid secretions by occasionally resorting to the aperient draught and enema directed above (§ 90.). The infusions of *cascarilla*, of *calumba*, or *cusparia* (F. 201.), or the decoction of *tormentilla* (F. 78.), may likewise be taken, with these or similar additions. When the evacuations are copious, as well as morbid, their excess occasioning vital depression, it will be necessary to control them by adding *opium*, and the usual *astringents*, to the *tonics* now mentioned; and to excite the functions of the skin by the warm bath, frictions of the surface, and the application of the *turpentine epithem* to the abdomen. The terebinthinated medicines, also, already mentioned, are the most active aperients, and astringents at the same time, in this complaint, as well as the most certain and beneficial in their effects. Upon the whole, these severe states of the disease require similar remedies to those enumerated in the articles Blood (§ 157. *et seq.*), and Debility (§ 38)., and in the sections on the treatment of the *adynamic* and *malignant* forms of Fever.

92. (*c*) The *bilio-adynamic* form presents considerable diversity of character in different seasons and epidemics, and requires a modified treatment accordingly. When there is no tenderness or fulness at the epigastrium, an *ipecacuanha emetic* will generally be serviceable; but its operation should be followed by a full dose of *calomel;* and that, in a few hours, if fæcal matters have not been already evacuated, by either of the mild *purgatives* prescribed above (§ 83.), and by *emollient injections*. When the patient complains of a burning sensation in the colon, or of scalding in the rectum, with great irritability, *nitrate of potash*, or *muriate of ammonia*, should be given in emollient or mucilaginous vehicles; and an opium and litharge *suppository* (F. 683.) administered; a similar combination of refrigerant and mucilaginous medicines being afterwards exhibited in enemata. In some cases, this form approaches nearly to that of sthenic vascular action, and then leeches are required to the abdomen; and will be most advantageously followed by the turpentine epithem. After these remedies, small doses of camphor, hydrargyrum cum creta, and Dover's powder, or simple ipecacuanha, may be taken every two or three hours, and the warm bath, in

the manner above directed (§ 89.), occasionally resorted to. If this variety be characterised by great vital depression, the treatment already directed (§ 91.) must be employed. In all its states, and stages, it will be requisite to evacuate the morbid bile that is secreted, and to correct the diseased action in the liver; but beyond one or two full doses of calomel, either with or without opium, this medicine should not be persisted in; as it increases the irritation of the colon and rectum, and depresses vital energy. The hydrargyrum cum creta, as now directed, will be more efficacious; especially when assisted by the above means, and by emollient and mucilaginous diluents.

93. *In the Dark Races*, dysentery assumes the simply asthenic or malignant forms. In them, the treatment may safely be commenced by an ipecacuanha *emetic*, and followed by a *purgative*, the *warm bath*, and warm *diaphoretics*. Early in the disease, calomel with rhubarb and ginger; or powdered jalap with cream of tartar and some warm spice, will be appropriate; but enemata are also required. The habits and modes of living generally adopted by these races, independently of their more lax fibre, and much less tendency to inflammatory action, require an earlier and more active use of tonics, stimulants, astringents, and aromatic spices, with opium, than can often be safely attempted among Europeans. Purgatives, also, should be of a more stomachic and warm kind, and the functions of the skin especially promoted. The combination of ipecacuanha with tonics, astringents, opiates, and absorbents, according to the peculiarities of the case, is generally extremely efficacious after fæcal matters have been evacuated. Camphor, catechu, the hot spices, and warm clothing, with the rest of the tonic and astringent treatment advised for the *chronic state*, and in DIARRHŒA (§ 37.), should be resorted to, as soon as exhaustion supervenes, or when the disease becomes protracted. To Europeans long resident in hot climates, a nearly similar method to that now recommended is applicable, if the hepatic functions be regular; but, as in them the liver is very seldom unaffected, the means directed for the chronic form, which it usually assumes, is more generally appropriate; and the treatment should chiefly depend upon the nature of the primary or attendant hepatic disease.

94. *C.* TREATMENT OF THE COMPLICATED STATES. — (*a*) The association of *acute dysentery* with *inflammation of the liver* (§ 34.) requires decided and early general or local depletion, or both, followed by cooling purgatives, sufficient merely for the evacuation of morbid secretions. In this complication, the morbid state of the bile, and the rest of the hepatic symptoms, are the consequence of inflammation, and can be removed only by *antiphlogistic treatment*, and not by inordinate doses of mercury, which will merely over-excite an already excited organ, and accelerate suppuration. Refrigerant, therefore, and cooling aperients, as the supertart. and tartrate of potash, tamarinds, manna, or the soda tartarizata; antimonial or ipecacuanha diaphoretics; small doses of camphor, with nitre and opium; cooling and emollient enemata, and a very low diet; constitute the principal means of cure. When the patient complains much of burning heat or soreness in the abdomen, with scalding, &c. in the anus and urethra, the nitrate of potash, with sub-carbonate of soda, and spirit. æther. nit., in emollient vehicles; the muriate of ammonia in mucilaginous mixtures; suppositories of opium; and local depletions, followed by the warm terebinthinate epithem over the abdomen; are chiefly to be depended upon. If blisters be applied, they should be surrounded by a number of leeches, the former being removed as soon as they have produced redness, and succeeded by warm poultices. As the substance of the liver is generally more or less acutely inflamed in this complication, and as mercurials will not readily produce their specific effects, or act beneficially, whilst this state continues, but will rather increase it, the exhibition of them with this intention can only occasion abscess, irritative fever, and exhaustion; and furnish one of the most injurious proofs of the "*nimia diligentia*," which is but too common in the treatment of this as well as of hepatic disease. Can any practice be more empirical, than to give the same substance to subdue over-excitement, which we find the most active in rousing torpid function, of an organ? Having removed the acute symptoms by the above means, the insertion of one or two *setons* in either side, and keeping up a free discharge from them for a long time, with appropriate diet and regimen, and change to a healthy air, will generally complete the recovery. When the dysenteric affection is merely *symptomatic of abscess in the liver*, the treatment advised for this condition (see LIVER — *Suppuration of*) should be employed.

95. (*b*) The *complication with disease of the spleen* is most common after intermittent and remittent fevers, and in unhealthy localities; and the symptoms are either but little inflammatory, or more or less asthenic. Local depletions even are seldom required in its treatment. Warm stomachic aperients, as cinchona with rhubarb, ipecacuanha, and aromatics; emollient enemata with anodynes; the warm bath, followed by frictions of the abdomen with either of the *liniments*, F. 297. 311., upon coming out of it; ipecacuanha with strichnine, or sulphate of quinine, or sulphate of iron, or with tonic extracts; camphor with warm diaphoretics, and the medicines directed for the more chronic states, which it more frequently assumes, or passes into; are the most appropriate in this state of the complaint. When dysentery follows *continued or periodic fever*, disease of the liver or spleen, or of both, should be dreaded, as well as its rapid termination in ulceration; and means, conformably with what has now been advanced, should accordingly be promptly put in practice. The most efficacious of these, are early local depletions — but only when the symptoms clearly indicate the propriety of resorting to them; the terebinthinate epithem applied to the abdomen, or large blisters, followed by poultices, and repeated according to the urgency of the case; with the rest of the treatment directed for the asthenic states, according to the peculiarities of the case.

96. (*c*) The association of *acute dysentery with scurvy*, requires the removal of the exciting causes; a suitable diet, especially fresh meat and vegetables; the liberal use of *lime juice*, with sugar, mucilage, and opium; the carbonate of potash or soda in effervescence, with an excess of lime juice, particularly when the secretions re-

quire evacuation by gentle means; the decoction of cinchona with muriatic acid, or citric acid, or chloric æther; and the draught and enema consisting of turpentine and castor oil, when the hæmorrhage is considerable, and the abdomen tumid or tympanitic, or when the state of the discharges indicate the propriety of exhibiting a purgative. If lime juice is not to be procured, lemon juice or citric acid should be substituted. When the debility and oozing of blood from the bowels are great, the tincture of the muriate of iron may be given in the infusion of quassia, or the infusion of catechu may be exhibited with other astringents, and with aromatics, warm spices, and the tinctura opii comp. (F. 729.). Carbonate of *ammonia* may also be taken in effervescence with an excess of *citric acid*, or lime juice; ipecacuanha, aromatics, and the above preparation of opium, being added. In the more urgent or obstinate cases, the warm *nitro-muriatic solution* should be daily applied over the abdomen, or added to mucilaginous and emollient enemata. It may likewise be used as a gargle, when the state of the mouth requires such means. The nitro-muriatic acids may also be taken internally with small doses of the compound tincture of opium, when citric acid or lime juice cannot be obtained. The *chlorates* may be prescribed with camphor, and opium, in mucilaginous vehicles; and administered, in a similar form, as enemata. During treatment, the diet should be regulated. and the excretions carefully observed. When the bile is scanty, and the stools without fæces, a few grains of blue pill may be given at night, and a full dose of magnesia in aromatic water the next morning, followed immediately by a glass of lemonade, or a draught with lime juice or citric acid, — the combination thereby formed in the stomach proving an agreeable purgative; or the hydrargyrum cum cretâ, with rhubarb, may be taken at bedtime, and the oily draught and enema already mentioned the following day. Aromatic confection, with magnesia; or cretaceous and other absorbents, with ipecacuanha or Dover's powder; are also serviceable, when the bowels are much relaxed and griped, and the stools become frothy and acid. Cretaceous medicines should not be given while the citric acid or lime juice is continued; but subsequently, in the form now directed, or with astringents, tonics, and warm spices, when the disease seems disposed to assume a chronic form, they are often beneficial, assisted by warm clothing, suitable diet, and the occasional exhibition of mild purgatives, so as to prevent the injurious retention of morbid matters, and promote the digestive and secreting actions. In the early stage of convalescence, a similar treatment, with vegetable tonics; and the exhibition of these with aperients, when the bowels become sluggish; should be persisted in. The daily use, for some time, of either of the balsams, according to the peculiarities of the case, combined with a sufficient quantity of magnesia to form a pilular mass, will more effectually restore the tone of the digestive mucous surface, and keep the bowels open, than any other means. Removal to a dry, pure, and warm air will accelerate and establish recovery.

97. (*d*) Dysentery is less frequently *complicated with worms*, in this country, than, perhaps, in any other. Worms are either so extremely common in the inhabitants of low and moist localities, and still more so in the dark races, especially among those who have not a sufficient supply of salt as a condiment; or they predispose so remarkably to the disease — or rather, the state of the digestive organs that favours their generation disposes to it; that a very large proportion of dysenteric cases in the former, and nearly all in the latter, are thus complicated. The judicious use of anthelmintics — the decoction of the bark of the pomegranate root; the male fern, &c., followed by castor oil; and especially the terebinthinated draught and enema already recommended (§ 90.), — will generally remove the disorder. When it has arisen from the want of salt, this substance in sufficient quantity, with warm spices, vegetable tonics, and subsequently chalybeate preparations, will soon have a decided effect; but, without salt, other means cannot be depended upon. This complication is not infrequent in *children*; the above remedies, or such as are most appropriate of those mentioned in the article Worms, being also suitable to them; but when the disease is removed, a course of chalybeates and change of air should be prescribed.

98. (*e*) The *hæmorrhoidal complication* is most speedily relieved by local bleeding from the sacrum or perinæum, followed by fomentations; the hip-bath; full doses of Dover's powder, especially at bedtime; opiated, or opium and litharge, suppositories; and by the supertartrate of potash, with nitre and confection of senna, when an aperient is required. Cooling diaphoretics, and various refrigerants in mucilaginous or emollient vehicles, taken by the mouth, and injected *per anum*, in small quantity, are often useful adjuvants. When the disorder is attended by much pain about the anus, a cooling and anodyne ointment, after having recourse to warm fomentations, will often give relief. The extract of *belladonna*, in an ointment of this description, will be most effective, as it subdues the morbid sensibility, and removes the spasm of the sphincter, which aggravates the pain in these cases.

99. (*f*) The *complication with rheumatism* (§ 44.), or *catarrh*, requires the frequent use of the warm bath or semicupium; and full doses of camphor, and ipecacuanha, or Dover's powders, in oleaginous or mucilaginous vehicles; or antimonial diaphoretics with opium, if there be much febrile excitement and heat of skin. If the symptoms are inflammatory, general or local depletions, or both, should precede the exhibition of these; and, if the biliary secretion be either obstructed or vitiated, a full dose of calomel, or of the milder mercurials, should be given, and be followed by a gentle purgative, and that by an aperient and emollient enema. When the disordered secretions are evacuated, warm diaphoretics, especially camphor with opium; small anodyne injections; opium suppositories, and the constant use of flannel next the skin; will remove the disorder. When severe rheumatic pains are felt in the lower extremities, opiate suppositories, after morbid matters are evacuated, will give great relief. In some instances, the pains in this situation depend upon the retention of fæcal or hardened substances in the cæcum, or about the sigmoid flexure of the colon. In this case, fulness or hardness will be felt in these regions, on a careful examination of the abdomen; and appropriate

purgatives, aided by laxative clysters, will be required, and should be repeated until the collection is evacuated.

100. ii. TREATMENT OF THE SUB-ACUTE AND CHRONIC FORMS. — *A. Of the more simple states.* — The *intentions of cure* by which we are guided in the acute, should, with little modification, be entertained in the chronic, forms. When the symptoms continuing after an acute attack consist chiefly of either frequent or copious evacuations, without tormina or straining, the appetite, pulse, and strength improving, or remaining unimpaired, astringents or opiates should not be prescribed; for the discharges are the means of bringing about a resolution of the inflamed and tumefied viscera. In such cases, the stools are usually of a good colour, and are feculent and fluid. But, if the motions be attended by abdominal soreness, increased on pressure; or by a sense of heat; or by griping, tormina, or tenesmus; if they be slimy, or sanguineous; and if the patient complain of thirst, with fever and restlessness at night; nature requires the judicious assistance of art. Here vascular depletion, most frequently local, although it may have already been practised, and more especially if it have not been resorted to, is required to an extent which the constitutional symptoms will indicate. If, however, the strength is too far sunk, or the asthenic characters are too prominent to admit of this measure, the warm epithem already described (§ 89.), or blisters to the abdomen, followed by a succession of poultices, and these by the warm bath, a thick flannel bandage around the abdomen, and stimulating frictions of the surface, and of the lower limbs, will sometimes be serviceable.

101. In all cases, the state of the biliary secretion and of the liver should be carefully examined. If the investigation furnish no proof of acute disease, or of abscess of this viscus, and if the bile be scanty or altogether obstructed, camphorated mercurial frictions on the hypochondrium, blue pill or hydrargyrum cum cretâ, with ipecacuanha or DOVER's powder at bedtime, and a mild purgative, such as cream of tartar, with confection of senna and extract of taraxacum in the form of electuary, in the morning, will often increase and improve the bile. If mercurials have not been previously used, and if no tenderness or soreness be felt in the region of the liver, nor oppression of breathing, dry cough, nor recurring chills or horripilations alternating with hectic flushings, &c., one or two full doses of calomel, with or without opium, may precede these medicines; the operation of which may be assisted, and the state of the large bowels improved, by emollient and oleaginous injections. After these means have been tried without benefit, the emplastrum ammoniaci cum hydrargyro may be placed over the abdomen; and one or two grains of hydrarg. cum cretâ, or of blue pill, with one of ipecacuanha, and as much camphor, taken thrice daily, with a draught containing a drachm of the extract of taraxacum, or consisting of the decoction of the recent root. As long as the stools are deficient in bile, astringent tonics will seldom prove permanently serviceable; but if the above medicines run off too rapidly in the stools, the compound tincture of opium should be added to them.

102. When the foregoing means have failed, nitric acid with opium or laudanum; and the application of the *nitro-muriatic acid* lotion over the hypochondria and abdomen; may be tried; or, instead of the nitric, the nitro-muriatic acid may be taken internally, in a very weak state of solution, or employed as an enema, with the laudanum, F. 729. Enemata consisting of a weak infusion of ipecacuanha, or of the decoctum lini, with mucilage, or of both, may be administered once or twice a day, while the acids are taken. If these fail, and if the debility be great, the *chlorates*, especially those of potassa or lime, may be given by the mouth, or in clysters.

103. In the advanced stages, the infusion of cinchona, of cinchona and rhubarb, either with or without laudanum, or of catechu with aromatics and warm spices, are generally requisite, more especially in the dark races; the same preparations being also advantageously administered as enemata, either with or without mucilaginous substances. When the disease, like a gleety discharge, proceeds from relaxation of the internal surface of the large bowels, and a habit of increased secretion, these means will prove of essential service. In many cases, the disorder is kept up either by too great indulgence in food, or by the use of stimulating liquors. The diet should, therefore, be restricted; and the digestion of what is taken promoted either by the above medicines, or by the sulphate of quinine or the sulphate of zinc in the form of pill, with inspissated ox-gall, or other medicines suited to the case. If we succeed in controlling the increased action of the bowels, an opposite state should be carefully guarded against, by the occasional exhibition of the means directed above (§ 83.); or of the draught and enema already mentioned (§ 90.). Inattention to this precaution, and errors in diet and regimen, are frequently productive of relapses.

104. If diarrhœa continue after the acute symptoms longer than seems sufficient for the resolution of inflammatory action in the large bowels, and of congestion of the portal vessels, we may suspect that the quantity or kind of aliment is such as the digestive organs, and the biliary and other secretions, are incapable of changing into healthy chyle, — a large proportion of it entering into such acid or acrid combinations as its constituents dispose it to form. In these cases, the stools are frothy, have a sour odour, or are lienteric; and tonics, with mild mercurials and antacids; the sulphate of quinine, as above recommended; the balsams with magnesia, and the liquor potassæ, or the sub-carbonate of ammonia, with tonic infusions, aromatics, and small doses of SYDENHAM's laudanum (F. 729.); are required; whilst the abdomen and hypochondria are sponged with the nitro-muriatic solution; and the large bowels fortified by the tonic and mucilaginous injections already mentioned.

105. In the cases denominated "*White flux,*" from the muco-purulent and gleety appearance of the discharge from the muciparous glands, and the absence of bile, a similar treatment to the above is required; with an occasional dose of calomel, or frequent and small doses of the mildest mercurials, as above directed (§ 101.) The infusion of either cusparia, catechu, simarouba, calumba, rhubarb, cinnamon, &c., with vinum ipecacuanhæ, aromatics, absorbents, and astringents, according to circumstances; the chlorates, or nitre with soda and emollients, in aro-

matic vehicles, and in clysters; assafœtida, with camphor and mucilage, in enemata; and the daily use of the salt-water warm bath, followed by frictions of the surface with a rubefacient and deobstruent liniment (F. 311.), and a flannel roller around the abdomen; may also be resorted to.

106. If the evacuations indicate *ulceration* (§ 34.) — which, indeed, is seldom altogether wanting in protracted cases — the above treatment, or mucilaginous mixtures with either of the balsams; emollient clysters, and the repeated applications of large blisters, or rubefacients, to the abdomen, or the insertion of setons, are chiefly to be relied on, with the other means advised in the treatment of Diarrhœa (§ 32.), arising from this pathological state.

107. A form of chronic dysentery depends upon, or is kept up by, *ulceration*, or even by a single large ulcer, *in the rectum*, with or without *prolapsus ani* (§ 47.), the abdominal symptoms being slight, but the tenesmus constant and painful. For it, small injections of a solution of the sulphate of zinc, or nitrate of silver, or dilute nitric acid with opium, or superacetate of lead, with pyroligneous acid and laudanum; or of paregoric elixir with mucilage; or of simple camphor mixture; the balsams, or sulphur with cream of tartar, and tonics with deobstruents, being taken internally, and a gently open state of the bowels preserved; will remove the disorder. In nearly all the more simple states of chronic dysentery, also, the same treatment may be appropriately employed as is recommended in the chronic states of diarrhœa, lientery, &c. (See Diarrhœa, § 29 — 33. and § 41. *et seq.*)

108. *B. The complications of chronic dysentery* are much more common than the simple states; and the most frequent are those with chronic affections of the liver, with disease of the mesenteric glands, and with enlargement of the pancreas and spleen. — (*a*) If the *liver* be free from acute disease of its substance, or from purulent formations (see Liver — *Inflam. and Suppurat. of*), mercurials are often essentially requisite. But, even in such cases, they have been much too liberally employed, on the supposition that salivation is indispensable to the cure of this complication. Where, however, these forms of hepatic disease exist, they should almost altogether be proscribed; and also, where the powers of the system are much reduced, even in the simple states of the disease, the extension of inflammatory irritation to the mesenteric and portal veins, or the absorption of morbid matters from the bowels (§ 77.), and consequent disease — especially purulent collections — in the liver, may be favoured or induced by prescribing them so as to produce their specific effects.

109. (*a*) We often have little or no proof of the presence of chronic change in the liver, beyond the torpid state of its functions already noticed (§ 48.), viewed in connection with the habits of the patient, and the history of his former complaints, and of his present attack; but, in these, mild mercurials, in frequent and small quantities, in conjunction with alteratives and deobstruents (§ 101.), especially minute quantities of antimony, with ammoniacum, soap, and opium; or these with taraxacum in full doses; or this latter with the infusion of calumba; will be found the safest as well as the most efficacious remedies, particularly when assisted by a camphorated mercurial ointment or liniment applied over the hypochondria; or by the nitro-muriatic acid solution, employed either as a wash, a lotion, or on the surface of warm poultices; or by repeated blisters; or by issues or setons, and the ammoniacal and mercurial plaster over the abdomen, or a combination of it with other deobstruent and warm plasters. In these cases, we must be guided by the evidence we may have of change of the liver, and direct our treatment to its removal, conformably with the views stated in the article on the diseases of that viscus. When the stools are frothy, and deficient in bile, the hydrargyrum cum cretâ, or the blue pill, will be advantageously combined with inspissated ox-gall, extract of taraxacum, and small doses of Dover's powder, or opium. The sub-carbonates of the alkalies, or borax, may also be given with vegetable tonics, ipecacuanha, and the preparations of hop; either of the liniments, (F. 296. 311.), alone, or with the mercurial liniment, being daily rubbed upon the abdomen, or applied by means of a piece of flannel moistened with it and placed under wash-leather, — which will protect the clothes from it, and prevent its evaporation. In the foregoing states of hepatic complication, change of air, horse exercise, or travelling, and a regulated diet and regimen, will materially assist the treatment.

110. *β*. A sub-acute, slight, or chronic form of dysentery is sometimes merely *symptomatic* of the advanced states of hepatic abscess, and occurs more frequently than the very acute complication alluded to above (§ 94.). It requires either a similar treatment to that now stated, or simply support of the powers of life, in order to enable them to overcome the disease. The arrest of the discharges in this state of the complaint frequently increases the hepatic malady, or occasions severe constitutional disturbance. Gentle tonics and restoratives, light or farinaceous food, and such astringents, anodynes, and emollients as will merely control and sooth the bowel affection, until the above treatment, or that recommended for *suppuration of the* Liver, shall remove the principal or primary disease, are the most deserving of confidence.

111. *γ*. When *purulent matter collects in the liver, in an advanced stage of dysentery*, the occurrence can be explained only as attempted above (§ 77.); and, during the life of the patient, the symptoms will seldom warrant more than a supposition of its having taken place. The facts, that a bad habit of body, and an asthenic state of the powers of life, are the chief causes of the absorption into the blood of morbid matters from the seat of disease, and of the extension of inflammation from an ulcerated part along the veins; and that these changes induce those observed in the liver in such cases, should be kept in view in the treatment of the advanced stages of dysentery, — particularly as it has been satisfactorily shown that a large proportion of unfavourable cases terminates fatally, owing to the contamination of the circulating fluid produced in this manner, either with or without the concomitant lesions of the liver, of which particular notice has been taken. Conformably, therefore, with these facts, the remedies I have shown, in the article Veins, to be most efficacious in arresting the extension of inflammation along them, in preventing or counteracting the contamination of the blood, and in supporting the vital

powers, will be most beneficial, not only where this complicated state is inferred, but also in an advanced stage of the malady, and especially in its asthenic forms, where it is most desirable to prevent or arrest these very dangerous occurrences. When the disease is *symptomatic* of the absorption of morbid matter from carious bones, foul ulcers, &c. (72. *c*), the principles and treatment now stated should be adhered to, and the chlorurets applied to the ulcerated parts.

112. (*b*) The complication with *disease of the mesenteric glands* frequently cannot be distinguished from that with chronic change in the liver; but, when the stools are lienteric, and the abdomen hard and tumid, the former association may be inferred, although the hepatic complication may also be present; the means now recommended being equally appropriate to both. I have seen benefit derived, in some cases of the mesenteric complication, occurring in *children*, from *liquor potassæ*, or Brandish's *alkaline solution*, in tonic infusions, with syrupus papaveris or tinctura opii; and from the chlorate of potassa with Dover's powder, a terebinthinate draught and enema being administered every third or fourth day. More recently, the ioduretted solution of the *hydriodate of potash*, with very small doses of laudanum, or the *ioduret of mercury* in minute quantities, has also been prescribed with advantage, especially when assisted by the warm bath, and some one of the liniments or other external applications enumerated above. If the patient, however, complain of tormina, or if the stools be bloody, the daily application to the abdomen of some one of the ointments containing the preparations of *iodine* (F. 766. *et seq.*) will be preferable to the internal exhibition of this substance. In this class of subjects, change to a dry and pure air, and the prolonged use of these medicines in very small doses, are requisite to success. The same treatment may be also employed in the hepatic complication. But in the acute maladies of the liver, the preparations of iodine are often injurious.

113. (*c*) The *complication with disease of the pancreas* is even more difficult to be ascertained than that with mesenteric enlargement; but, even when confidently inferred, it does not seem to require a different treatment from that now recommended. —In the *splenic association*, nearly similar measures to those already stated are also applicable. The preparations of bark; the sulphate of quinine, and of the metals; and stomachic purgatives; are more especially indicated in it; particularly when aided by emollient clysters, and the external applications described above (§ 109.).

114. (*d*) *Chronic dysentery in the dark races*, being characterised by relaxation of the mucous surface of the large bowels, and an adynamic state of the system, and differing not materially from chronic diarrhœa, will be most successfully treated by tonics conjoined with astringents, absorbents, aromatics, and hot spices; by the warm bath; by injections with lime water and other astringents; and occasional stomachic or warm purgatives, in order to prevent fæcal matters from collecting. Its principal *complications*, in these races, are with *enlargement of the spleen, with worms*, and *with mesenteric disease*; the two latter especially. In the association with enlargement of the spleen, the sulphate of iron or other chalybeates, with rhubarb, and occasionally stomachic purgatives, are the most efficacious medicines. To the other complications, the treatment already prescribed (§ 97. 112.) is also appropriate. (See also Diarrhœa — *Treatment of, in the Dark Races*, § 37.)

115. iii. Treatment of certain States and contingent Changes. — *A.* When dysentery is prevalent, a recognition of the *early symptoms*, particularly those *premonitory* of an attack, as sunk pale countenance, griping pains with borborygmi, and irregular chills or horripilations, with or without diarrhœa or tenesmus, should lead to the adoption of means which will often ward off the disease or cut it short. Of these, the most efficacious is an ipecacuanha *emetic*; which may even be repeated until its free operation is procured, followed by a single full dose of calomel; and that, in two or three hours, by a purging draught, and a laxative enema. After these, a warm bath, the patient being well rubbed upon coming out of it, and placed between warm blankets; and pills with camphor, ipecacuanha, and three or four grains of opium, repeated subsequently in smaller doses; will frequently remove all disorder. This plan, if employed sufficiently early, is equally applicable to all the varieties of the disease.

116. *B.* (*a*) Extreme *irritability, want of sleep*, and distress at night, during the most acute attacks, often exhaust the strength of the patient, and require either very large doses of opium, or opiate suppositories, or small opiate injections, especially after coming out of a tepid or warm bath — a tepid bath if there be much heat of skin or attendant sthenic diathesis, and a warm bath if the constitutional affection be of the asthenic kind. — (*b*) Excessive *irritation in the rectum*, and *dysuria*, may be alleviated by the treatment directed above (§ 84, 85.), and by small injections — from three to five ounces — containing either opium, or the extract of hyoscyamus, or the extract of belladonna, or F. 137.; recollecting, however, that this latter will often produce much disorder, if too freely employed. In a case where I prescribed it, in 1826, with remarkable benefit, it affected the head, and caused a most copious scarlet eruption on the skin. — (*c*) Very copious *effusions of blood* alarm the patient; and although they frequently relieve the sthenic forms, yet, if often repeated, or occurring too largely in the asthenic varieties, they require to be moderated, or arrested. In the former states, general or local depletions will be the best means of removing them; but in the latter, or when they sink the vital energy, the terebinthinated draught and injection prescribed above (§ 90.), or the superacetate of lead, in draughts with acetic acid and laudanum, or in enemata; or the muriated tincture of iron in the infusion of quassia, by the mouth, or in clysters; or lime juice and opium, similarly prescribed; will generally prevent further discharge. — (*d*) Distressing *flatulence* and *meteorismus* will often be relieved, especially in the adynamic states, by a terebinthinated or an assafœtida injection (F. 136.), and by the warm epithem; or by the infusion of the leaves of rue, employed as fomentations over the abdomen; or by the bruised macerated leaves applied warm to the same situation. — (*e*) *Leipothymia* or *sinking*, or even full *syncope*, may follow the efforts at evacuation — particularly if

patient get up to the night-stool, at an advanced, or in an adynamic state of the disease; and death may even take place from this circumstance, especially in the scorbutic complication, or when the patient has been kept too low, or has been addicted to spirituous liquors. Restoratives, the supine posture, and the use of the bed-pan, should not be neglected in these cases.

117. *C.* (*a*) *Prolapsus ani* indicates severe irritation about the sigmoid flexure of the colon, and upper part of the rectum, and requires the careful replacement of the part, local depletions from the sacrum, astringent fomentations with opium to the anus, astringent lotions, and injections with an urethra syringe, especially if the rectum be ulcerated; small injections of the dilute black wash, if sloughing of the bowel be suspected; and the belladonna plaster over the sacrum, or above the pubis, in order to remove the spasm of the muscular coats of the intestine. When this symptom occurs in chronic dysentery, we may infer the existence of ulceration. In such cases, injections of a solution of nitrate of silver will give permanent relief. — (*b*) *Excoriations about the anus* often occur, in all the forms of the disease, but most frequently in the hepatic complication, and require warm anodyne fomentations and poultices; small narcotic injections; and ointments with opium and mineral astringents, as the sulphate of zinc or the acetate of lead. — (*c*) *Abscess in the vicinity of the anus* should be treated at first by local depletions and cooling discutient applications; and if these fail, by warm poultices, and early external openings, in order to prevent internal fistula. If the suppurating part assume an unhealthy aspect, injections with the dilute disinfecting fluid, and a tonic constitutional treatment, should be adopted. — (*d*) *Ulceration in the bowels*, of a sloughing kind (§ 54.), is a very unfavourable occurrence in the *acute forms*, for which a tonic and an emollient treatment — the internal use of the chlorates with opiates, and mucilages, clysters of the same description, and the other measures directed for the malignant variety (§ 89.) — should be employed. — The ulceration that takes place in the progress of the *chronic form* ought to be treated by the remedies recommended for the obstinate states of that form (§ 105, 106.).

118. iv. Of certain Consequences of Acute and Chronic Dysentery. — *A.* (*a*) In the acute varieties, and occasionally in the chronic, the *extension of inflammation*, with or without previous ulceration, from the internal *to the external surface of the bowels*, or to the *omentum*, or *mesentery*, is one of the most dangerous results; and requires very decided treatment, as soon as the symptoms of this change (§ 55.) appear. General or local depletion, if the state of the circulation and of the constitutional affection permit either or both, should be practised; a full dose of calomel, camphor, and opium being exhibited immediately afterwards. These may be followed in a few hours by the terebinthinated draught, or enema, or by both; but more especially by the warm turpentine epithem (§ 89.), which ought to be repeated until the peritoneal inflammation is subdued. Nothing short of these means, promptly practised, will, in such cases, save the patient; but these will sometimes be successful, if properly employed, and not left to ignorant or careless persons. — (*b*) *Adhesions* of various parts of the serous surfaces sometimes remain after these attacks; as shown upon dissection of cases that have been carried off a long time subsequently by other diseases. The signs of this *sequela* are very obscure and uncertain. But I believe, that these adhesions will gradually diminish, and ultimately almost disappear, if we succeed in restoring the natural functions to a healthy state; all adventitious productions being removed by a due manifestation of the vital energies in the assimilating and absorbing organs; and by derivation to, and counter-irritation in, distant parts. Either with, or without, the effusion of lymph necessary to these adhesions, a copious *effusion of serum into the peritoneal cavity* may take place, the dysenteric affection being suppressed, or very rarely persisting. This occurrence is most frequent when there is coexistent disease of the liver, or when the dysentery has followed fevers. The treatment, in such cases, must be much the same as that directed in Dropsy *of the Abdomen*. The application to the abdominal surface, twice daily, of about a drachm of an ointment consisting of from six to twelve grains of *veratria* to an ounce of prepared lard, as first recommended by M. Magendie, and very recently adopted in this country, promises to be extremely beneficial, as being more especially appropriate, in dropsy occurring in these circumstances.

119. *B. Contractions or strictures of the colon* are among the most unfavourable changes, attending the advanced stages of the chronic disease, or remaining as its *sequela*. It is important, in respect both of the diagnosis and treatment, to form some idea, although we cannot often be certain, of their existence during life. Yet I have seen the diagnosis fully established, in some instances, by rational inferences from the phenomena of the case. The use of bougies, for the purposes of diagnosis or cure, is entirely out of the question: the legitimate exercise of medical science is here only required. If there be great difficulty or impossibility of procuring full or feculent stools, the patient not complaining of tenesmus or the acute symptoms of dysentery; if the evacuations be scanty, or contain semi-dissolved fæces, with shreds of white mucus or of albuminous exudation, and if they be preceded by an uneasy sensation in the course of the colon, with that of load or fulness about the cæcum and right hypochondrium, or between the epigastrium and umbilicus; if there be distension of the abdomen, with flatulent eructations and a foul or feculent odour of the breath; if an injection cannot be fully thrown up, or if it return immediately, or before the last part is thrown up, although the pipe is fully introduced and carefully guarded; and particularly if these symptoms occur in an advanced stage of the chronic disease, or in persons who have had previous attacks; then stricture in the left and sigmoid flexures, or even in the transverse arch, should be dreaded. In such cases, the patient will occasionally complain of a sense of tearing, scraping, gnawing, or of dragging in some part of the colon, previously to the operation of the bowels; the regions of the cæcum and ascending colon being hard and tumefied.

120. The chief objects in these cases are to preserve the contents of the large bowels in a

fluid state, and prevent thereby the accumulation of fæcal matters above the stricture, and the consequent irritation and distension; endeavouring, at the same time, to subdue the chronic inflammation and ulceration frequently existing in the strictured part. These intentions are to be fulfilled by gentle and cooling laxatives; by refrigerants with anodynes and emollients, and by injections of a similar kind, slowly and carefully thrown up by the improved apparatus. Gentle friction, also, of the abdomen, with oleaginous or antispasmodic liniments, following the exhibition of these medicines, will also be serviceable. As to the particular remedies that may be employed, the supertart. of potash with borax, or with magnesia; soda tartarizata; manna; olive oil, or oil of almonds, either alone, or with sweet castor oil; ipecacuanha with soap, small doses of blue pill or hydrarg. cum cretâ, and extract of hyoscyamus or of conium; the nitrate of potash with subcarbonate of soda and small doses of camphor; the confection of senna with sulphur, and cream of tartar; the decoctum lini in enemata with olive oil, or with borax; the common soap injection; the emplastrum ammoniaci cum hydrarg. either alone, or with extract of belladonna, placed on the abdomen; or the linimentum hydrargyri, with the linimentum saponis cum opio, and the linimentum camphoræ compositum, rubbed assiduously on this part; or external irritation of it by F. 311., or by citron oil; and a regulated farinaceous diet; have appeared to me the most successful remedies. Aloetic, saline, resinous, or irritating cathartics are obviously injurious. During this treatment, febrile excitement of the system should be guarded against, and removed by cooling diaphoretics. The occurrence of *stricture in the rectum*, as a sequela of chronic dysentery, is not infrequent, and should be treated upon the same principles and in the manner explained in the article Rectum.

121. v. Notices of Methods of Cure and Remedies recommended by Writers. — In the treatment of no other disease, perhaps, has the baneful influence of exclusive medical doctrine been more fully exerted than in that of dysentery. This is fully evinced by the much less rational measures very generally employed, towards the end of the last century and at the commencement of this, wherever the theory of Brown was adopted. — *A. Vascular depletions* have been directed in dysentery from the earlier periods of medical history. They were recommended by Aetius, Alexander, and Rhazes; and by Gorion (*Ergo Dys. Phlebotomia*. Paris, 1604.), Riverius, Prosper Alpinus, Lespicier, Botallus, Sydenham, Ellain, Zacutus, and many other writers of the sixteenth and seventeenth centuries; but had fallen into disuse, when Dr. Jackson and Dr. Whyte (*Med. and Phys. Journ*. vol. ii. p. 283.) revived the practice. During the Peninsular campaigns, general and local bleeding were freely employed by Drs. Somers, Ferguson, Forbes, and other physicians of the British army. Indeed, it had never been altogether neglected by judicious practitioners during the last century, notwithstanding the injurious influence of theory upon medical observation and practice; for we find it directed by Hillary, Akenside, Cleghorn, Pringle, Baker, Stoll, M'Grigor, &c., and strenuously contended for by Juncker (*De Util. Venæsect. in Dys*. Hal. 1770.) in the early stages of the inflammatory disease. From what has been stated above, it is apparent that bloodletting, although applicable to certain forms of dysentery, should be employed with much discrimination, and with due reference to the exciting causes, and to the prevailing epidemic constitution. This is well illustrated by its injurious effects in the asthenic forms; especially those proceeding from depressing causes and contaminating sources; and by the history of dysenteric epidemics (§ 29.). Mr. Bacot states that, when the malady was consequent upon fever, in the Peninsula, or arose from the same exciting causes, bleeding could seldom be borne. It would also appear, that from 1817 to 1827, during which period the seasons were tolerably regular and the summers dry and warm, this disease was attended by more or less of the inflammatory diathesis; and that, from this latter date, when they became less regular and much more wet and cold, it has assumed more of the asthenic characters. The application of *leeches* to the anus, advised by Neumann, Hunnius, and many French writers, is often productive of benefit; but irritable sores, owing to the excretions coming in contact with the bites, are apt to follow.

122. *B. Evacuants*. — (*a*) *Emetics* are extolled by some writers, and considered injurious by others. The circumstances in which they may be employed (§ 92. 115.) have already been pointed out. They are certainly more beneficial in some seasons and epidemics than in others; as, indeed, admitted by Chomel (*Ergo Dysent. Vomitus*. Paris, 1698.), Fischer, Goeden, Michaëlis, and Schmidt (*De Emet. Usu in Dysent*. Jenæ, 1803.), and Hunnius (Horn's *Archiv*. 1811. p. 151.), who are amongst the most strenuous believers in their efficacy. Hippocrates directs early recourse to be had to them. Cleghorn advises them in the bilious form: Wendelstadt in the same variety, or when the disease is complicated with rheumatism; and he prescribes diaphoretics and opium after their operation. Stoll very justly considers them most appropriate where there are little fever, and no constant pain or tenderness in the abdomen. In these cases, they generally promote diaphoresis, especially if opiates be given soon afterwards. As to the choice of emetics, some difference exists. Antimonials are preferred by Pringle (*Edin. Med. Essays*, vol. v. art. 15.), Baker, Adair, and Saunders; and ipecacuanha by Hargens, Weber, Annesley, and the great majority of the most recent writers. Dr. Wright found ipecacuanha emetics, followed in succession by cream of tartar and castor oil; afterwards by Dover's powder, as soon as the digestive tube was evacuated; and, lastly, by cinchona or cascarilla; the most successful method in West Indian dysentery.

123. (*b*) *Purgatives*, generally of a mild description, are directed by Du Brevil, J. Hunter, Lombard, Müller, and Hesse (*De Usu Evacuantium in Dys*. Jenæ, 1800.). Sydenham prescribes those of an active kind, after bleeding and a full dose of laudanum. Jackson and Annesley adopt a nearly similar practice. Hunnius and Wendelstadt prefer laxatives, or mild and cooling purgatives, and consider them most serviceable in the bilious variety; whilst Lind,

Vogel, Thomann, Weber, and Neumann believe all purgatives injurious, and advise only the gentlest *oleaginous laxatives*. The circumstances in which these medicines are most appropriate will be apparent from what has been stated above; as well as those which should be selected. *Calomel* is preferred by Jackson, Ballingall, Bampfield, and Annesley, when assisted in its purgative operation by other medicines, either combined with it, or given subsequently. *Sulphur* is recommended as a laxative by Wedekind and Lange (*Miscel. Verit*. p. 30.); and certainly full doses of the precipitated sulphur, with one or two drachms of cream of tartar; or these with confect. sennæ, in the form of electuary, are amongst the gentlest and most certain aperients that can be exhibited, in an advanced stage of the acute, or in the chronic disease; and may be given every two or three hours, until the effect is produced. The *neutral salts* are, in general, not so serviceable as the laxative oils, although Clarke, Balmain, and Mursinna are favourable to the use of the sulphate of soda. Stoll recommends the saline aperients only in the bilious variety; and anodynes after their opertion; and several writers extol them when conjoined with antimonials. The supertartrate and tartrate of potash, or the soda tartarizata, are, upon the whole, the most serviceable of this class of purgatives. The *supertartrate of potash*, finely levigated, and given to the extent of three or four drachms every six hours, in the form of electuary, with the pulp of tamarinds and syrup of ginger, will often open the bowels and procure the excretion of bile, when other means fail. The practice is recommended by Selle (*De Curandis Morbis, &c*. p. 157.), and was found to succeed in some hopeless cases by Dr. Cheyne. It is the more efficacious after the exhibition of mercurials; and, when the substance of the liver is acutely affected, may be depended upon as an appropriate refrigerant purgative. But, in ordinary circumstances, there can be no doubt of the propriety of the decision of Cullen, Bang, Tode, Clark, and Piderit, in favour of oleaginous laxatives given by the mouth, and in mucilaginous enemata. When we suspect, from the existence of scybala, or the appearance of the stools, or from fulness or hardness in the course of the colon, the accumulation of fæcal matters in the cells of this bowel, the oleaginous draught prescribed above (§ 83.) may be exhibited; or the following pills may be given every two hours until a full evacuation is procured.

No 203. ℞ Scammoniæ, Pulv. Rhei (vel Pulv. Jalap.), āā gr. ij.; Potassæ Sulphatis gr. iv.; tere probe simul, et adde Olei aut Syrupi q. s. ut fiant Pilulæ duæ.

124. (*c*) *Enemata* are amongst the most efficacious means for either the evacuation of morbid matters, or the removal of the diseased action going on in the large bowels, or both. Those with the *laxative* and *emollient oils* are preferred by Celsus, Cullen, Bang, Horn, Rademacher, and some others, when the first intention requires to be fulfilled; and to these substances may be added laudanum or hyoscyamus, according to circumstances. *Amylaceous, emollient*, or *mucilaginous* injections, with or without anodynes, are directed by Hippocrates, Alexander, Paulus, Lind, Schlegel, Duncan, Neumann, Thomann, &c., chiefly with the second of these intentions. Small *acetous* clysters with opium are prescribed by Vander Heyde, Birnstiel, and Brüning; decoction of *linseed* with laudanum, by Celsus, Clark, and Horn; decoction of *quince seeds*, by Wendt; the decoction of the root of *marsh mallows*, by Paulus Ægineta, and Ecker; *milk*, by Celsus, Alexander, and Forestus (lib. xxii. obs. 36.); and milk with theriaca, in the acute varieties, and with Venice turpentine, in the chronic, by Sydenham. Injections, as directed in the foregoing sections, should have strict reference to the state and stage of disease, and not be bulky. Hunnius considers large enemata injurious; they are very seldom lorg retained. Many substances, besides those now mentioned, may be thus administered; especially in the chronic states. Galen, and the Arabian physicians, exhibited nearly all the vegetable and mineral *astringents*, the *anodynes*, and even the escharotics, as the preparations of *arsenic* and *copper*, in this way. Dr. Jackson advises a weak solution of *corrosive sublimate*, with myrrh, and demulcents; and Mr. Annesley, the black or yellow wash, to be thrown up in enemata, in the chronic complaint.

125. *C. Emollients and Demulcents* are beneficial, not only in themselves, prescribed in the form of draught or injection, but also as the vehicles of more active substances. They constitute one of the chief means employed by Hippocrates in dysentery. Several *oils* are exhibited in this manner, either in the state of *emulsion*, or on the surface of other fluids. *Linseed oil* is preferred by Ruland (*Curat. Erup*. c. iv. n. 40.); *almond oil*, by Heuermann; and *sweet oil*, by numerous writers. This last, in sufficiently large quantity, is one of the most efficacious remedies that can be administered as an enema. *Mucilages*, prepared chiefly from the gums, either alone (Gilibert, *Advers. Pract. Prim*. p. 417.); or with absorbents and opium (Pfenninger and Staub); the *decoctions* of marsh mallows or of the common mallow (Paulus, Kortum, Ecker), drunk warm, in large quantity; saleb (Weber and Hargens); and the decoction of the Carageen moss, or of Iceland moss (Hargens, l. c. and Herz, *Briefe*, b. ii. n. 2.); are useful medicines.

126. *D. Anodynes*, especially after vascular depletions where they are required, and alvine evacuations, are very generally recommended. —(*a*) *Opium* is the most to be depended on, and the most generally appropriate in some combination or other, according to the intentions to be fulfilled. If its sedative effect chiefly be desired, and if inflammatory fever be present, it may be given in doses of from one to four grains, either alone, or with nitre, or with antimonials, as directed by Blane, Himly, Jawandt, Cheyne, Neumann, and Horn (*Archiv*. b. vi. p. 103. *et seq*.). When it is desirable to procure a diaphoretic operation, it is best conjoined with ipecacuanha (Cardin, Müller, &c.), or small doses of camphor and nitre; or in the state of laudanum, with considerable quantity of the spiritus ætheris nitrici, or with other diaphoretics (Hiner, Jackson, &c.), especially in the asthenic forms. If the biliary secretion be scanty, the liver not being actively diseased; or if the intention be to excite salivation; opium may be conjoined with moderate doses of calomel, and given every four or

six hours, as directed by J. Johnson, Leidenfrost, Renton, and others—particularly in the sub-acute and chronic states. If the powers of life be depressed, and the circulating and secreted fluid vitiated, it will be necessary to exhibit it with tonics and antiseptics (Morton, Wedekind, &c.), as cinchona, the chlorates, &c.; and with astringents (Riedlin), when the evacuations are profuse, the digestive mucous surface relaxed, or the disease chronic. Consbruck considers opiates injurious, unless preceded by emetics; and Sydenham, Mursinna, and others, either premise evacuations, or alternate them with anodynes. The opinion of Wendelstadt, that opium, as well as astringents, are injurious in the bilious variety, until morbid secretions are evacuated, is judicious, and may be extended to most forms of the disease. In the nervous or typhoid variety, they should be given with great circumspection. Morton found that, when mainly depended on, in the epidemic of 1666, they augmented the exhaustion and muttering delirium frequently attending it. Opium, in *suppositories* (Bateman, &c.), and in *liniments* rubbed on the abdomen, or externally in other forms (Hargens and Thomann), has been already recommended in various states of the malady.

127. (*b*) Amongst those substances which act most energetically in removing spasm of the intestinal fibres, and diminishing morbid sensibility, hyoscyamus, belladonna, and tobacco, are the most deserving of notice. *Hyoscyamus* is recommended by Matthæi, Withering, and Hunnius; and, in the acute and febrile states of the disease, may be exhibited in the same manner and forms of combination as opium. The recent juice of *belladonna* is praised by Gesner (Haller's *Biblioth. Med. Pract.* vol. ii. p. 55.), and Ziegler (*Beobachtung.* p. 35.); but the powder of the root, and the extract of this plant, are equally efficacious when properly preserved. A strong infusion of *tobacco* is prescribed as a fomentation to the abdomen, by Drs. Graves and O'Beirne. These narcotics are appropriate only to the early stages of the sthenic states of the disease, and require much discrimination and caution. The *prussic acid*, with camphor, ipecacuanha, and mucilages, is of benefit when judiciously prescribed.

128. *E. Diaphoretics* are extremely beneficial in the early stages of the disease. Those of a cooling and relaxing kind are most suitable to the sthenic forms, and such as are warm and exciting in the adynamic states.—(*a*) *Antimonials* are preferred by Pringle, Sims, Fischer, Baker, Vogel, Adair, Richter, and Hufeland; whilst Heuermann (*Bemerk.* b. i. p. 184.) considers them injurious,—an inference, which I believe to be correct as respects their exhibition in the advanced stages, or in the asthenic states. Of these preparations, the most serviceable is James's powder, given with calomel, or with calomel and opium in the first stage. *Liquor ammoniæ acetatis*, with mucilages, emollients, and opiates (Hargens); or with small doses of *camphor* and nitre, and either with (Richter and Saunders) or without anodynes, is more generally appropriate; and, in persons who have been addicted to spirituous liquors, or in the asthenic forms, with camphor mixture, the spiritus ammoniæ aromaticus, or the *spiritus ætheris nitrici* and laudanum, is very beneficial. The infusions of *serpentaria* or of *arnica*, either alone, or with liquor ammoniæ acetatis, or with camphor and opium, are indicated chiefly in the malignant or nervous varieties, or in the advanced stages of the other asthenic forms. The infusion or powder of the root of *arnica* (Michaëlis, Collin, Birnstiel, and Fischer), may be employed in similar combinations and states of the disease, as advised by Richter. Stoll (*Rat. Med.* vol. ii. p. 421.) recommends it after emetics, depletions, and evacuants, in the acute; and in the chronic complaint. *Ipecacuanha* is, however, the most certain in its effects, when combined with opium, and the most to be dependedupon, in arresting the train of morbid actions. The injunction of Sir G. Blane, to have recourse to diaphoretics after evacuations have been procured, should not be overlooked.—(*b*) The importance of restoring the functions of the skin has been duly estimated by Gruber, Jackson, Neumann, Vogler, and Schlegel, and should not be confided to internal remedies merely. *Tepid* or *slightly warm baths*, in the highly inflammatory states, and *warm baths* (Blane, Horn, Richter, König, Goeden, &c.), or baths with aromatic and stimulating herbs infused in the water (Thomann, *Ann. ad* 1800, p. 237.) are also important means. *Vapour baths*, and the application of *dry heat* (Heister, Vogler, and Hargens,) are also deserving of notice. Frictions of the surface, or, as Prosper Alpinus and others advise, frictions with sweet oil, upon removal from the bath to a warm bed; and the internal use of diaphoretic diluents, are useful adjuvants.—(*c*) Warm *poultices* (Annesley and Author) and epithems or *fomentations* frequently applied to the abdomen, as directed by Alexander, Riverius, Brünner, Stoll, Richter, &c., are often serviceable, when they are so managed as not to wet the bed-clothes. Warm cataplasms of aromatic and antispasmodic herbs, &c., are praised by Heister, Blanchard, Thomann, Brüning, Klinge, (in Hufeland, *Journ. der Pr. Arzneyk.* b. vi. p. 900.), Hinze, (Horn's *Archiv.* b. iv. p. 516.), Goeden (*Ibid. Mart.* 1812, p. 331.), and Horn (*Ibid.* b. vi. p. 263.). These also act as derivatives, as well as diaphoretics.

129. *F. External derivation* is very generally prescribed. Moseley and Matthæi recommend it chiefly in the complication with rheumatism, for which Paulizky (*Beobachtung.* st. ii. n. 1.), directs *blisters* to the thighs; where, also, they are generally ordered to be applied by Müller, Ecker, and Amelung. Schlegel, Lind, Stoll, Blane, Fischer, Mursinna, Neumann, and Annesley advise large blisters to the abdomen; and Hunnius to the sacrum; whilst other writers think that they increase the dysuria. *Sinapisms* are noticed by Blane and Fischer; and camphorated *liniments* rubbed on the abdomen, by Lind. These are less rapid in their effects, and much less efficacious, than the turpentine *epithem* described above (§ 89.), or friction with *croton oil*, either of which may be also applied to the insides of the thighs and legs in urgent cases.

130. *G. Astringents* form a principal part of the means employed in dysentery by Galen and the Arabian physicians. Various substances of this kind are recommended. Dr. Wright advises *citric acid* and common salt, which are often of

much service either with or without opium, especially in the asthenic states, and as they occur in the dark races. Goeden (in Horn's *Archiv.* Mart. 1812, p. 284. and 323.), prescribes *tartaric acid* with refrigerants, and opium; Bano, *sulphuric acid* with mucilage; Annesley, the *nitro-muriatic* acids, with anodynes; and M'Grigor and Hope, *nitric acid* with opium; this last being chiefly appropriate to chronic cases, and those associated with disease of the collatitious viscera. Birnstiel directs *alum* conjoined with camphor; Loos (Horn's *Archiv.* Jan. 1810, p. 193.) alum with *tormentilla root;* Hunnius, Michaëlis (Hufeland, *Journ. der Pr. Arzneyk.* b. vi. p. 280.), and Hargens (*Ibid.* b. vii. p. 137.), alum with mucilages, opium, &c., chiefly in the chronic and atonic states; Moseley and Jackson, alum with sulphate of zinc, by the mouth and injections; and Adair, alum with spermaceti, or gum, opium, and aromatics, in epidemic dysentery occurring among negroes. *Lime water* with milk, or with mucilages, is praised by Grainger, Brefeld, and Lange; but is most serviceable in the chronic and asthenic states, and in the form of enema; in which cases, various other astringents are recommended, especially after morbid matters are evacuated. In this manner the preparations of *catechu* are directed by Brande (Todd's *Med. Journ.* b. x. n. 1.) and others; *kino*, by Weber; *hæmatoxylon* with cinnamon and other aromatics, by Pringle and Wendt; the *tormentilla root*, by Hoffmann; the *lythrum salicaria*, by Quarin and Gardane; the root of the *ledum palustre*, by Biornlund; *betel*, by Peron; the inner bark of the *brucea antidysenterica*, by several writers; and the decoction of the *pomegranate bark*, or of the rind of the fruit, by the ancients, and by many modern authors. All these, especially tormentilla, catechu, and betel, are advantageously combined with ipecacuanha or Dover's powder. Several mineral astringents are also exhibited, especially in the asthenic and chronic states, or in far advanced stages; internally as well as in enemata. *Arsenic*, and the rust of *copper*, are prescribed by Galen, Rhazes, and most of the ancients; and the *sulphates of zinc*, of *copper*, and of *iron*; and the *nitrate of silver*, either with or without opium; by the authorities referred to in the article Diarrhœa (§ 50.). The *superacetate of lead* is recommended by Fernelius, Camerarius, and Nardius, and is now frequently employed, in pills, draughts, or injections, generally with opium and ipecacuanha, both in the acute and chronic forms; particularly the latter. It should be recollected, when prescribing astringents in this disease, that they are injurious when exhibited early in the acute states, and whilst there is much fever, or when morbid matters remain to be evacuated. In other circumstances, they frequently are of much service; particularly when altered secretions and accumulated excretions are discharged from time to time by a judicious exhibition of mild purgatives; and when they are conjoined with demulcents, with ipecacuanha, or with absorbents, or with anodynes, according to the forms of the disease and the state of the patient. Morton found them injurious, although they diminished the discharges; in the malignant or colliquative epidemic of 1666; and similar results have been remarked by others.

131. *H. Tonics* are required in nearly the same states of the disease as astringents; but they are less frequently injurious, as they do not so completely suppress the discharge from the intestinal mucous surface as astringents usually do. They admit, also, of similar combinations with anodynes, demulcents, and absorbents, to those found most serviceable with astringents; and possess the additional advantage of promoting the operation, and, in some instances, counteracting the ill consequences that might result from the exhibition, of purgatives or aperients. In the asthenic forms, they may be exhibited as early as the morbid matters are evacuated, particularly in conjunction with ipecacuanha, or diaphoretics and opiates; and when evacuation should be promoted, they are beneficially associated with laxatives. *Cinchona* is praised by Whytt, Linke, Clark, and Douglas (*De Dysent. Putrida*, ed. 1766, p. 35.). Bano prescribes it with rhubarb (*Act. Reg. Soc. Med. Haun.* vol. i. p. 105.); Schmidtmann, with ipecacuanha; Whytt, Quarin, and Pringle, with catechu and ipecacuanha, after bleeding and alvine evacuation; and Morton with opium. Heuermann restricts it to dysentery following fevers; and Cullen advises it chiefly when the disease assumes an intermitting or remitting character. Huxham and Pringle prescribed an *infusion of it* and *serpentaria*, with great benefit, in the asthenic and malignant states, and during convalescence. Marcus considers the bark injurious; which it doubtless is in the early stage of the inflammatory forms. Most of the other tonics are recommended by authors, and admit of similar forms of exhibition, in the states which require the lighter preparations of bark; for where the infusion or decoction of cinchona, with liquor ammoniæ acetatis, vinum ipecacuanhæ, and anodynes, are of service, the other tonic infusions will also be of use. Indeed, some of them, as the infusion of *calumba* (Percival and Mertens), or of the *cusparia bark* (Brande, in *Hannover Magaz.* b. xxviii. p. 1101.), will be preferable in certain forms of the disease, especially in the combination now stated. In the advanced stages of the acute, or in the chronic and more asthenic forms, where tonics are chiefly required, *simarouba* (Wright, Gooch, Wendt, Quarin, Baumes, Degner, and Sumeire) will be also found an excellent remedy, either alone, or with the medicines just enumerated. Dr. O'Brien found it very serviceable in the advanced stages of the dysentery that was lately epidemic in Ireland, in conjunction with opium. The *willow bark* (Loeffler and Osiander), and *cascarilla* (Weber, and Horn, *Archiv.* July, 1820, p. 301.) may be employed in similar circumstances, and in the same combinations. It should not be overlooked, that tonics ought to be preceded by vascular depletions, or alvine evacuations, where either is required; that the promoting of the latter, by suitable laxatives conjoined with, or intervening between them, or exhibited in enemata, will occasionally be required; especially when the disease proceeds from a morbid state of the secretions; and that they should be very cautiously resorted to in the sthenic or phlogistic varieties, even in their advanced stages.

132. *I. Aromatics and Absorbents* are often useful adjuvants in the advanced periods, or asthe-

nic forms of the acute, or in the chronic affection; more especially when occurring in the dark races. — (*a*) Blane prescribes *aromatics* with bitter infusions. Horn (*Archiv.* b. iii. p. 317.) prefers the *calamus aromaticus*; and Pringle, the preparations of *cinnamon*. The hot spices, especially *Cayenne* and *black pepper*, are most commonly used in warm countries, and are best suited to the natives, combined with tonics, absorbents, or mucilages. Active *stimulants* are too indiscriminately recommended by Brown, Marcus, and Zincke; but Vogler justly considers them injurious, unless in the adynamic or malignant states, in which, as well as in many of the chronic, the hot spices, thus combined, or given with ipecacuanha, camphor, and opiates; or with honey and small doses of the chlorates, or even of borax, in the chronic; will frequently be of great service. — (*b*) The ammoniacal, calcareous, and magnesian *absorbents* are most serviceable in the chronic and asthenic conditions, in the states of association here mentioned. In the phlogistic varieties, the subcarbonates of the alkalies, with refrigerants, anodynes, and diaphoretics, are most appropriate.

133. *K. Mercurials* are prescribed — 1st, as chologogue purgatives or laxatives — 2d, as simple alteratives; and, 3d, to procure their specific effects, whereby their alterative operation may be better secured, and a derivation from the seat of the disease established. — Cleghorn, Lysons, Clarke, Wright, Saunders, Richter, Jackson, Bampfield, and Annesley direct *calomel*, either alone, or with some purgative, generally at bedtime; and sometimes oleaginous laxatives and enemata subsequently, in order to accomplish the first of these intentions; and Duncan and Lempriére combine it with rhubarb. The chief objection to this practice is, that, however appropriate it may be in respect of the hepatic functions, a full dose of calomel generally increases the tenesmus; and the more, the oftener it is repeated, or the larger the dose.* This I have often remarked; and Sir J. M'Grigor states that calomel, given in the early stage of the acute unmixed disease, aggravated the symptoms. A similar observation is also made by Dr. Cheyne. Hargens and Consbruch prescribe calomel as a purgative in the verminous complication; whilst Horn and some others consider it, as well as mercurials generally, when frequently repeated, or, in large quantity, very injurious. Lind recommends the exhibition of the pure quicksilver with sulphur, gum acacia, and ipecacuanha, after emetics, with the view of removing obstructions in the large bowels. Leidenfrost directs small doses of calomel with opium. Johnson and Renton give four or five grains, every four or six hours, or much larger doses less frequently, also with opium, until salivation is produced; and Dr. Ferguson, half a grain with a grain of ipecacuanha, every hour, till the gums become affected; bleeding having been premised in the early stage of the inflammatory disease. *Inunction* is preferred by Boag (*Med. Facts and Observ.* vol. iv. n. 1.), Clarke, and Houlston, for procuring the specific effects of this medicine, in the chronic and complicated forms of dysentery. The observations already (§ 101.) offered respecting mercurials, will show the circumstances in which they may be employed, and the preparations that may be preferred. They are most appropriate to the sub-acute and chronic states, after depletions, when the substance of the liver is not actively diseased,; and are best combined with James's powder, or ipecacuanha, or Dover's powder. *Calomel*, or the *hydrargyrum cum cretâ*, should then be given; and if their specific effects soon follow, the circumstance may be considered favourable; but the former should not be persisted in. The latter, however, may be continued longer; particularly in conjunction with ipecacuanha, as being much less liable to increase the tenesmus than calomel; especially in the chronic disease. When dysentery proceeds from endemic sources, or when it assumes a very adynamic form, little benefit beyond its chologogue operation is produced by it; as I have had sufficient reason to believe, that, when given with the view of affecting the system, it favours relapses, and protracts convalescence.

134. *L. Ipecacuanha* was first employed in the cure of this disease by Piso, who brought it from the Brazils (*De Med. Braz.* lib. ii. *de Indiæ utriusque Re Naturali et Medica, &c.* Amst. 1658, fol. p. 231.), and had given it in drachm doses, and in the form of infusion. But it was not until Helvetius, who had come from Holland to Paris, gave some of it, with a knowledge of its virtues, to the physician of Louis XIV., who employed it successfully in the case of the Dauphin, then dangerously attacked by dysentery, that it came generally into use. Marais (*Ergo Dysent. affect. Radix Brasiliensis.* Paris, 1690.) and soon afterwards, Sloane (*Philos. Trans.* No. 238.), Heister, Vater, &c. further demonstrated its good effects. It has subsequently been very generally recommended, more particularly by Akenside, Lind, Hillary, Desbois, Linnæus, Duncan, Richter, and Hunnius. Since its exhibition by Piso, in very large quantities, Mr. Balmain* seems to have been the earliest

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* A most important fact was determined by the experiments performed by Mr. Annesley (*Sketches of Dis. of India*, 2d ed. 8vo. p. 374.), in order to ascertain the operation of calomel: and these experiments presented uniform results, viz. that, whilst the stomach and duodenum of dogs that had taken large doses of this preparation were much paler and less vascular than in ordinary circumstances, the colon and rectum, from the cæcum to the verge of the anus, were most acutely inflamed: thereby explaining the results of clinical observation; namely, that, although large doses of calomel calm those symptoms usually caused by increased vascular action, or inflammation of the mucous surface of the stomach and duodenum, they lower the vital energy of these important organs, and occasion tenesmus, griping pains in the course of the colon, mucous or bloody stools, hæmorrhoids; and, if persisted in, many more of the symptoms of dysentery, or even structural change of the colon and rectum. I am confident that dysentery becomes chronic; that an occasional indigestion lapses into a constant dyspepsia; and that habitual constipation often passes into strictures of the rectum, and hæmorrhoids into fistulæ; from the frequent exhibition of large doses of this medicine. Ingenuity cannot possibly devise a more successful method of converting a healthy person into a confirmed invalid, of destroying many of the comforts of existence, and of occasioning hypochondriasis and melancholy, than the practice of prescribing large doses of calomel on every trifling occasion, or when the bowels require gentle assistance; or because the patient erroneously supposes himself to be *bilious*, or is told so by those who should know better. The unfortunate word "*bilious*" is the scape-goat of the ignorant.

* The importance of the subject has induced me to give the substance of Mr. Balmain's communication. He states: — "I found the ipecacuanha, in small doses, always useful (in dysentery); and, in an accidental con-

to employ it in this manner, in conjunction with large doses of laudanum. A few years afterwards, Mr. Playfair adopted this practice in India; he giving from half a drachm to a drachm, with as much laudanum, and directing this dose to be repeated again and again if it should be rejected. Mr. English prescribed from a scruple to half a drachm, with double this quantity of laudanum; and Dr. Bateman confirmed the propriety of this method in all the stages and forms of the disease, as he had observed it in this country. More recently, Mr. Twining has modified this practice, and directed from four to eight — more frequently six — grains of ipecacuanha, with nearly as much extract of gentian, and occasionally also with blue pill or calomel, twice or thrice daily; premising bleeding and alvine evacuations in the acute disease, and resorting to mild purgatives, once a day, during the treatment. I had, in 1817 and 1818, given from eight to ten grains of ipecacuanha with opium, and sometimes also with calomel or blue pill, with the best results; having at first, by mistake, prescribed the simple powder for the compound; and afterwards continued the practice when the circumstance and the effects became known to me. Fischer directs ipecacuanha, when opiates fail of affording relief. Rhanoë (*Act. Reg. Soc. Haun.* vol. i. p. 33.) combines it with rhubarb; and Clarke, Schlegel, and Annesley give it in the form of infusion, which may also be exhibited as an enema. Dr. Dick praises it in the dysentery of India; the bowels being freely opened by clysters, whilst it is frequently given by the mouth. It may be conjoined with nearly every other medicine that can be exhibited in this disease — with refrigerants and evacuants in the inflammatory states, and with tonics and antiseptics in the malignant; and it will occasion as much nausea in one or two grains, as in sixty; this effect being less remarkable after its exhibition in the form of pill, and with bitters or opium, or even with calomel, than when taken in simple powder.

135. *M. Rhubarb* may be given either as a mild purgative, or as a gentle astringent. It is approved of by Borellus (*Cent.* ii. obs. 82.), Heister, Riedlin, Pringle, Jacobs, and Baker; is considered injurious by Kortum, Jawandt, Weber, Neumann, and Mursinna; and is prescribed only in the most advanced stage by Lind, Stoll, and Richter. It is much praised by Pringle, in the camp dysentery; especially when exhibited in large doses after emetics; and it is often of much service in the dysentery of *children*, conjoined with hydrargyrum cum cretâ, and minute doses of ipecacuanha, or with absorbents and Dover's powder. It is one of the best purgatives in the more asthenic forms; but it is injurious in the early stages of the inflammatory disease, or when the bile is obstructed; and it then often increases the tenesmus, as remarked by Wendelstadt and myself. It is apt, in many constitutions, to suppress the excretion of bile, even although it may open the bowels; and, upon the whole, it requires much discrimination in its use.

136. *N. Camphor* is favourably noticed by Brefeld, Marcus, Sponizer (Hufeland, *Journ. der Pr. Heilk.* b. v. p. 546.), and Mende (*Ibid.* Aug. 1810, p. 88.). Chambon directs it to be dissolved in oil; Michaëlis conjoins it with opium; and Osiander and Thomann (*Annalen*, 1800, p. 258.) employ it freely, both internally and externally. It is an excellent adjunct, in small doses, to refrigerants or diaphoretics, in the inflammatory or acute states; and, in large doses, with other antiseptics or tonics, in the malignant variety, and in the verminous and rheumatic complications. It is particularly serviceable in the nervous or typhoid state; and in the advanced stage, when nervous symptoms supervene. It may be given with ipecacuanha, either in pills, or in demulcents; and in emollient enemata. In the infectious conditions, it should seldom be omitted; and may in these, especially such as are malignant, be given in doses of ten or twelve grains.

137. *O.* The *terebinthinates* are valuable remedies in the asthenic and chronic forms. They were recommended by the Author (*Med. and Phys. Journ.* vol. xlvi. p. 107.), and have since been employed by several physicians. The circumstances in which they may be resorted to, and the manner of prescribing them, are manifest from what has been stated. They are not contra-indicated in the inflammatory varieties, although bleeding should be premised; and, when exhibited so as to act gently on the bowels, or in small enemata, they counteract the tendency to sloughing or ulceration; particularly in the asthenic varieties. Any of the *balsams* — but more particularly the Peruvian (F. 843.), Canadian, and copaiba — may be given with aromatics, magnesia, and demulcents; or with opiates; and be administered in enemata. They are most serviceable in the chronic disease, especially when assisted by frictions of the surface, deobstruent plasters, flannel bandages, and regulated diet. When the stools are frequent, and without pain, they are particularly serviceable, the hydrargyrum cum cretâ being taken with Dover's powder at night; or they may be alternated with either the hæmatoxylon, catechu, or kino, in mucilaginous or absorbent vehicles.

138. *P. Antiseptics* are praised by Wedekind. With a view to its antiseptic as well as to its aperient operation, Jackson and Crawford advise the use of *charcoal*, in doses of half a drachm or a drachm, frequently repeated. It may be advantageously given rubbed up with camphor. But the *chlorates* are much more powerful agents. The chlorate of potash is prescribed by Garnett,

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versation with a Mr. Wentworth, who assisted me, I formed the design of giving it in larger quantities. He informed me, that a man, who lived in the same town where he did, was uncommonly successful in the cure of dysentery, by using from a drachm and a half to two drachms of ipecacuanha, with laudanum. Mr. W. had, just previously to this conversation, given ninety grains of the powder, with forty drops of tinct. opii, to a man whose life was apparently near a close, and with whom evacuants had been used. There was a wonderful abatement of every symptom in the course of one night; and a repetition of the medicine, in smaller quantities, completed the cure in a few days. I did not hesitate to follow this practice; and gave the ipecacuanha frequently to the quantity of two drachms, with the addition of sixty drops of tinct. opii: and, in many cases, found that a dose or two was sufficient to remove every dangerous symptom. It answered the purpose best when given in the form of pills; and if the patient kept still, and lay on his back, with the head and chest tolerably elevated, nausea seldom or ever followed it; and oftentimes it happened that he had not a stool the succeeding day, although, previously, the gripings were violent, and the discharges of blood frequent and in large quantities." (*Mem. of Med. Soc. of Lond.* vol. v. p. 210.)

and the hydro-chloruret of lime by **Reid**. This latter, and the hydro-chloruret of soda, have been employed by me in this disease since their introduction into practice (see communication from the Author to Mr. **Houlton**, in the Appendix to this gentleman's excellent translation of **Magendie's** *Formulary*), and may be given with demulcents, or in various other states of association, and in enemata; especially in malignant states, or when sloughing is dreaded.

139. *Q.* Besides the foregoing, *various other remedies* have been recommended. — (*a*) All the ancients, and **Diemerbroeck** (*Observ. et Curat. Med. C.* n. 29.), **Brefeld**, and **Paulini** (*Cent.* iii. obs. 76.), among the moderns, prescribe *cold applications* to the abdomen, in the phlogistic states of the disease. Lotions and poultices, with the *nitro-muriatic acid solution*, are directed to this quarter by Mr. **Annesley**. — (*b*) The *nitrate of soda* (**Niemann**, **Mayer**, &c.) has been recently exhibited in dysentery, in doses of about a drachm, every four or five hours; or half the quantity each hour or two, in demulcent mixtures, with ipecacuanha (F. 929.). It acts as a refrigerant sedative and laxative, and is suited to the phlogistic states. The *sub-nitrate of bismuth*, particularly with ipecacuanha and opium, is extremely serviceable in some acute, as well as chronic, forms of dysentery. M. **Lombard**, and several others, had employed it with or without opium; and, more recently, MM. **Récamier** and **Trousseau** have found it to possess much efficacy as an antispasmodic sedative and astringent in this disease, and deserving adoption after depletions and evacuations have been practised in cases requiring them (*Gaz. Med.* Feb. 26. 1833.). — (*c*) *Nux vomica*, or its *extract*, and its active principle, *strychnine*, are recommended in the chronic disease by **Hufeland**, **Fischer**, **Haakmann**, **Goeden**, **Klinge**, **Odhelius**, **Hagstroem**, **Graves**, and **Oswald**; but **Hargens**, **Weber**, **Michaëlis**, and **Horn** state that they derived little or no benefit from it. In the particular condition now mentioned, either of the above preparations is often of use; more especially the extract, or strychnine, with ipecacuanha. — (*d*) *Hedera arborea* and *h. terrestris* are prescribed by **Camerarius** (*Memorab.* cent. iii. n. 79.); the fruit of the *Adansonia*, by L. **Frank**; *Armenian bole*, and the *terra lemnia*, or *sigillata*, by many of the older writers; *castor*, with nitre, by **Schlegel**; *musk*, with camphor and absorbents, &c., in the malignant states and last stages, by **Hunnius**; *wax*, with gum acacia, by **Wedekind**; the decoction of *vaccinium myrtillus*, or bilberry, with burnt spirit, by **Fraser**; and the preparations of the *hop* (F. 871. 900.), and of the *diosma crenata* (F. 231. 396.), by the Author. In the complication with rheumatism, **Baker** recommends *valerian*, *castor*, and *musk*; and, if there be little or no fever, the preparations of *guaiacum* with ipecacuanha and opium.

140. The chronic form of the disease will occasionally baffle every method of cure. Mr. **Hooper** states, that, in the cases of chronic dysentery, forming a large proportion of the sick which reached this country from Corunna in 1808, emetics, purgatives, calomel to salivation, **Dover's** powders with aromatics; opium in large doses, alone or with acetate of lead; starch injections with astringents, and various other medicines, were given without benefit. Balsam of copaiba, with aromatics and opium, rhubarb being also prescribed occasionally; and, in other instances, the decoction of bark with acids, opium, and a small dose of calomel being taken at night; were, upon the whole, most successful; a small quantity of wine having been allowed. The chronic disease is frequently prolonged by too much food, especially in children, and sometimes also in adults. The following are formulæ of a few medicines not commonly prescribed, but occasionally beneficial in the chronic states of the disease: —

No. 204. ℞ Infus. Cuspariæ ʒ xj.; Acid. Boracici gr. x.—℈ j.; Vini Ipecacuanhæ ♏ xx.; Tinct. Camphoræ Comp. ʒ j.; Syrup. Papaveris ʒ jss. Fiat Haustus.

No. 205. ℞ Sodæ Nitratis ʒ ss.—ʒ j.; Pulv. Acaciæ ʒ ij.; tere simul, et adde Aq. Pimentæ (vel Cinnam.) ℥ vij.; Vini Ipecacuanhæ ʒ iij. M. Capiat Coch. unum, secundâ vel tertiâ quâque horâ. (**Mayer**.)

No. 206. ℞ Extr. Nucis Vom. gr. vj.; Pulv. Ipecacuanhæ gr. xij.; Extr. Humuli ʒ j. Misce probe, et divide in Pil. xxiv., quarum capiat binas, quartâ vel sextâ quâque horâ.

No. 207. ℞ Extr. Nucis Vomicæ gr. x.; Mucilag. Acaciæ ʒ j.; tere bene, et adde Mist. Amygdal. Dulc. et Mist. Camphoræ āā ℥ iij.; Vini Ipecacuanhæ ʒ ij.; Tinct. Camphoræ Comp. ʒ ss.; Syrup. Althææ ʒ ss. M. Sumatur Cochleare unum omni bihorio.

No. 208. ℞ Strychninæ gr. ij.; Pulv. Ipecacuanhæ gr. xij.; Conserv. Rosar. ℈ ij. Misce probe, et divide in Pilulas xxiv. Capiat duas, quartis horis.

141. *R. The Diet and Regimen*, in all the states of dysentery, should be strictly regulated. In the phlogistic variety, abstinence must be strictly enforced. In the more asthenic, gentle nourishment should be tried, and its effects upon the bowels and the constitutional affection carefully observed. *Milk*, either recent or boiled, is recommended by **Alexander Trallianus**, and most of the ancients. **Cælius Aurelianus** directs it with *honey*. This last is both an excellent article of diet, and vehicle for medicines, in many instances, and it may often be advantageously given with small doses of borax. Milk is praised both as food and medicine by **Schmidt** (*Ergo Dysen. Lac.* Monsp. 1649.), **Borellus**, and **De Haen**. **Sydenham** gave it by the mouth and in enemata. The celebrated **Boyle** (*Works*, vol. v. p. 113. *the Advantages of Simple Remedies*) directed milk, boiled with an equal quantity of water, until there remained as much as the milk first amounted to. A decoction of the leaves and flowers of the *verbascum thapsus* in milk is a popular remedy in Ireland. **Mursinna** and **Vander Heyde** prefer buttermilk; and **Richer**, whey. Milk may also be taken with the gums, honey, and lime water. Animal *gelatin* (**Gautieri**, in **Hufeland's** *Journ. d. Prac. Heilk.* b. xviii. p. 137.), in the form of jelly, or beef-tea may be tried with spices, in the asthenic and chronic forms; but they are not always found to agree. Farinaceous articles, as sago, tapioca, rice, biscuits soaked in beef-tea, mutton or veal broth, &c., are the most generally useful. If the patient have been habituated to a liberal use of wine or spirits, a little burnt brandy or wine may be given with these or with his beverages; and, in the more urgent cases, aromatics may be added. For *drink*, he may have weak gruel, or barley water, or either of the beverages prescribed in the Appendix (F. 588. *et seq.*) that will suit the case, and the treatment employed. He ought, from the first, to be placed between warm blankets; the bed-pan being used, to prevent his getting out of bed to the night-chair, and the chills con-

sequent thereon. In chronic cases, a large warm deobstruent plaster (§ 109.) should be applied over the abdomen, which ought to be surrounded by a flannel roller (Dewar, &c.). During *convalescence*, also, the diet and clothing should be carefully attended to; as an error in the former, and insufficiency of the latter, particularly at night, will often occasion *relapses*, to which there is a greater tendency in this, than in almost any other disease. *Change of air*, *exercise on horseback*, and *travelling*, with due precautions against cold and other injurious contingencies, are also very beneficial. After repeated attacks, or after the chronic disease, the *Harrowgate water*, or the artificial mineral waters of *Carlsbad*, or of *Marienbad*, in quantity sufficient to act gently upon the bowels; and subsequently those of *Eger*, *Pyrmont*, or *Spa*, with the occasional alternation of those of *Seidschutz* or *Pullna*; this plan being varied according to the peculiarities of the case; will often prove of service. Warm or tepid salt-water bathing, or the affusion of tepid salt water over the abdomen, will also promote a perfect recovery.

142. *S. Prophylactic measures* are sometimes necessary; particularly where the endemic causes abound, in autumn after rains, or in cold and wet seasons in warm climates; and when the disease is epidemic. These measures consist chiefly of avoiding the predisposing and exciting causes, especially injurious ingesta (§ 10. 22.); of filtering or boiling impure water, and of purifying it, by mixing with it antiseptic absorbents, as lime, the chlorates, &c.; of regular habits, and wholesome and digestible food; of wearing flannel next the skin, and shunning exposure to the night dews, or to cold and moisture; of sleeping in warm beds and airy chambers, elevated far above the soil; of avoiding the air of close apartments in which the sick are confined, and the emanations from the bodies of those thus circumstanced, or from the evacuations, when the disease presents any of the asthenic characters; of not using the water-closet or night-chair resorted to by those affected; of having recourse to the chlorurets, to destroy the noxious effluvia; by sprinkling the apartments with them, or throwing them into the vessels containing the evacuations, or into the water-closets; and of the absence of all dread of being affected.

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DYSMENORRHÆA. See MENSTRUATION.

DYSPHAGIA. See DEGLUTITION, DIFFICULT.

DYSPNŒA. See RESPIRATION, &c.

DYSURIA. See URINE, &c.

EAR—NERVOUS AFFECTIONS OF THE.

1. *Certain diseases of the ear* will be here considered; which, although sometimes attended by disorder of *hearing*; and often terminating in impairment, or loss of this sense; are not necessarily accompanied by either. — In the article HEARING, the affections of this function will be viewed with reference to the lesions producing them, seated in different parts of the organ.

I. NOISES IN THE EAR. SYN. — *Tinnitus, Susurrus, Sonitus, Sibilus, Syrigmus, Bombus, Aurium,* Auct. *Paracusis illusoria*, Good. *Das Ohrentönen, Ohrenklingen*, Ger. *Tintement, Bourdonnement de l'Oreille*, Fr. *Singing in the Ear.*

CLASSIF. — 4. *Class*, 2. *Order* (Good). — I. CLASS, IV. ORDER (*Author*).

2. DEFIN. — *A sense of ringing, whizzing, or beating sounds in one or both ears, without external causes.*

3. i. These sounds vary in their *characters*. They are sometimes sharp, shrill, ringing, and successive; occasionally whizzing, roaring, acute, and continuous; and in other instances, beating or throbbing. They may be recurrent or intermittent, or devoid even of remissions, and be heard either in one or in both ears. M. ITARD — the highest authority on diseases of the ear — divides them into, — 1st, the *false*, or those which have no existence whatever; and, 2nd, the *true*, or such as are seated in the interior of the head, or of the ear, but without being caused by external sonorous bodies. *Tinnitus aurium* is most frequently attended by a slight degree of deafness, which, in some cases, it produces, and in others is merely coincident with it. (*a*) *True tinnitus* may proceed from — α. cerebral plethora, congestion, or determination; — β. the impeded or obstructed return of blood from parts within the head; — and, γ. mechanical obstacle to the free circulation of air in the different compartments of the ear; but without completely preventing its entrance, for then the noise would be replaced by simple deafness. When the noises depend upon the state of the cerebral circulation, they are generally beating, heavy, hissing, or whizzing; frequently correspond with the pulsation of the carotids, which also is often strong; and are arrested by pressure of these vessels. (*b*) *False tinnitus* is — α. *idiopathic*, as when a very loud noise has injured the function of the auditory nerve; and, β. *symptomatic*, when allied to some nervous affection, often unappreciable in respect either of its cause or of its nature, or sympathetic of disorders of some other organs. Thus, this affection often attends indigestion, and hypochrondriasis, especially in persons devoted to prolonged and exhausting mental exertions; sometimes debility or hysteria, particularly in delicate females, who have suffered from excessive discharges, or who are addicted to venereal indulgences or manustupratio; and occasionally disorders of the *primæ viæ*, as worms, torpid states of the colon, &c. In this variety, the noises are, in some cases, of a very unusual and even singular kind; and in hypochondriacal, nervous, or melancholic persons, give rise to various fancies or even hallucinations. In the case of a lady, for whom I was lately consulted at the same time with two other physicians, and who complained of noises in the ears after having suffered in her general health from too frequent returns of the catemenia, in excessive quantity, there gradually arose in the mind of the patient, an idea that persons were engaged whispering behind her; and ultimately it took so firm a possession of her mind, that it amounted to an hallucination, influencing both her judgment and her actions.

4. ii. Noises in the ears are most frequently *caused* by interruption to the free circulation of air through the Eustachian tube. Hence they are common attendants on catarrhs, and on enlargement of the glands, &c. in the vicinity of the tube;

and are often produced by currents of cold air falling on one side of the head or directed towards the ear, as by travelling in an open carriage, or with a carriage window open; or by having the hair cut, when abundant, in cold weather. When caused by partial obstruction of the eustachian tube, a loud noise or crack is heard upon yawning; and the sounds often cease, or are diminished for some time afterwards. They are frequently a troublesome symptom during convalescence from fevers; and are sometimes attendant upon rheumatic affections of the head or neck; in both which circumstances, they are probably dependent on morbid sensibility of the auditory nerves, or on determination of blood to the head, or on both. Mr. TOD imputes them chiefly to a faulty state of the secretions of the ear, in respect either of quality or quantity; Mr. BUCHANNAN, principally to an imperfect secretion of cerumen. Their dependence upon derangements within the head, as well as upon affections of distant organs, should always be kept in mind, whilst investigating their nature and relations; and hence the propriety of viewing them in the comprehensive manner adopted by M. ITARD.

5. iii. TREATMENT. — The ancients, especially CELSUS, paid considerable attention to this affection; many of these remedies are active and appropriate. It is obvious that the means of cure should be directed to the pathological conditions on which it depends. In the *true tinnitus*, especially when it is of a beating kind, vascular depletions should be prescribed. M. ITARD has seen it instantly vanish upon opening the jugular vein. Active and continued purging, with due attention to the digestive organs, is also requisite in these cases. *Symptomatic false tinnitus* should be treated according to the nature and seat of the primary affection. When it is connected with rheumatism, GRAPENGIESSER and RITTER advise having recourse to electricity or Galvanism. For the *true nervous* or *diopathic affection*, tonics, nervines, blisters behind the ears, stimulating gargles, and antispasmodics may be prescribed. HEISTER recommends in such cases fumigations of the ears with the vapour of a hot vinous infusion of rosemary and lavender; M. ITARD, fumigations with æther directed to the meatus, frictions of the scalp, and warm applications, with the view of promoting an abundant transpiration in this situation; and Mr. BUCHANNAN, two drops of the mixture of equal parts of pyroligneous acid, spirit of sulphuric æther, and spirit of turpentine to be introduced into the ear. The digestive organs should be assisted by stomachics, aperients, or purgatives; and transpiration promoted by gentle diaphoretics, and moderate exercise in the open air. When tinnitus arises from cold, the same means, or those usually resorted to in CATARRH, with attention to the state of the bowels, will be appropriate. Gargles also with the muriate of ammonia, or nitrate of potash, or this latter and the sub-borate of Soda, will also be useful. In this form of the affection, little further should be attempted, unless it become *chronic*, from partial obstruction of the tube, or diminished secretion of cerumen, in which cases it is generally associated with some degree of deafness, when it will require the treatment advised, in such circumstances, in the Article HEARING — *diminution of*, &c.

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II. EARACHE. SYN. — *Otalgia* (from οὖς ὠτὸς, the ear, and ἀλγέω, I pain); *Ohrenschmerz*, *Ohrenzwang*, Germ.; *Otalgie*, Fr.

6. DEFIN. — *Violent pain, generally in one ear, suddenly supervening, and often abruptly departing, without fever.*

7. i. *Earache* is most frequently *symptomatic* of inflammation of the ear, or of the presence of foreign bodies, or of insects in the meatus, or even of congestion or inflammation within the head. It sometimes also attends inflammation of the pharynx, or of the tonsils and fauces, or of the parotid gland; and is occasionally consequent upon small-pox, scarlet fever, and erysipelas of the adjoining parts. More rarely it is *idiopathic*, or a *purely nervous affection*, seated either in the nervous filaments sent to the internal parts of the ear, or in that part of the facial nerve passing through the aqueduct of FALLOPIUS, or in the filaments of the acoustic nerve, which seems the least probable seat. The *idiopathic*, or true nervous otalgia, is at its maximum of intensity on its invasion; and, unlike the pain attending otitis, does not gradually increase in severity, nor is it attended by throbbing, and inflammatory fever. Its duration is very uncertain. Sometimes it disappears abruptly in a very short time, occasionally being followed by neuralgic or rheumatic pains in some part of the face or head, or even in a remote part of the body — an occurrence further distinguishing it from otitis — and frequently again returning to the same ear, and very rarely to the other. When the pain is excessive, it often irradiates along the nervous filaments over the same side of the cranium, or of the face, or both, the eyes sometimes becoming red and watery; but it seldom or ever occasions delirium or convulsions (ITARD), unless it be connected with inflammation of the internal ear, or is produced by insects or foreign bodies in the meatus. When, however, the pain proceeds from this latter cause — an occurrence which is not unfrequent, particularly in children, and of which I have seen several instances amongst the poor and squalid — dangerous and repeated convulsions often supervene. Noises in the ear, and often a slight deafness, accompany otalgia; indicating the coincidence of extreme exaltation of sensibility in the parts composing the ear, with a diminished power of perceiving sounds; and evincing that the acoustic nerves are not the seat of the exquisite pain that is felt. Like all nervous affections it is never constant in its course: it may be continued, or intermittent; may recur several times, after irregular intervals; or it may appear once and never return.

8. ii. The CAUSES of earache are those of all

other nervous affections. Otalgia is much more common in females than in males; and it sometimes attends the early periods of pregnancy. It is often symptomatic of disorder in the *primæ viæ*, and is frequently connected with rheumatism, particularly of the face, head, or neck; as well as with facial neuralgia and toothache. M. Andral treated a case, in which it alternated with sciatic neuralgia. M. Fauchard records an instance where it long resisted all treatment, until a carious molar tooth on the same side as the affected ear was extracted; and Mr. Pettigrew, in the case of a lady suffering excruciating agony from this affection, directed the wisdom tooth to be drawn, which he correctly inferred to be its cause, and the pain was instantly abated. Various writers have seen otalgia consequent upon the disappearance of rheumatism and gout. A case following rheumatism occurred in my own practice; and another, produced by a current of cold air falling on the ear. This last is, perhaps, one of its most frequent causes. Earache may exist for some time, and either excite, or be merely contingently followed by, otitis, which, however, may have commenced long before its usual signs were fully developed.

9. iii. Treatment. — If this affection be *symptomatic*, the means of cure must be directed to the primary disease. (See Ear — *Inflammation of*.) If it arise from a foreign body, this should be extracted without greatly increasing the irritation; but if that cannot be accomplished, it will be better to wait its spontaneous discharge by means of the increased secretion which will be occasioned. Insects may be dislodged by injecting a sufficient quantity of an emollient oil into the meatus; or by introducing a small piece of sponge or cotton, with oil, by means of a probe. Infusion of tobacco, various other narcotics, and even acrid substances, have been directed to be employed for this purpose; but I believe that they may sometimes prove injurious, — an opinion also entertained by M. Itard. For the more obviously *nervous or idiopathic otalgia*, the ancients recommend the injections of warm emollient or stimulating oils; or these conjoined with anodynes. Cælius Aurelianus advises tepid oil to be dropped into the ear, and wool to be stuffed into it; he also directs fomentations, poultices, scarifications, and leeches, — remedies often serviceable, and generally safe. M. Itard states, that he has seen opiates introduced into the meatus for this affection followed by cerebral symptoms: he therefore prescribes the injection of tepid emollients, such as milk, the decoction of marchmallows, &c.; means but little different from those mentioned by the authority just referred to. In addition to these, he recommends the mouth of a phial containing three drachms of Hoffmann's anodyne, and half an ounce of water, to be directed to the meatus, the phial being kept immersed in warm water; and an abundant transpiration from the surface of the head to be excited, by sponging it with warm water for a quarter of an hour, afterwards rubbing it for some time with warm flannel, and lastly covering it by an impermeable or gummed silk cap. *Blisters* behind the ear, or on the temple, and medicines to promote the alvine secretions and excretions, are also suitable. Dr. Lehman directs a mild purgative, and the introduction of cotton into the meatus, charged with tincture of digitalis. Dr. Kennedy prescribes an *emetic* as early as possible in this affection; and after vascular depletion, if inflammatory action seem to be present. I found an active emetic almost immediately abate the excruciating pain, in the case of the wife of a celebrated author. After free vomiting, which may in some cases be promoted by the warm infusion of chamomile flowers, a dose of calomel, either with, or followed by, a purgative; and gentle diaphoretics; will be of much service. In every case, the state of the gums and teeth should be examined. Where the head is free from congestion, warm baths, vapour or fumigating baths, and narcotics with antispasmodics internally, may be tried. Tonics, especially the sulphate of quinine, the preparations of iron in large doses; valerian, or serpentaria with cinchona; or an infusion of valerian with the ammoniated spirit of colchicum; may also be prescribed, more particularly if the otalgia be of an *intermittent type*, or of a *rheumatic character*, and if morbid secretions have been evacuated by an emetic and purgatives. In the rheumatic or gouty state of the complaint, the decoction or infusion of cinchona with valerian, the subcarbonate of soda, and the ammoniated spirit of colchicum, will be most efficacious. On the first indication of inflammatory action in the ear, or within the head, the jugular vein on the affected side should be opened, or other modes of depletion instituted, and active cathartics administered.

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EAR — Inflammation of the. Syn. — *Otitis*; *Empresma Otitis*, Good. *Ohrenentzündung*, Germ. *Otite*, Fr.

Classif. — 3. *Class*, Diseases of the Sanguineous Function; 2. *Order*, Inflammations (*Good*). III. Class, I. Order (*Author*).

10. Defin. — *Ingravescent pain in the ear, with tenderness on pressure, or on moving the lower jaw; with inflammatory fever, and frequently impaired or confused hearing.*

11. Inflammation may affect both the external and internal ear at the same time; and it may commence in either, and be thus confined, or extend to both. It assumes various grades of severity; its duration being equally indefinite. The more *acute states* of the disease will be first considered; and next, those which are chronic, and which, from being characterised by a discharge from the external meatus, have been called *Otorrhœa*.

12. I. Acute Inflammation of the Ear — *Otitis Acutus* — has been accurately observed only in modern times; and more especially by J. P. Frank, Itard, and Lallemand. — (*a*) Sometimes the *external* conduit or meatus is the chief seat of inflammation — *External acute otitis*. — (*b*) Frequently the cavity of the drum, with its dependencies, the membrane of the tympanum, Eustachian tube, and mastoid cells; or the *internal* ear, strictly speaking — as the vestibule, the semicircular canals, and the cochlea; either separately or conjointly, is the seat of the disease, —

Internal acute otitis. These will be described separately, but with reference to their mutual relations.

13. i. Symptoms.— *A.* Of *External Otitis.*— Inflammation of the external conduit frequently commences with slight pain, or a sense of heat, or of intense itching or irritation, gradually increasing to an acute or distressing degree. It is sometimes lancinating, or is increased at intervals; and it occasionally gives rise to various nervous symptoms. In other cases, the disease runs its course without being attended by much pain. But pain is always augmented upon pressure; by the motions of the lower jaw; and by the contact of cold air, and too warm fluids. Hearing is also impaired or confused; and noises are heard in the ear. Upon examining carefully the meatus, several of the changes about to be noticed (§ 17.) are observable. From a few hours to three or four days after the commencement of the symptoms, a fluid begins to be discharged from the meatus, that is generally at first thin, limpid, or sanguinolent; but gradually becomes thicker, and assumes puriform characters; being whitish, yellowish, or greenish; inodorous, or fœtid; and sometimes so acrid as to irritate the part with which it remains for some time in contact. With the increase of the discharge, the pain usually abates, unless inflammation extends to the inner ear. Afterwards, as inflammation declines, the fluid passes into a consistent or caseous matter, that accumulates in the meatus, and requires to be removed; and is followed by a more abundant secretion of wax than usual. Occasionally, as the discharge from the interior of the meatus decreases, a serous exudation from behind the ear supervenes.

14. *B. Internal Otitis* is sometimes attended merely by local symptoms: but whenever the inflammation is very acute, and the pain great, more or less fever is present, with headach, watchfulness, and disorder of the natural functions. The chief difference between the course of this and external otitis is contingent upon the parts of the internal or middle ear chiefly affected. Thus, the matters secreted by the inflamed surface of the cavity of the tympanum can be discharged externally only with great difficulty, owing to the extension of inflammation to the adjoining portion of the Eustachian tube, and its consequent obstruction; their retention giving rise to a most distressing sense of distension, with painful throbbing, febrile reaction, and nervous disturbance. — *a.* Internal otitis often *commences* with severe headach or hemicrania; and an intense, acute, continued, and deep-seated pain, with clanging, loud, or beating noises, in the ear. These symptoms become more severe, and are generally attended by heaviness in the head, and often with a sense of bursting or distension in the ear. The eyes are now injected and watery; the face anxious or red; the skin somewhat hot; the pulse frequent, but not full; the tongue loaded or white; and all the natural functions disordered. In some cases, particularly when the more interior parts are inflamed, it requires attention to connect the cerebral symptoms with their origin; but the pain is generally referred more especially to the internal ear; is attended by severe tinnitus; and is increased on mastication, and on moving the head, and on the least noise. In other instances, the pain is felt at the bottom of the meatus, which is seen, on examination, exempt from lesion; or in the mastoid process. Delirium, especially at night, often attends the complaint at its acmé; or convulsions, in children. The fever often assumes a nervous or typhoid character, if the inflammation do not readily terminate in resolution. The above may be called the *first stage*, in the most severe cases: but those which are less violent, or *sub-acute*, or actively treated at the outset, subside partially in from twenty-four to forty-eight hours; and afterwards more slowly; the functions of the organ still remaining more or less impaired for some time, but without passing into the next stage.

15. *b.* When the disease does not thus terminate in *resolution*, the products of inflammation accumulate in the cavity of the drum and dependencies, and force their way externally, their appearance commencing the *second stage*. These matters may be discharged — *α.* through a spontaneous perforation of the membrane of the drum; — *β.* along the Eustachian tube; and, *γ.* through a fistulous opening in the mastoid apophysis. The first of these is the most common — its frequency being to that of the second in the proportion of six to one (Itard); and the third comparatively rare. The discharge by perforation of the tympanum generally takes place suddenly; a large quantity of matter being voided, as if an abscess had burst; and the patient experiences relief, which increases with the continuance of the evacuation. Sometimes the great consistence of the secretion prevents its passage through the opening in the membrane, and causes its reaccumulation in the cavity; and occasionally the irritation and inflammation produced by it in the meatus, or the incrustation of it on this passage, obstructs this outlet, and has the effect now stated, with the consequences of prolonging or augmenting both the local and general symptoms. It is necessary, therefore, to ascertain the permeability of the meatus, as well as that of the Eustachian tube, which most frequently is obstructed in these cases. This is to be done both by inspection of the external conduit, and by causing the patient to expire forcibly whilst the mouth and nose are shut. If the Eustachian tube be permeable, bubbles of air mixed with the fluid will escape at the meatus. In the much less frequent cases of the discharge of the accumulated fluid along the Eustachian tube, a sensation is felt in the posterior fauces or throat, as if an abscess in one of the tonsils had burst; a sudden expectoration of a muco-puriform, sanious, or purulent matter taking place, and continuing, in smaller quantity, for some time afterwards, or returning after indefinite intervals.

16. *C.* From what has been stated, it is evident that the inflammation may extend from the external to the internal ear; but rarely from the latter to the former, unless matter finds its way through the tympanum. The *duration* of the disease varies from two to thirty, or even forty, days; but the symptoms lose their severity before a month is elapsed, and become *chronic*, generally in the form of *otorrhœa*, which may, however, follow a sub-acute or an originally slight or chronic affection. After acute otitis has terminated, as above (§ 14.) in resolution, or by the discharge of matter externally (§ 15.), hear-

ing often remains impaired, owing to the lesions consequent upon it; and is either recovered after some time, or permanently diminished. These lesions are thickening of the cartilaginous parts of the conduit; permanent thickening of the skin or dermis of the meatus, and narrowing of its canal; thickening, opacity, or perforation of the membrane of the drum; loss of one or more of the small bones; and obstruction of the tube of Eustachius. Caries of the mastoid apophysis, and of the petrous portion of the temporal bone, with destruction of the internal organisation of the ear, and disease of the adjoining membranes and portions of the brain, may also be caused by internal otitis; sometimes at a period very remote from the first manifestation of disease in this organ.

17. ii. The structural Changes produced by acute otitis are, injection of the delicate dermis lining the auditory conduit, with more or less tumefaction, and entire or partial obliteration of the canal. Pustular formations, at first red, after whitish and filled with pus, are seen in the surface of this tissue, varying in size and number: sometimes transparent vesicles are met with instead of these. The fluid contained in these pustules or vesicles either is absorbed, or escapes through their parietes, giving rise to ulcerations of variable depth and size. The lining of the meatus, when inflamed, presents a striking resemblance to an inflamed mucous membrane; and the fluid which it secretes undergoes the same changes as that proceeding from an inflamed mucous tissue. Thus, in the slighter grades of inflammation, a mucous fluid fills the meatus; in an advanced stage and grade, purulent matter is formed; and occasionally, in children, a membranous or albuminous exudation forms upon the surface of the canal. The osseous parts of the internal ear are seldom affected excepting in otorrhœa; but the cartilaginous portion is not infrequently softened, or even perforated, in the acute disease. In rare instances, the perforation takes place from without, owing to an abscess formed between the mastoid apophysis, the angle of the jaw, and the conduit. The inflammation may be limited to the mucous membrane of the tympanum, and give rise to the collection of a mucous, serous, sanguinolent, purulent, or curd-like fluid in the cavity. From the mucous surface of this cavity, inflammation may extend — *α.* to the surface of the Eustachian tube, causing obstruction of it, either by the diseased secretion, or by the temporary swelling of the inflamed part; — *β.* to the mastoid cells, producing tumefaction of the mastoid apophysis, and occasionally a fistulous opening through it; — *γ.* to the membrane of the tympanum, which, often in a very short time, is softened and perforated, allowing the discharge of the matters collected in the cavity, sometimes with one or more of the destroyed small bones.

II. Chronic Inflammation of the Ear — *Chronic Otitis; Otorrhœa* (from *οὖς, ὠτος, the ear*, and *ῥέω, I flow*); *Ohrenflus*, Germ.; *Otorrhée*, Fr.

18. i. History, &c. — A discharge from the ears may be seated in the external, or in the internal, ear, or in both; or may proceed from an abscess opening into the ear. It has been distinguished into — *a. Mucous*, or *Catarrhal otorrhœa*; and, *b. Purulent otorrhœa*, from the appearance of the discharge; the former often preceding the latter, which is much more serious, as being generally dependent upon caries of the bone. Otorrhœa is often a termination of acute otitis; but it is frequently a primary disease, and not preceded by any acute symptom, not even by pain; the discharge being the only phenomenon. — *a. Mucous otorrhœa* may be confined to the external ear, the lining membrane being either scarcely altered, or red, tumefied, covered with vegetations; or partially adherent, and the canal partially or altogether obstructed or obliterated. This species of otorrhœa is most common among children of a delicate, lymphatic, or scrofulous constitution; frequently resisting treatment for years, and yet subsiding spontaneously, or disappearing at puberty. Serious symptoms seldom accompany it; but sometimes hearing is somewhat impaired. The discharge varies greatly in colour, odour, and quantity; but little importance need be attached to these variations. It is often scanty at one time, and copious at another; or even disappears for a while, and returns in greater or less abundance. The obstructions already noticed (§ 15.) in respect of the discharge in acute otitis, also occasion this change. In some cases, the sudden interruption of the discharge may be followed by pathological phenomena in some other quarters. M. Itard has seen engorgements of the lymphatic glands of the neck, tumefaction of the testes, affections of the eyes, porriginous eruptions on the scalp, and dangerous diseases of the brain, follow its disappearance. I have likewise seen the same results, as well as partial paralysis of the nerves of the same side of the face, in three instances, two of which were referred to Sir C. Bell, in illustration of the discoveries of this eminent physiologist. M. Lallemand has remarked the alternation of otorrhœa with an attack of rheumatism, with catarrhus vesicæ, and with leucorrhœa. Mucous otorrhœa may also be seated in the cavity of the drum: in this case, the membrane is perforated, and the symptoms are nearly the same as now described.

19. *b. Purulent otorrhœa* may, like the preceding, but much more rarely, be the result of a porriginous inflammation of the lining membrane of the meatus; or the matter may, in the first instance, proceed, as stated above (§ 15.), from acute otitis, the tympanum having been spontaneously perforated; and, owing to the access of air whilst it lodges in the cavity of the drum, mastoid cells, and other parts, become more and more acrid; inducing ulceration in the membrane lining these parts, and ultimately inflammation and caries of the osseous structure itself. As soon as these changes take place, the discharge is more sanious than purulent — or of a greyish tint, mixed with red; exhales a peculiar odour, and stains a silver probe of a bronze colour; carious portions of bone being sometimes also detached at an advanced stage. The patient, in these cases, generally complains of a dull pain in the ear, extending over the side of the head; of impaired hearing; with dulness, and a heaviness of expression. The caries is, in most instances, as here stated, the consequence of the disease of the mucous membrane lining the several auditory canals; but it is also, although much more rarely, the primary disease. In both cases, the otorrhœa is *idiopathic*. Abscess formed in the brain may form a passage through the petrous bone, which

had become secondarily affected and destroyed; the caries being, in this case, *symptomatic*. This occurrence, however, seldom takes place.

20. The mastoid process is more frequently the seat of caries than any other part; and is, consequently, the source of purulent otorrhœa in most instances; disorganisation proceeding also most rapidly in this situation, which is painful and tender on pressure, the external parts being swollen and œdematous. After some time, the mastoid cells are perforated; the skin reddened; and an abscess forms, bursts, and becomes fistulous. On injecting a fluid through the external opening, which is generally close behind the ear, it frequently escapes by the meatus, or the Eustachian tube. Instead of an opening in this situation, the pus sometimes penetrates between the muscles attached to this process, and the abscess opens low in the side of the neck. The diagnosis is then more difficult. In some instances, the carious mastoid apophysis is not perforated, but the pus collected in its cells is evacuated through the cavity of the tympanum and the external meatus. Occasionally the carious part of the process is gradually melted away in the sanio-puriform discharge, without any disease of the soft parts covering it; the gradual destruction of it causing the disappearance of the prominence it occasions. M. LALLEMAND, therefore, directs the comparative state of both mastoid regions to be examined in cases of purulent otorrhœa. The bony parietes of the external auditory conduit is sometimes the seat of caries; but much more rarely than the preceding. The part of the petrous portion of the temporal bone, which contains the semicircular canals, is, according to ITARD and LALLEMAND, that which is most frequently diseased after the mastoid process. In other cases, caries is seated in the parts forming the aqueduct of the cochlea, or the aqueduct of FALLOPIUS; or, lastly and more rarely, the internal auditory canal. But if, in some instances, the disease is thus limited, it is not so in others; various portions of the osseous structure being either simultaneously or successively attacked. The petrous portion may be altogether destroyed, and the adjoining bones also invaded, and more or less injured. M. LALLEMAND has seen, in the same case, caries of different parts of the temporal and of the occipital bones, and even of the first vertebra also.

21. *α*. Caries of the petrous portion of the temporal bone, in some one of the states now noticed, necessarily induces disease of the membranes, and frequently also of the brain. — (*a*) It sometimes happens, that acute cerebral disease suddenly supervenes during otorrhœa, and death quickly follows; the petrous bone being found carious upon dissection, and the membranes adjoining extensively inflamed; but the brain itself sound. — (*b*) In other cases, the cerebral symptoms take place more slowly, or assume the characters of chronic meningitis or cerebritis (see BRAIN, § 160. *et seq.*); either partial separation of the dura mater, with or without adhesion of the two lamellæ of the arachnoid, or softening of the brain, or abscess seated in the cerebral structure, or both these alterations of the membranes and brain, being found after death. These lesions are observed more frequently at the anterior, than at the posterior, aspect of the petrous bone. Sometimes, instead of this portion of the temporal bone, a large collection of pus communicating with the middle ear is only found. The abscess formed around, or in the vicinity of, the petrous bone, consecutively upon disease of this part, often makes its way externally to the meatus; a similar channel of evacuation also being formed, but much more rarely, when caries of this bone follows the formation of cerebral abscess (ANDRAL).

22. *β*. The *Symptoms* which indicate the extension of disease from the ear to the brain, or its membranes, are nearly the same as characterise the idiopathic states of inflammation of these structures (BRAIN, § 146. *et seq.*), according to the acute and chronic states they may assume. Whilst the ear only is diseased, the pain in the head appears to proceed from the ear as its source; but when the parts within the head become affected, the cerebral symptoms are most prominent, and often obscure or altogether mask the disease of the ear. If, at an advanced stage of chronic otitis, the discharge be suppressed, or even much diminished, these symptoms are very liable to come on in a very severe form; and if some time elapse between the disappearance of the one, and the supervention of the other, and if the history of the case be not attentively investigated, the disease of the ear may be altogether overlooked; and what is strictly a symptomatic affection of the brain, or its membranes, treated inappropriately as an idiopathic seizure. — When inflammation extends to the parts within the head, the patient complains of a deep-seated, and often throbbing pain, towards one side, with heaviness of the eyes, stupor, and slight delirium. The pulse is small, sharp, and quick; the tongue furred; and the febrile symptoms, which are usually slight, increased in the evening. There are also tenderness of the scalp near the affected ear, so that the patient prefers to lie on the opposite side, thereby favouring the lodgment of the morbid secretion in the ear; and sometimes convulsions with paralysis. During the progress of caries of the bony structure, even before the disease has extended to the membranes and brain, more especially when the parietes of the aqueduct of FALLOPIUS are implicated, neuralgic pains in the face, inflammation of the conjunctiva of the eye, convulsive motions, and ultimately paralysis, of the muscles of that side of the face, &c. take place, owing to lesion of the trunk of the facial nerve. Since attention was directed to these associations by Sir C. BELL, numerous cases illustrative of them have been observed by LALLEMAND, and others; and several have been seen by myself.

23. *γ*. The *duration* of otorrhœa is most indefinite. It may continue for several weeks or many years; and may resist all means. Sometimes it disappears either spontaneously, or during medical treatment. In other cases it presents a somewhat intermittent form, continues long to do so, and ultimately terminates either favourably or fatally, as stated above. In two instances which terminated in this latter manner, — at upwards of forty years of age in the one, and about thirty in the other, — I ascertained that otorrhœa commenced in early childhood, and had continued, with various remissions and intermissions, to that age, when cerebral symptoms came on. In these prolonged cases, the discharge varies much in quantity. When the Eustachian tube is not obstructed, it often

passes into the throat, and discolours the sputum; or is at one time evacuated by this route, at another by the meatus. During catarrh or sore-throat, the symptoms are generally aggravated, chiefly in consequence of obstruction to the discharge of matter.

24. ii. The Prognosis of otorrhœa depends — 1st, on its cause, — thus the syphilitic is much less dangerous than the scrofulous disease; — 2d, on the nature of the discharge, — the puriform being much more unfavourable than the mucous; — 3d, on the age, — it being much less serious in childhood, than at or after puberty; — 4th, and most especially on the presumed extent of disorganisation, and caries; the occurrence of local paralysis, but particularly of the cerebral symptoms alluded to (§ 22.), being very unfavourable. All chronic discharges from the ear, however slight they may seem, should be viewed in a serious light, not merely as they generally lead to deafness, but as they are also liable to be followed by fatal cerebral disorganisation.

25. iii. Causes. — *A. The predisposing causes of otitis and otorrhœa* are, delicacy and susceptibility of frame; the scrofulous diathesis; the periods of dentition and childhood; the syphilitic poison; and disorders of the prima via and digestive organs generally. — *B.* The *exciting causes* are chiefly a current of cold air; exposure to cold air after the removal of the hair; the introduction of foreign bodies into the meatus; accumulations of wax in this part, or the use of irritating injections; herpetic eruptions on other parts of the body, or porriginous eruptions on the scalp, and the suppression of either; inflammatory affections of the throat, tonsils, and fauces; and determinations of blood to the head. Either the acute, sub-acute, or chronic states of the disease may supervene in the course, or after the subsidence, of any of the exanthemata, or even of continued fever, but more especially scarlet fever, small-pox, and erysipelas. Difficult dentition, the irruption of the wisdom-teeth, caries of the teeth, and injuries of the head, are more rarely exciting causes. M. Itard thinks that falls upon the head may occasion otitis without producing disease of the brain. It may follow even slight attacks of catarrh in children; and in some instances its cause is by no means evident.

26. III. Treatment. — The means of cure differ according to the acuteness, the seat, the stage, and the particular characteristics of the inflammation; and the results to which it has given rise.

27. i. Of the Acute. — *A. Acute external Otitis,* whilst the pain is moderate, and febrile symptoms are absent, requires chiefly the removal of all sources of irritation, the injection of tepid and simply emollient fluids, and the application of poultices. When the pain is severe, and febrile commotion is present, general or local *bleeding* — the former in patients who are more than a few years of age, either from the arm, or from the jugular vein — should be prescribed; and, if there be not much fulness of blood in the head present, an *emetic,* as recommended by Dr. Kennedy, exhibited. After its operation, a full dose of *calomel* with *James's powder* ought to be given, and followed in a few hours by an active *cathartic* draught. If the symptoms be not greatly relieved by these, a number of *leeches* should be placed behind the ear, or *cupping* performed on the nape of the neck, a *blister* being subsequently applied in this situation. In this stage and state of the disease, the introduction of any substance into the meatus beyond simple emollient injections occasionally, is more injurious than beneficial. Some writers recommend the use of *narcotics;* but unless the harmless decoction of poppy heads, they are as well abstained from. M. Itard advises two or three grains of *camphor*, rolled in cotton, to be placed in the meatus, if there be no discharge; but this appears more suitable in sub-acute and slight cases, than in those that are very acute. Dr. Lehman directs the tincture of *digitalis* to be dropped into the ear, or cotton impregnated with it to be introduced. When a discharge takes place, the simplest tepid injections only should be employed; and, during the course of treatment, a free action on the bowels kept up. The blister on the nape of the neck should also be preserved open; and leeches again applied behind the ear. When the pain has subsided, a mucous discharge only remaining, M. Andral prescribes slightly astringent *injections*, and particularly those consisting of the waters of Barrèges. I believe that the less they are employed the better; attention to the functions of the stomach and bowels, and change of air, with such means as may promote the general health, being the safest and best means.

28. *B. Acute internal Otitis,* demands the prompt and decided use of the above remedies. After general *depletion,* the repeated application of leeches behind the ear, at short intervals, is often requisite, with external *derivation,* &c. If the exhibition of an *emetic* after these fails of removing the acute symptoms, *antimonials* should be given, so as to produce nausea and keep down vascular action; the bowels being also freely acted on. For this purpose, *calomel* with small doses of *tartar emetic* or James's powder should be prescribed every three or four hours. These means will generally be followed by resolution of the inflammation, and subsidence of the symptoms, if resorted to at an early period. But if the disease pass on to suppuration, the patient will complain of a throbbing pain, with a bursting sensation in the ear, and persistence, or even aggravation of his sufferings. In this case, an additional indication must be fulfilled, viz. the speedy evacuation of the matter collected in the cavity of the drum, as its retention will materially aggravate the disease, and endanger the bony structure of the ear. Several authors have advised, in such circumstances, the application of fomentations and *poultices,* to accelerate the ulcerative perforation of the tympanum and the external evacuation of the matter. These are, however, often inefficient. In order to remove obstruction of the Eustachian tube usually existing in such cases, *gargles* with a solution of the sub-borate of soda, or of nitre and it, may be employed. Some writers recommend the smoke of tobacco to be forced into the tube whilst the mouth and nose are shut. But these means do not often succeed. Instead of waiting for the spontaneous evacuation of the pent up matter, which insinuates itself under such circumstances into the various sinuosities of the ear, M. Itard advises, and has in many instances practised with benefit, *perforation* of the membrane of the drum. Having performed this operation, it is generally requisite to inject mild tepid fluids in order to procure the full evacuation of the matter, which has often become more or less consistent.

If inflammatory symptoms either continue or return, after the perforation of the tympanum, antiphlogistic measures should be directed; but if the discharge continue, the patient should sleep on the side on which the ear is affected, diluent and *emollient injections* being occasionally employed, so as to prevent any clogging of the meatus, and accumulation of matter in the middle ear. M. Itard directs, with this view, an injection formed of a drachm of caustic potash to the pint of rose-water. Light tonics and mild laxatives, with change of air, ought also to be prescribed, so as to prevent the disease from degenerating into the ulcerative and chronic states.

29. ii. Of Chronic Otitis. — When otorrhœa becomes established after acute otitis, as above, or follows a slight or imperceptible state of inflammatory irritation, the treatment may be divided into the local, and general, — the latter more especially being directed against the state of constitutional disorder. *Local depletion* is required only early in those cases which present more of a sub-acute character, or when this, or even acute symptoms supervene from obstruction to the discharge, or any other cause. *Blisters* behind the ear, stretching to the occiput, or on the nape of the neck, and either kept discharging or repeated, are often very serviceable. M. Andral notices *setons*, or cautery of the nucha, or issues in the extremities. M. Itard directs, in addition, the head to be shaved, rubbed assiduously with stimulating substances, and kept constantly covered with a gummed silk cap. He very judiciously forbids the use of any other than simply *diluent or emollient injections*. Even gently astringent fluids ought not to be resorted to until the discharge begins to diminish; if its diminution be not attended by any aggravation of the local or constitutional symptoms. In this case, the mildest *astringents* may be commenced with, and those which are more and more active successively employed. A weak infusion of roses, or of chamomile flowers, may be first prescribed, and subsequently a weak solution of the sulphate of zinc, or of *kreosote* in distilled water. Oily injections, in cases of otorrhœa, should not be used, as the oil speedily becomes rancid when any part of it remains in the ear. Whenever the discharge is suddenly suppressed, means should be taken to restore it. Warm bread and water *poultices or fomentations*, frequently renewed, may be resorted to with this intention. M. Itard directs bread warm from the oven, and deprived of its crust, to be applied every three hours, and an injection of a solution consisting of three grains of corrosive sublimate in eight ounces of water. Care should also be taken to remove any obstruction that may present itself in the meatus. If the suppression be attended by the accession of acute symptoms, leeches must be applied; but the powers of life ought not to be much reduced by these or any other means. Mercury in this state of disease is injurious. If matter form in the vicinity of the mastoid process, an early outlet should be given to it by a free *incision* down to the carious bone, and the powers of life supported by *gentle tonics*, light nutritious diet, and change to a healthy air. When caries is obviously present, and there is no increase of sensibility, or any other symptom of acute inflammatory action, M. Andral advises injections of a strong solution of potash to be frequently thrown into the ear. When, however, there is evidence of the caries having induced disease within the head, the simply diluent injections should only be used, in order to prevent any interruption to the discharge.

30. By the constant use of simple diluent or *emollient injections* — of warm water, or milk and water merely — and careful attention to the general health, the disease may be kept stationary, from youth to old age, although it may not be cured. In scrofulous and lymphatic subjects, the *bitter tonics*; the infusion or decoction of bark; the *kreosote* internally; the preparations of *iodine* in gentle doses; the *ioduret of iron*, or the ammoniated or tartarized *iron*; and mild purgatives, once or twice a week; will be extremely serviceable, if there be no acute symptoms, or febrile action. I have also seen much benefit accrue from *sulphur* given daily in sufficient quantity to keep the bowels freely open. If the disease seems connected with a syphilitic taint, or has come on after syphilitic sore-throat, or an inefficient course of mercury, the *oxymuriate* of mercury should be given in gentle tonics, or with a course of *sarsaparilla*. Where there is fever, with a loaded tongue, or pain in the head and ear; in addition to those appropriate local means above stated, (§ 28.), a course of mild and cooling *purgatives* or aperients, external derivatives, diaphoretics, and a mild farinaceous diet, should be employed. Change of air, and such mineral waters as may suit the peculiarities of the case — the chalybeate, aërated, and sulphureous, in cases devoid of fever and other acute symptoms; the aperient and refrigerant in those thus accompanied — will be very powerful adjuvants. (See *Art.* Hearing.)

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ECLAMPSIA. See Convulsions (§ 24. 27.).

ECSTASY. See Cataleptic Ecstasy, &c.

ECTHYMA. Syn. — Ἔκθυμα (from ἐκθύω, I break forth), Willan. Τέρμινθος, *terebinthus* of the Greeks, according to Hoffmann; or Ἐρέβινθος, *Cicer.*, as it is read by others with more reason, Turner; also Ἐπινυκτὶς (from ἐπὶ and νύξ), owing to its appearing or being aggravated at night, according to Celsus, Galen, Paulus, and Aëtius. *Terminthus*, Wiseman, Turner, &c. *Phlysis Ecthyma*, Young. *Ecpyesis Ecthyma*, Good. *Psydracia*, J. P. Frank, Chiarurgi, and J. Frank. *Phlyzacion*, Paget. *Dartre Crus-*

tacée, Furoncle Atonique, Fr. *Erbsenblattern, Eiternde Flechte*, Germ. *Papulous Scall.*

CLASSIF. — 5. *Order*, Pustular Eruptions (*Willan*). 6. *Class*, Dis. of Excernent Functions; 3. *Order*, Affecting the Skin (*Good*). III. CLASS, I. ORDER (*Author, in Preface*).

1. DEFIN. — ***An eruption of large, round, and distinct pustules, seated on a hard, elevated, red base, and terminating in a thick, hard, and dark-coloured scab, leaving a livid spot or superficial cicatrix; not contagious.***

2. I. DESCRIPTION. — These pustules are always discrete, scattered sparingly, and appear successively in different parts of the body; and rarely terminate in ulceration or tuberculous induration. They may appear in any part of the body; but they are most frequently observed on the limbs, abdomen, shoulders, breast, and neck — rarely in the face or scalp. They present modified states, according to the causes, the age of the patient, and the severity of the eruption. These WILLAN has arranged into, *Ecthyma Vulgare, E. Infantilis, E. luridum*, and *E. Cachecticum*. To these may be added the *Ecthyma Syphiliticum* (FRANK, BIETT, CAZENAVE, SCHEDEL, TODD, &c.), the syphilitic affection sometimes assuming the ecthymatous form. M. RAYER has adopted a simpler and more correct division, *viz.* into the *Acute* and *Chronic*, which I shall here follow.

3. i. ACUTE ECTHYMA; *E. Vulgare*, WILLAN. — In its simpler and rarer form, ecthyma appears in some one part of the body, most frequently on the neck and shoulders, in the form of circumscribed reddish elevations, firm to the touch, and distant from each other. Pus soon is formed at the summit of these elevations; and the pustules are completely developed in three or four days; their bases being much inflamed, elevated, large, hard, and circular, — of a bright red in young persons, and of a livid red in the aged. Their suppurating summits generally break in one or two days after their formation; the purulent matter giving rise to a brownish, or greenish, and very adherent scab. After one or two weeks, the scabs are detached, and leave a livid red mark, or occasionally very superficial cicatrices, of the size of those of small-pox, but much less deep. The eruption of the pustules is attended with stinging pains in them; sometimes with tumefaction of the adjoining lymphatic glands, and is often preceded or accompanied by chronic inflammation of the digestive mucous surface, which may continue after the healing of the pustules. This variety is seldom attended by fever.

4. ii. CHRONIC ECTHYMA is much more frequent than the preceding, and always consists of several successive eruptions on the limbs, neck, breast, &c., at periods more or less distant. The pustules present the same characters, and follow individually, and independently of each other, the same course as above described; some making their appearance whilst others are suppurating, or even healing. During several months, divers eruptions are thus formed. Besides the successive eruptions, the pustules themselves may be more chronic, their bases assuming large dimensions, approaching those of boils, and being tense and prominent. In these cases, the subjacent cellular tissue is inflamed, their areolæ becoming hard and violet-coloured — *Ecthyma luridum* of WILLAN. Their summits break in eight or ten days, and discharge a little sanious or bloody matter, sometimes ulcerate slightly, and are covered by hard and black crusts or scabs, which adhere firmly, and are surrounded by livid red areolæ, which sometimes remain after the crusts have fallen off; this taking place in the course of a few weeks; leaving dark red spots, or livid cicatrices, after them. If the scabs are torn away before the period at which they usually fall off, small indolent ulcers, with callous borders, giving issue to a sanious fluid, are often produced. When the pustules remain long stationary without ulcerating, they are occasionally followed by violet-coloured tubercles, which may ultimately suppurate or ulcerate, and more deeply mark the skin. A *symptomatic* form of this eruption, which is often tedious and severe, sometimes attends the cachexia consequent on measles and other eruptive fevers; but it differs in nothing from the disease now described, excepting in the number of the pustules, and the marked constitutional disorder.

5. The successive eruptions characterising this variety are observed chiefly in feeble and ill fed children — (*Ecthyma Infantile* of WILLAN). — When the number of pustules is small, and the successive eruptions are distant from each other, there is generally little or no fever. But when the pustules are numerous, their bases very large and much inflamed, or if they ulcerate, there is usually present a co-ordinate degree of fever — *Ecthyma Febrile, E. Cachecticum.* — The febrile symptoms sometimes precede, and at other times accompany, the severer forms of the eruption, particularly in unhealthy and aged persons; and are also attended by gastric and intestinal disorder, — by anorexia, pain at the epigastrium, irregularity or constipation of the bowels, a morbid appearance of the tongue, gums, and fauces, and of the evacuations, headach, pains in the limbs, lassitude, and by great depression of spirits, — with heat, stinging, tingling, or itching in the pustules. In such cases, as well as in other chronic states, this eruption is often *complicated* with swellings of the lymphatic glands, with inflammation of the conjunctiva, or of the fauces, or of the pharynx; with œdema of the lower extremities; and with other cutaneous eruptions, especially with rupia and furunculus. It is also frequently associated with, or rather symptomatic of, chronic inflammation of the digestive or respiratory mucous surfaces, and biliary derangement. The *duration* of chronic ecthyma is always subordinate to the successive eruptions of pustules, to the habit and constitution of the patient, and the treatment employed. It is usually from two to four months; but it may be longer or shorter.

6. When syphilitic disease gives rise to eruptions with the characters of ecthyma — *E. Syphiliticum; Psydracia Venerea*, J. FRANK; *Syphilide pustuleuse Phlyzacie*, BIETT, RAYER, &c.; *Pustular Venereal Disease*, CARMICHAEL — the pustules are always surrounded by broad, dark, copper-coloured areolæ, and are very large, indolent, and inclined to ulcerate. The ulcerations, when the scabs are detached, are deep, greyish or pale, unhealthy, with abrupt and violet-coloured edges; but they seldom extend, the scabs gradually reforming over them, and being successively detached, until they heal under appro-

priate treatment, leaving permanent, round, copper-coloured cicatrices. This form of the syphilitic eruption is most common in children born with the infection, the pustules being numerous, flat, and sometimes oval, followed by ulcerations; the skin foul and dingy; and the body emaciated (Cazenave and Schedel).

7. II. Diagnosis.— The pustules of ecthyma are easily recognised, by their form, their size, their inflamed base, and mode of developement; and distinguished from those of acne, of impetigo, mentagra, or porrigo. — *a*. However, when the pustules of *mentagra* or of *acne* present, as they occasionally do, hardened red bases, they may be istaken for the *phlyzacious* pustules of ecthyma, in the induration, rather than the inflammation, were attended to; but the specific characters of these eruptions are sufficiently distinct. — *b*. The umbilicated pustules of *small-pox*, the multilocular pustules of *vaccinia*, independently of their contagious properties, cannot be mistaken for those of ecthyma. — *c*. The inflammation in *furunculus* begins in the sub-cutaneous cellular tissue, and extends outwards; in ecthyma, it commences in the skin, and proceeds inwards; the former being either single, or much less numerous, and much larger. — *d*. *Rupia* sometimes is coëtaneous with ecthyma, in its chronic form — *E. luridum* and *Cachecticum*; the latter seeming to be converted into, or appearing to be an earlier stage or less severe grade of, the former, more especially in cachectic children, as correctly alluded to by Mr. Dendy, whose experience in cutaneous diseases, as my colleague at the Infirmary for Children, has been most extensive. But the early stages of both will sufficiently distinguish them from each other, independently of the prominent and thick crusts, with the deep ulcerations, characterising rupia. — *e*. The *itch* presents only a few analogies with ecthyma, when it is complicated with, or when its vesicles are accidentally transformed into, pustules. In ecthyma, the pustules are rarely numerous; they appear successively, the course of each being independent of the rest. But in itch, the accidental pustules form on the most inflamed points; are always intermixed with the small vesicles, by which it is characterised; are more agglomerated than in ecthyma; are seated chiefly on the hands, between the fingers, especially between the thumb and forefinger; and are attended by itching; whilst the pustules of ecthyma produce a stinging pain: the itch, moreover, being vesicular and contagious.

8. III. Causes.— Ecthyma attacks all ages and constitutions; but it is most common in adults of a sanguineous temperament and bad habit of body; or in persons who have prematurely exhausted the powers of the digestive organs, and vital energies of the system generally. It occurs at all seasons; but is most frequent in spring and summer. Unwholesome and insufficient nourishment; cold and moist habitations; want of personal cleanliness, especially among those who wear foul woollen next the skin, or who are scantily clothed; and the irritation of various mineral and pulverulent substances; are its most common causes. Hence it is prevalent chiefly among the poor, and mechanics (*Psydracia Artificum*, J. Frank), whose occupations subject them to those contingencies. Great fatigue, prolonged watching, anxiety or distress of mind, inattention to the states of the stomach and bowels, and whatever lowers the digestive and assimilating powers, and energies of life, inducing general cachexia, will occasion this form of eruption. The *chronic states* of the eruption are most frequent in the indigent; in persons living on stale smoked or salted provisions; or whose constitutions are broken down by imprudence, misfortune, drunkenness, age, and irregularities; or in ill-nourished and debilitated children, living in low, damp, dark, and close cellars, &c. Ecthyma often also follows small-pox, the itch, scarlatina, measles, the bites of leeches, and the application of irritating plasters or unguents. The tartarized antimonial ointment produces pustules of this kind. It may be symptomatic of pregnancy, and of several diseases of internal organs, especially of the prima via. Indeed, it may be in most instances considered as one of those infinitely diversified expressions of morbid action on the external surface, attendant upon prolonged disorder of the digestive and assimilative organs. Hence it cannot be a matter of surprise to find it sometimes associated with other chronic diseases of the skin. From the foregoing it follows that this eruption is dependent upon the general state of the system, to which our treatment should be chiefly directed in all its forms. This state is evidently one of debility, accompanied frequently with erethism, or morbid irritability, and essentially with altered sensibility and deficient tone of the vascular ramifications in the cuticular and sub-cuticular tissues.

9. IV. Treatment. — *A*. In the *Acute form*, when the pustules are few, little more is requisite than a mild diet, tepid baths, cooling aperients, and two or three grains of hydrarg. cum creta with dried sub-carbonate of soda or potash, at bed-time. Whey is the best beverage; and, if the patient be robust and the pustules numerous, a small bleeding, or leeches to the anus (Cazenave, &c.), may be resorted to. If the stools be morbid, the soda tartarizata, or the soluble tartar, should be given with infusion of senna, and afterwards the compound infusion of roses may be taken with small doses of either of the sulphates; or these latter may be taken in tonic infusions, with the addition of a little dilute sulphuric acid.

10. *B*. The *Chronic states* generally require gentle tonics, with alteratives, and light nourishing diet.—*a*. When they occur in *infants*, the nurse should either be changed, or the treatment directed chiefly to her. Where this cannot be done, asses' or goats' milk should be substituted or given in addition; and the regimen strictly regulated. Change of air, warm salt water bathing or sponging, and gentle alteratives, will also greatly assist the cure. Hydrarg. cum creta, and the sub-carbonate of soda or potassa at night; the liquor potassæ in tonic infusions twice a day, and an occasional purgative in the morning; small doses of the chloruret of potash, or of the hydriodate of potash; warm salt-water bathing, and afterwards the ferrum tartarizatum; have been the most efficacious remedies, in these states, in my practice among *children*. The chlorate of potassa, and the other chlorates, were first employed by me, in this disease, many years ago, at the Infirmary for Children.

11. *b*. In grown up or aged persons, we should

always suspect disorder of the digestive and assimilating functions; and, if there be little or no fever, have recourse to deobstruent alteratives, as Plummer's pill, with soap, or taraxacum, at night; a stomachic purgative every second or third morning, and the decoction of sarsaparilla; or mild tonic infusions with soda or potash, in the course of the day. If we suspect congestion of the liver, or find tenderness of the stomach on pressure, small local depletions should be employed, and repeated according to circumstances, whilst the above depurating and mildly tonic remedies are continued. Mercurials should not be given in large doses. Plummer's pill, blue pill, or hydrarg. cum creta, with taraxacum, inspissated ox-gall, guaiacum, and sarsaparilla, are the most beneficial. The occasional exhibition of purgatives, or the association of them with tonics, is also necessary, especially if the stools be morbid, and the abdominal viscera require to be excited. In such cases, a prolonged course of tonic or stomachic purgatives is often necessary.

12. *c.* When the cachectic state is complicated with some degree of febrile action (§ 5.), the mild mercurials now particularised should be conjoined with James's or Dover's powder; and saline diaphoretics exhibited at short intervals; the morbid secretions and fæcal accumulations being evacuated from time to time, by cooling purgatives. If there be tenderness at the epigastrium, a few leeches applied there will materially assist these remedies. After these, the infusion or decoction of cinchona with liquor ammoniæ acetatis, or with the pyroligneous acid, or with nitrate of potash and sub-carbonate of soda; a course of tonic infusions, with alkalies and the extract of taraxacum; tepid or warm bathing; the mineral acids with anodynes; and the other means particularised in the last paragraph; may severally be exhibited. Having removed fever, and evacuated morbid matters, more active tonics, as the quinine in the compound infusion of roses, with tinctura opii; the decoctum cinchonæ with the mineral acids, or with camphor and ammonia; chalybeate preparations, sarsaparilla and guaiacum, the balsams and terebinthinates with magnesia, common tar made into pills with this absorbent, the bark of the *madar* root, &c., may be prescribed.

13. *d.* The *syphilitic form* of ecthyma should be treated in the manner described in the article Acne (§ 30.). Mr. Carmichael does not consider this eruption as being truly syphilitic, and therefore confides chiefly in sarsaparilla with antimonials and guaiacum. In a case of this form of syphilitic eruption, lately attended by my friend Mr. C. Hutchison and myself, oxymuriate of mercury, given in sarsaparilla, was required for its cure, milder means not having succeeded. Dr. A. T. Thomson advises this preparation in minute doses to be given in the decoction of elm-bark, or in the emulsion of bitter almonds. In the cases of infants, some French physicians recommend the milk of a goat on which mercurial ointment has been rubbed. When the child is at the breast, the nurse should enter upon a gentle course of the oxymuriate in the decoction of sarsaparilla, or in almond emulsion.

14. *e. External means* are sometimes required to remove the irritation attending the eruption, and to heal such as ulcerate. With these intentions, *tepid alkaline baths*; fomentations with a decoction of poppy-heads; a weak solution of the chlorurets of lime or of soda, especially when there is ulceration; or solutions of chlorine, or of sulphate of zinc with hydrocyanic acid, or of the nitro-muriatic acids, or of nitrate of silver, &c.; may severally be employed. Dr. A. T. Thomson recommends the following:—

No. 209. ℞ Plumbi Acetatis ʒss.; Acidi Hydrocyanici ʒiij.; Unguenti Cetacei ℥iij. M. Fiat Unguentum partibus cutis nudis applicandum.

15. *f.* The *diet* in the *acute form* ought to be bland and farinaceous, whey and emollient fluids, or water with a little vinegar, being the chief beverages. — In the *chronic states*, lig[illegible] and nourishing food, if there be no fever, [illegible] after fever is removed, is always requisite. In the more cachectic cases, a small quantity of wine should also be allowed. The patient will always derive benefit from the internal use of tar-water, which may be taken as the common drink in these cases. This medicine, which was formerly so inordinately praised, and, owing to this circumstance, now so undeservedly neglected, is most serviceable in this and many other chronic affections of the skin. In addition to these, frequent tepid and warm baths, and subsequently salt-water bathing, exercise in the open air, change of air, mental recreation, warm and suitable clothing; regularity in eating, drinking, and sleeping; early rising, and a regular state of the bowels, are important adjuvants.

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ECZEMA. Syn. — *Eczemata* (from ἐκζεω, I effervesce). *Ecsesmata*, Blancard. *Hidroa*, Sauvages, Vogel. *Ecphlysis Eczema*, Good. *Cytisma Eczema*, Young. *Hydrargyria*, Alley. *Mercurial Lepra*, *Mercurial Disease*, Moriarty and Mathias. *Hitzblätterchen*, Germ. *Dartre Squameuse humide*, *Dartre Vive*, *Hydrargyrie*, Fr. *Heat Eruption*.

Classif. — 6. *Order*, Vesicular Eruptions (*Willan*). 1. *Group*, Eczemata (*Alibert*). 6. *Class*, 3. *Order* (*Good*). III. Class, I. Order (*Author*).

1. Defin. — *An eruption of minute vesicles, uncontagious, crowded together, and terminating in the absorption of the fluid they contain, or in superficial excoriations, with more or less serous exudation, concreting into thin flakes or crusts.*

2. I. Description. — This eruption may be confined to a single part of the body, or it may attack several parts, or even the whole surface. It most frequently appears in the axilla, the insides of the thighs, the groins, hams, &c. When it is more general, it often extends over the backs

of the hands, the face, scalp, neck, and fore-arms. It often occurs on the scrotum and verge of the anus, on and around the nipples, and in the vulva. Eczema presents various *modifications*, distinguished by Dr. Willan into the *E. solare*, *E. impetiginodes*, and *E. rubrum*. MM. Biett and Rayer have, I think more correctly, divided it into the Acute and Chronic — a division which I shall partially adopt.

3. i. Acute Eczema. — The eruption of the vesicles of this form is preceded and accompanied by a sensation of heat and tingling of the affected parts, aggravated to smarting on being exposed to heat — *A*. In its most *simple form* — *Eczema simplex* — the skin still preserves its natural colour; and the vesicles are very small, very crowded, and hardly inflamed at their bases. The serum which they contain is at first limpid, afterwards opaque, milky, or turbid; and is ultimately absorbed, or dried on the summit of the vesicles after their rupture. In this latter case, which is not frequent, small epidermic flakes, and minute crusts of the size of a pin's head, are observed. These are soon detached; and often, in the space of one or two weeks, no traces of the eruption remain. Such is the usual course of the slightest state of eczema, as when it follows the action of the sun's rays, or of topical irritants, &c. It occurs most commonly in young persons, particularly females; is attended by no fever; but is sometimes complicated with lichen, and with psora.

4. *B*. When the inflammation is more acute, the skin becomes red and shining, as in erythema or erysipelas, at the same time that it is covered by minute vesicles — *Eczema rubrum*, Willan. — It commonly appears about the parts provided with hair, as the organs of generation, the margin of the anus, bends of the arms, wrists, and neck; and is more frequent and much more severe than the foregoing. The vesicles are small, crowded, or confluent, transparent, slightly shining, surrounded by red areolæ, especially in young, plethoric, and strong persons. They remain limpid until they burst, — about the fifth or sixth day, — frequently giving issue to a milky or reddish serum; and are replaced by small, yellowish lamellæ or flakes. In the *slighter grades* of this variety, the fluid is often absorbed, and the cuticle forming the vesicle exfoliates; but in the *severer grades*, the contents of the vesicles, when they burst, irritate the already inflamed surface, occasioning superficial excoriations, with a more or less abundant exudation of serum, which ultimately lessens, becomes thicker, and at last concretes, forming, with the detached cuticle, thin lamellæ or crusts.

5. *C*. The vesicles of eczema may be associated with small psydracious pustules — *E. impetiginodes* of Willan. — The inflammation is then carried to its highest degree, is preceded by a sensation of tension in the affected part, of burning heat, or attended by smarting, and intense itching, and considerable tumefaction. The vesicles are confluent or agglomerated, — at first transparent, assuming, in three or four days, an opaline hue, and passing into a sero-puriform state, being moreover interspersed with psydracious pustules. They all discharge a fluid having a faint unpleasant odour, and irritating the parts with which it comes in contact.

6. *D*. — *a*. In the *simple acute Eczema* there is usually at first not much disorder beyond that of the affected part. But in the *E. rubrum* and *E. impetiginodes*, there is generally febrile action, the intensity of which is proportionate to the local irritation. Not infrequently the eruption is preceded by gastro-intestinal irritation or disorder, the symptoms of which are often very manifest both before and at the time of the eruption. The lymphatic glands in the vicinity of the eruption are often swelled and painful. This form of the disease is almost always consequent upon appreciable external causes (§ 15.). — *b*. Its *duration* is commonly from two to three weeks. But the simplest variety may be a week less, and the severest form a week longer; the affected parts not losing their red colour for a considerable time longer.

7. ii. Chronic Eczema — may present the three grades of *acute eczema* particularised above, — the *E. simplex*, *E. rubrum*, and *E. impetiginodes*, whatever may be the causes which produce them. — *a*. When the inflammation is aggravated after the breaking of the vesicles, it may be extended to the deeper layers of the skin, and even to the sub-cutaneous tissue. The skin becomes very painful, is excoriated, its cuticle fissured; and, when it is very much irritated, resembles a blistered surface in a state of suppuration — *the Dartre Squameuse humide* of Alibert — and constantly exudes an ichorous fluid, which resembles drops of dew, and is often so abundant as to penetrate all the linen wrapped around the part. It is chiefly when the eruption has reached this height, that it is attended with the most insupportable itchings. The skin is then so acutely inflamed as to be as red as carmine in some parts. Repose at night is impossible, unless at intervals, when the smarting, stinging, or itching subsides; but this symptom suddenly returns without any obvious cause; when scratching of the part, sometimes until blood is poured forth with the exuded serum, cannot be longer forborne.

8. *b*. After a time, varying from a few weeks to many months, the inflammation subsides. The exuded serum becomes less abundant, thickens, and forms into thin, soft, yellowish brown, and semitransparent crusts, but little adherent, often very large, leaving beneath them, when detached, an inflamed and a slightly moistened surface. These crusts form more slowly, become drier, &c.; and then, without any obvious cause, the inflammation and the serous exudation resume their former intensity; or, when the healing process has proceeded further, the surface again becomes red, vesicles reform, break, and the affection follows the same course. Lastly, in some cases, no further exudation takes place: the crusts become drier, less yellow, and more adherent; often thickened, fissured, or chopped, and easily detached, leaving the surface but little inflamed. Sometimes, however, in the more extensively diffused state of the disease, the skin remains, even for several months, of a bright red; is covered in parts by dry and thin scales or flakes; and is in some places cracked, but without any perceptible exhalation. In this case, the eczema resembles certain scaly affections, especially *psoriasis*, — the more, as these scales arise, not as heretofore, from an exhalation and concretion of lymph, but are, as in the scaly eruptions, the lamellæ formed of diseased epidermis. In some cases, especially on the limbs, there remain but two or three small

places, the skin of which seems thin, stretched, shining, and smooth; its surface being covered by whitish and extremely thin scales, as if formed of epidermis, but without the least appearance of vesicles; the diagnosis being difficult, if the previous history, or the appearance of vesicles about the circumference of the excoriated part, did not render the nature of the eruption evident.

9. *c. Chronic Eczema*, although generally at first very limited, may extend over a wide surface, so as even to cover a whole limb, or the greater part of the body. — α. When it attacks the *face*, the redness and swelling, with œdema of the eyelids, are considerable; and sometimes associated with inflammation of the conjunctiva. — β. It occasionally is seen in the *ears*, especially when it affects the scalp, and is then often mistaken for a variety of porrigo, and it is sometimes associated with otorrhœa. — γ. When it attacks the *scalp*, it exudes a viscous fluid having a faint and nauseous odour. As it subsequently diminishes, it concretes into lamellated or furfuraceous crusts, which are easily detached. At last the secretion entirely subsides, the skin passing into a scaly state, and becoming the seat of an abundant and constant desquamation, the removal of the scales leaving the skin red, shining, and irritated. Eczema of the scalp may continue many months. It is generally attended by swelling of the posterior cervical lymphatic glands; and it occasions change or loss of the hair. — δ. When it is seated in the upper parts of the *thighs*, it often spreads to the anus, the scrotum, and to the vulva, occasioning, as indeed in its other severe forms, the most insupportable stinging and itching. If it extend to the penis, the prepuce is often fissured; painful itching, irritation, and erections, being caused by it. — ε. Eczema may be *complicated* with *lichen*, with *scabies*, with *impetigo*, and with *ecthyma*.

10. iii. SPECIFIC ECZEMA — *Mercurial Eczema*, *Mercurial Disease*, SCHREIBER, MORIARTY; *Hydrargyria*, ALLEY; *Exanthema Mercuriale*, J. FRANK — is, in its slighter grades, and as respects the characters of the eruption, in every respect the same as the acute and chronic *Eczema rubrum*. But the constitutional symptoms are much more severe, and the disturbance of the nervous system much greater, in the former than the latter; whilst the eruption is much more generally and more frequently diffused over the surface. Both in these lesser grades, and in the severer states about to be described, it is ushered in by much constitutional disturbance — especially furred tongue, accelerated circulation, and increased sensibility and irritability.

11. The more severe states of this affection were first described by BENJAMIN BELL, SPENS, MORIARTY, PEARSON, M'MULLIN, CHISHOLM, and ALLEY. Besides being preceded by a well-marked febrile paroxysm, these grades are often accompanied by difficult respiration, tightness across the chest, and dry cough, the skin being very hot, and the seat of a smarting and stinging sensation. When the disease is consequent on mercurial inunction — for it may also follow the internal use of mercurials — a diffused redness, with numerous crowded vesicles, supervenes in one or two days, generally on the thighs, scrotum, fore-arms, &c. In some cases, the eruption proceeds no further than the parts where frictions have been applied, and, after one or two weeks, subsides. But in the severer grades, the skin is extensively studded with vesicles, which soon break, discharging an irritating and offensive fluid, which concretes into large incrustations of a dark colour. At the same time the fauces, and frequently the conjunctiva, are greatly inflamed; and the face itself covered with incrustations, fissured in different directions. The eruption extends over a large space, and spreads in succession over most of the body; the excoriated surface being the seat of constant irritation, which is increased by the pressure of the body, and by the substances which imbibe the exuded fluid. The incrustations crack, and expose the raw surface in several places, upon change of posture. If the disease increase in severity, or be still more intense from the commencement, the attendant fever assumes a more adynamic form; diarrhœa is readily induced; the pain in the chest, and difficulty of breathing, increase, and are attended by anxiety at the præcordia; a dirty, bloody expectoration, indicating an analogous affection of the respiratory mucous surface, is observed; and ultimately, if relief be not obtained, the tongue and fauces become dry and dark, and the pulse frequent, small, feeble, and irregular. Sometimes sphacelation of the skin, with delirium or convulsions, takes place, and death ensues. — Such are the intense states of this disease, according to the physicians now referred to; but it more frequently assumes the milder grade described by Dr. BATEMAN; and which is characterised chiefly by a less severe and less extensive eruption and excoriation; by less remarkable constitutional disturbance, and by the entire absence, or the slight nature, of the pectoral symptoms.

12. The *duration* of this particular variety is very uncertain. When a limited part is affected, it may terminate in ten or twelve days; but when it is more universal and more severe, recovery seldom takes place in less than as many weeks, or even longer. The whole epidermis is destroyed by the more intense grades of the inflammation; and when the discharge ceases, it lies loose, and, with the concreted matter, assumes a pale brown colour, changing to black, before it falls off in large flakes. The red cuticle afterwards formed is liable, as in some other diseases, to desquamate again and again, even for a third or fourth time, but in smaller branny scales, of a light colour, a roughness long remaining like slight psoriasis. After the intenser forms, the nails and hair fall off; the former, when renewed, being thickened, furrowed, and incurvated.

13. II. DIAGNOSIS. — *a. Eczema simplex* may be mistaken for *scabies*, especially when affecting the wrist, and the sides of the fingers, or attended by much itching. But the vesicles of the former are flattened and agglomerated; those of the latter acuminated and isolated. The irritation or pruritus of eczema is rather a smarting or stinging; whilst that of scabies is rather agreeable than painful. Moreover, the latter is essentially contagious, the former is non-contagious. — *b. Eczema rubrum* may be mistaken for *miliaria;* but the vesicles of the latter are never confluent, as in the former; and are symptomatic of much constitutional disturbance, of which the eruption is a less important symptom than in eczema. — *c. E. impetiginodes* differs from *impetigo* in always occupying a large space, the latter being much more

confined. The pustules of impetigo have a larger base, and contain a thicker fluid, than this variety of eczema, which is always vesicular at its commencement, its secretion never consisting of true pus. Impetigo also gives rise to thicker, rougher, and more unequal crusts than it; and is never surrounded by the vesicles of eczema rubrum, as the E. impetiginodes always is. — *d.* Eczema, in its chronic state, may be confounded with *lichen agrius;* but the crusts formed by the latter are not so large, nor so thin, as the scales of the former; and when they fall off, they leave not a red, smooth, and shining surface; but a certain roughness, owing to the small prominent papulæ, which are generally evident to the eye, and always to the touch. Also, when lichen becomes dry and scaly, the skin is thicker, and more rugose, than in eczema; and there are commonly some papulæ scattered about, which, by their peculiar characters, further distinguish lichen. — *e.* The vesicles of the early stages, and their presence around the patches of excoriation in the latter periods, as well as the less dry and less friable scales of chronic eczema, will generally distinguish it from *psoriasis;* in which also the skin is more elevated or thickened, and more fissured in parts not influenced by the motions of the joints, than in any of the states of chronic eczema.

14. III. Prognosis. — In its acute form, this affection is generally of no great importance: but in many of its chronic states, it often becomes most distressing; and sometimes even embitters existence; opposing, for many months, every known means of cure; and often returning after having been apparently altogether removed. When occasioned by mercury, especially if this mineral have been employed in large quantity, it may assume, as shown above, a most dangerous form; it therefore requires a guarded, and in some instances an unfavourable, prognosis, particularly when pectoral and nervous symptoms are present.

15. IV. Causes. — *a.* Eczema is most common in adults; is somewhat more frequent in females than in males; and oftener occurs in spring and summer, than in winter. Susceptibility of frame seems to dispose to it; and there appears to be a predisposition in some constitutions, generally connected with vascular plethora, favouring its passage into a severe and chronic form. — *b.* It is most frequently *excited* by solar or artificial heat; by the contact of either mineral, vegetable, or animal irritants, — especially the oxides of the metals; by mineral or other powders; by lime, alkalies, dust, and want of cleanliness; by sugar, &c. I have seen it produced on the insides of the thighs and parts adjoining, by the contact of the leucorrhœal discharge, and by the catamenial fluid. Draughts of cold water when the body is overheated, acid, acid fruits, pickles, and shell-fish, will also occasion it, especially in some constitutions. Blisters and plasters, and rancid oils or grease applied to the surface, are also among its usual causes. It sometimes, however, appears without any obvious reason; at other times, it seems attributable to indigestible and unwholesome food, to spirituous liquors, and similar errors in diet; it being, in such cases, most obstinate. It is not contagious: but M. Biett supposes that it may be communicated in some cases, as when the exudation continues in contact with a healthy surface. He states, that he has seen it transmitted from, and to, the organs of generation, by sexual intercourse. The *specific form* is always caused by the use of mercurials — internal or external — but most frequently the latter; and by exposure to cold during their influence. Whether or not the eruption, in such cases, may be in some measure produced by a change in the fatty substance used in oxydizing the metal, is very difficult to determine.

16. V. Treatment. — The remedies recommended by Willan and Bateman, viz. heating tonics and acids, I have found more generally injurious than beneficial. The treatment directed by Biett in his clinical lectures at the "*Hôpital Saint Louis,*" and by his pupils, Rayer, Cazenave, and Schedel, in their works, is decidedly more rational and successful. — *A.* The *slighter grades* of the acute disease are readily removed by simple *refrigerants* and *emollient* diluents, with cooling aperients, and tepid bathing. But when the eruption is more extended, is accompanied by smarting, or assumes the form of the *Eczema rubrum* or *E. impetiginodes, tepid alkaline* or *sulphuretted baths* — made by adding from four to eight ounces of the sub-carbonate of soda or of potash to the water of a whole bath, for an adult; or four ounces of the sulphuret of potash; — an antiphlogistic regimen; general *blood-letting* in young plethoric or robust persons; *local bleedings* in the vicinity of the excoriations; and small doses of the *nitrate of potash,* with *soda,* in mucilaginous diluents; will be required in addition to the above more gentle means. Emollient and *soothing applications* should also be resorted to. I agree with Mr. Plumbe, in avoiding all greasy applications; and with M. Biett, in forbidding the use of sulphur, or repeated doses of mercury, in this state of the disease; an antiphlogistic and soothing treatment being in every respect the most appropriate. I have prescribed with much benefit the *sub-borate of soda,* with or without the nitrate of potash, in emollients, in the acute form; and after the bowels have been evacuated, the *nitrate of soda* in similar vehicles. In all cases, the exciting causes should be ascertained and removed.

17. *B.* In the *chronic states* of this eruption, the antiphlogistic treatment recommended above should be employed, where it has been either neglected, or insufficiently tried. *Purgatives* also ought to be frequently resorted to, where the tongue is loaded and the evacuations unnatural, and repeated daily until they assume a healthy hue. For this purpose a mercurial preparation may be exhibited at night, and a purgative draught in the morning. If there be signs of asthenia and a cachectic state of the frame, the purgative should be of a tonic and stomachic kind; the bark of the *madar root,* or *tonic infusions,* with the nitrate of potash, or with the mineral acids, being taken through the day, but not until mercurial medicines have been relinquished. Dr. Elliotson advises, in addition to bleeding and a low diet, the exhibition of mercury until the mouth is affected; but the latter part of this practice does not agree with my experience; the former I have always directed. It is chiefly when the excoriations are extensive, and the exudation copious, and after depletions have been employed, that *acids* seem to be indicated; morbid secretions having been

evacuated from the *prima via*. The infusion of roses, with sulphuric acid and small doses of the sulphate of potash, or of quinine, or the infusion of cinchona with nitrate of potash, nitric acid, and the spiritus ætheris nitrici, is most conformable to the treatment advised by other writers; but I have seen more benefit accrue from the decoction or *infusion of bark*, with nitrate of potash and sub-carbonate of soda; from the compound decoction of *sarsaparilla* (the mezereon having been omitted in its preparation) with liquor potassæ; and from the decoction of *dulcamara*, or of *elm bark*, with very minute quantities of the oxymuriate of mercury, than from mineral acids. I have found Fowler's arsenical solution of service in some very chronic cases, but the affection often returned. It is requisite, in inveterate cases, that the diet should be strictly regulated, and confined chiefly to farinaceous food, and broth, with emollient diluents, in order to derive lasting advantage from any plan of treatment.

18. *a. External means* are especially requisite in most chronic states of the complaint. In addition to those directed above, poultices or cold cream with a solution of the acetate of lead, or lint moistened in a dilute solution of this substance, may be applied to the excoriated parts. When smarting and stinging are great, Dr. A. T. Thomson recommends them to be washed with a mixture of a drachm of hydrocyanic acid in eight ounces of the emulsion of bitter almonds. M. Guillemineau advises the application of a solution of the nitrate of silver. When the excoriations are extensive, and the exudation copious, the *linimentum calcis*, either alone, or with a little of the linimentum camphoræ, will be very serviceable. The external use of *camphor*, in all such cases, is productive of advantage. Much benefit will often accrue from vapour baths, from tepid and warm alkaline, or sulphuretted baths; and, in the more chronic cases, from sulphureous fumigating baths: but this result will seldom be obtained — more particularly in plethoric and robust persons — until after morbid secretions have been fully evacuated, and bloodletting has been carried as far as circumstances will permit. Indeed, any of the numerous applications or combinations of *moist heat*, in the treatment of acute or sub-acute eruptive diseases, is more or less injurious, unless preceded by these measures. —When the eruption passes into a scaly and indolent state, some writers have prescribed *blisters*, or an ointment with the red precipitate, with the view of exciting a new action in the part; but these and simlar means are inferior to the baths mentioned above. Ointments with the *proto-ioduret* (℈j. to ʒj.) or the *deuto-ioduret* (gr. x. to ℥j.) *of mercury*, promise, however, greater benefit. When the disease has been of long duration, the arrest of it should not be risked, unless with the precautions of occasional vascular depletions, alvine evacuations, and the insertion of either an issue or seton, otherwise internal disorder may supervene, or the eruption return, — illustrations of both these results having come before me in practice.

19. *b. Mercurial eczema* requires, according to the grade it assumes, a nearly similar treatment to the above. Biett judiciously prescribes *blood-letting* at the outset; Pearson, *diaphoretics*; and Bateman, frequent *warm baths*, with diaphoretics and opiates; and subsequently tonics and mineral acids. Dr. Moriarty, however, found opium to be a somewhat doubtful remedy. Mercury ought to be immediately relinquished, and a return to it either avoided, or ventured on with caution. When the symptoms are severe, and the attendant fever of an adynamic kind, *camphor*, *ammonia*, the *liquor ammoniæ acetatis*, or *pyroligneous acid*, or the *chlorates*, are the most appropriate remedies. Either of these should be associated with such other substances as may be appropriate to the circumstances of the case; and, when the discharge from the excoriated surface is either abundant or offensive, employed *externally* as well as internally; the strength of the patient being supported by appropriate means.

20. *c.* When *convalescence* from either of the states of the complaint is advanced, change of air, regular exercise, avoiding the ingestion of cold fluids when the surface is warm; a spare, light, and regular diet, with the occasional use of deobstruent or sulphuretted mineral waters; will generally tend to confirm the recovery.

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EDUCATION, PHYSICAL. — This subject is fully treated of in the article Age, where measures for the healthy developement of the organs and tissues, and for strengthening the constitution, are succinctly stated in connection with the epochs of early life in which they should be adopted (see Age, § 5—28.). In the article Disease, the numerous causes which impede, counteract, or entirely subvert, physical developement and strength are described, and their mode of operation explained (see Disease, § 11—62.); and in the article on Infants, various observations not comprised under the foregoing heads are adduced.

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ELEPHANTIASIS OF THE ARABIANS.

Syn. — Elephantia, *Elephantiasis Arabum*, Auct. Var. *Hernia Carnosa*, Prosper Alpinus. *Glandular Disease of Barbadoes*, Hendy. *Barbadoes Leg. Cochin Leg. Egyptian Sarcocele*, Larrey. *Bucnemia Tropica*, Good. *Elephantiasis tuberosa*, and *Scrotalis*, Alibert. *Oelschenkel*, *Drusenkrankheit*, Germ. *Lèpre tuberculeuse éléphantine*, Fr. *Dal Fil*, Arab. *Elephant Leg, Elephant Disease*.

Classif. — 7. *Order*, Tubercular Affections (*Bateman*). 6. *Group*, Leprous Affections (*Alibert*). 3. *Class*, 2. *Order* (*Good*). IV. Class, IV. Order (*Author*).

1. Defin. — *Hardness, lividity, and great tumefaction of one or both limbs, or of the scrotum, &c., with an irregular glabrous, or scaly state of the skin; endemic chiefly in warm countries.*

2. Although this disease was first described by Rhazes, it has been very generally confounded, in modern times, with the elephantiasis of the Greeks, from which it is quite distinct. Its resemblance, even, to the latter affection, does not sufficiently justify M. Alibert in arranging it under the same genus. It is *seated* most frequently in the lower extremities, but is also met with in the upper extremities, in the scrotum, the vulva, the breasts, and more rarely in other parts of the body. The *countries* in which it is most common are, Barbadoes, and all the West India Islands; various parts of South America; Egypt, and several parts of inter-tropical Africa; Ceylon, the neighbourhood of Cochin on the coast of Malabar, and other parts of Hindostan; Japan, and some districts of China; the Polynesian isles; and the provinces of Asturias and Castile, in Spain. Cases, however, occasionally occur in all the countries of Europe. According to Dr. Graves and Dr. Evanson, a variety of it is common in Ireland. I have seen one case in the Infirmary at Edinburgh; five in London, one of them very recently under the care of Mr. Morley; and several, many years ago, in Africa, and on the Continent of Europe.

3. I. Causes. — *a.* The *predisposing causes* are not sufficiently known. It appears not to have been a very old disease in the West Indies, where it seldom occurs in Europeans. It is most frequent in Creoles and in imported Africans, and in places near the sea-coast. In the East Indies, it attacks only the natives. It seems in some instances hereditary, and in others derived from the habits or circumstances of the individual. — *b.* The *exciting causes* are also obscure. Hillary and Hendy attribute it to sudden vicissitudes of temperature. It has been considered that the use of fermented beverages, especially those prepared in warm climates from the sap of several species of palm, occasions it, as acid wines give rise to gout, with swelling of the extremities, in this country. The remarkable case of it in both lower extremities, under the care of Mr. Morley, is that of a man in good circumstances, who has lived well, and resided constantly in London.

4. II. Symptoms and Progress. — The disease often commences without any premonitory signs; the patient experiencing rigors or chills, with nausea, headache, and intense fever, followed or attended by acute and burning pain, extending in the course of the lymphatics. Subsequently a tense, knotted, and hard chord, very painful to the touch, may be traced to enlarged glands in the groin or armpits. The surface of the part is soon affected by an erysipelatous inflammation, attended by a burning and smarting sensation, and by great tumefaction; the cellular tissue being implicated as well as the skin, which presents no appearance of vesication. These local symptoms are accompanied by fever, ardent thirst, burning heat of surface, &c., alternating with copious perspirations. All these symptoms are diminished in the course of two or three days, and, excepting the tumefaction, disappear in a short time; but they return again after irregular intervals, each successive attack leaving the limb more tumefied and hard, until the disease reaches that pitch to which the term elephantiasis has generally been applied. After each of these seizures, the redness of the surface, and particularly that in the course of the absorbents, disappears; but the part at last becomes irregular, altered in colour, sometimes fissured or cracked, hard and elastic, pressure leaving no impression after it. The progress of alteration varies extremely — from a few months to many years. Sometimes the disease remains stationary for several years, and without any return of the attacks now described. The cutaneous surface is occasionally pale, more frequently yellowish, of a dirty hue or livid. It is often also scaly, resembling icthyosis, rugose, or fissured; is in some instances covered with soft vegetations; or with hard, horny excrescences; and is more rarely ulcerated. In other cases, the surface is traversed by enlarged veins; and very frequently enlarged or varicose veins are seen ramifying from the seat of enlargement, — a circumstance which evidently induced the Arabian physicians to notice this affection in connection with, and indeed as depending upon, a varicose state of these vessels. At a far advanced period, the hard and engorged glands sometimes suppurate, or even sphacelate; and more rarely, indolent abscesses, or deep-seated suppuration, with offensive discharges, supervene in the midst of the enlarged mass. When the disease is seated in the *scrotum*, this part often becomes very remarkably enlarged. In Egypt and the East, tumours of this description are not infrequent, and sometimes weigh from 30 to 80 lbs. Several of these have been removed in Egypt by Clot-bey. One of enormous size was lately operated upon in London, but unsuccessfully. M. Dupuytren met with an instance of this alteration in the labia majora vulvæ.

5. III. Pathology. — i. On *dissection*, the integuments of the part are found thickened and hardened: — 1st. The epidermis is very thick, adherent, and fissured; — 2d. The mucous layer is very distinct; — 3d. The papillary body is greatly developed, and readily distinguished from the cutis vera or dermis, the papillæ being elongated, enlarged, and prominent (Andral, Chevalier); — 4th. The cutis vera is much thickened, it sometimes being half an inch in thickness; — 5th. The sub-cutaneous cellular tissue is either thickened, the cellular areolæ containing a semiliquid, gela-

tinous matter; or it is hardened, presenting an intermediate state between a lardaceous and a scirrhous structure, and is more and more dense as it approaches the skin. The muscles underneath are pale, thin, or softened. The lymphatic glands and vessels present evidence of disease, but not uniformly; and one or more of the principal veins are generally obstructed or obliterated, as observed in the cases inspected by MM. **BOUILLAUD** and **GAIDE**.

6. ii. *Nature, &c.* — The structural alterations to which elephantiasis is strictly applicable, are evidently remote effects of various states of morbid action, which have either repeatedly returned, or have long continued in the diseased part. From the history of cases, and the changes observed on dissection, the skin, subjacent cellular tissue, the absorbents, and the veins, are evidently more or less implicated; but it is very difficult to ascertain which of these is primarily or chiefly affected. The principal characteristics of elephantiasis have manifestly resulted, in several instances, from disease of the absorbents, or veins, or both. They have also followed, within the scope of my own observation, a chronic affection of the skin, which has extended to the subjacent tissues, and, sooner or later, to either the veins or the absorbents, or perhaps to both. I was lately consulted by a female of middle age, who, during convalescence from a dangerous attack of continued fever, more than ten years previously, experienced hard and painful swelling of one of the lower extremities, depending on disease of the absorbents or veins, or both, according to the account she gave. When I saw her, the limb, below the knee, was very hard, and enormously swollen; and had all the characters of elephant leg; the skin being irregular, scabrous, livid, and fissured. I directed bandages, and the internal use of iodine; but after two or three visits, I saw no more of her, and consequently know nothing of the result. Some time previously, a similar case, as respects its origin and history, although not so severe, came before me. It had been of several years' duration; and had increased gradually after the acute attack in which it originated. The limb was hard, dark red, and livid in parts, somewhat irregular, slightly scaly, and the veins above the tumefied part enlarged. The affection of the skin was here consecutive. Considerable advantage was procured from bandaging, and the internal use of iodine; but the enlargement is not entirely removed. The patient is still under my occasional observation. More than one of the cases I saw in Africa, seemed, on the other hand, to originate in a very manifest alteration of the cutaneous surface.

7. M. **ALARD** considers elephantiasis essentially to depend upon inflammation of the cutaneous and sub-cutaneous absorbing vessels and lymphatics. Dr. **MUSGRAVE** also views it, as it occurs in the West Indies, as a consequence of inflammation of the lymphatics, the inflammation being accompanied with pungent heat, and with redness of the skin, and characterised by great tendency to metastasis. He states, that it usually betrays itself in the scrotum, the mammæ, or in some part of the extremities, most frequently about the ancle, or high up the thigh; and, although at first circumscribed, it often diffuses itself over the limb. When the glands are not involved, painful and indurated chords can be traced to the nearest cluster; but, whatever may be its original seat, the patient is never secure, while the constitutional disturbance subsists, from a sudden retrocession to some vital organ. He has seen it translated from the scrotum to the head; from thence, after a few hours, descend rapidly to the abdomen; again migrate to the chest; and return, perhaps, to the encephalon, and prove fatal there; or resume its more harmless situation, and there run its course. While occupying an internal viscus, it gives rise to the usual symptoms of acute inflammation. Dr. **HILLARY** and Dr. **MUSGRAVE** view the local affection as a consequence of fever, which commonly precedes it for two days. Dr. **HENDY**, however, contends that the fever is symptomatic of the inflammation of the lymphatic vessels and glands. During the acute stage of the disease, either, perhaps, may precede the other; but it is most conformable with just views in pathology, to consider the local change as a consequence of the constitutional disorder; the advanced or chronic state being the result of repeated attacks of inflammation of the lymphatics or veins, and of the integuments, generally existing together, but often originating in, and continuing more or less confined to, either.

8. *Inferences.* — According to the descriptions furnished by **TOWNE**, **HILLARY**, **HENDY**, **MUSGRAVE**, **BOUILLAUD**, and **GAIDE**, and to my own observations, this disease should be viewed — (*a*) as consisting of certain *acute*, as well as far advanced or *chronic*, states, generally connected with a bad habit of body, and each requiring an appropriate method of cure; and, (*b*) as arising — α. most frequently from inflammation of the lymphatic system and skin, particularly in warm climates; β. from inflammation and obstruction of the veins, in some instances, with irritation of the skin in various grades at an advanced period; and, γ. from the extension of inflammation from the skin to the veins or lymphatics, in other cases. The tumefaction and hardness are necessary consequences of thickening of the *cutis vera* and sub-cutaneous tissue, with deposition of inspissated lymph in the areolæ of the latter, whether arising from chronic inflammation of these structures, or from inflammation and obstruction of the lymphatics or veins, or from both these species of alteration.

9. IV. *a*. The **DIAGNOSIS** of elephantiasis is very easy in the chronic and far advanced state. In the earlier stages, when commencing in either of the parts noticed above, it should be viewed as inflammation of that part, which, in countries where the disease is endemic, may be followed, if not properly treated, by the organic changes constituting its fully formed condition. When this takes place, the great tumefaction and hardness, and especially the circumstance of pressure not being followed by pitting, with the alterations already described (§ 4.), will sufficiently mark the nature of the disease. — *b*. The **PROGNOSIS** is unfavourable, as respects the removal of the disease, when it is fully formed, although relief may be obtained, and persons may live very many years with it. But it tends generally to shorten life, and always to render it much less comfortable. When it is not far advanced, it may be nearly or altogether removed by treatment. The result, however, will very much depend upo-

habit of body, and vigour of constitution, of the patient.

10. V. Treatment. — i. Rhazes and others of the Arabian physicians recommended, in the *Acute stage* of elephantiasis, general bleeding, emetics, aperients, confinement to the horizontal posture, and spare diet, with cooling epithems to the part, and subsequently bandages. A similar treatment is very generally adopted in the East; and I believe that it cannot be much improved upon. Dr. Musgrave advises, in addition to the local application of warmth, and to febrifuge and purgative medicines, the exhibition of mercury until the mouth is affected, in order to prevent the metastasis of the disease, which, in the West Indies, is so common and dangerous; as well as the deposition of lymph, to which the hardness and swelling are chiefly owing. The employment of a number of *leeches*, or *incisions*, as recommended by Mr. Copland Hutchison in erysipelas, followed by poultices, or other emollient applications, may also be resorted to with advantage at this period.

11. ii. In *the Chronic stage*, the above treatment will seldom be productive of benefit. M. Rayer, however, states, that general *bleeding* will be of service when the constitutional powers are not much impaired; and M. Lisfranc advises *scarifications*, local bleedings, and *compression*. Bandages, and *frictions* with various resolvent substances, are more to be depended upon in the most chronic cases, and where the vital energies are too far depressed to admit of depletions. But even in these, active *purging* is indispensable. M. Alard records a case of twelve years' duration, that was cured by the repeated exhibition of cathartics. When the skin is in a state of irritation — is fissured, erythematous, or exudes a fluid concreting into scales or crusts — frictions, or even bandages, are not endured by the patient, and are not appropriate. In these, *scarifications* and *blisters* may be employed with the view of giving issue to the fluid infiltrated into the sub-cutaneous tissues. *Cauteries* and *moxas* have also been directed with this intention. Several writers advise douches of *vapour* — simple or medicated; and fumigating baths — either local or general. From my experience of *iodine*, I am inclined to think favourably of it in this disease. In one of the two cases, in which I employed it, manifest benefit was derived. It should be prescribed chiefly internally, as its external application is apt to increase the local irritation: and the bowels ought to be freely and frequently acted upon by deobstruent and stomachic purgatives. The limb should be kept as much as possible in the horizontal position. *Amputation* of the affected part has been advised, and practised in a few instances with success.

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EMPHYSEMA.

Syn. — Ἐμφύσημα (from ἐμφυσάω, comp. ἐν, in, into, and φυσαω, I blow), Ἐμπνευμάτωσις, Gr. *Pneumatosis*, Lat. *Windgeschwulst*, Germ. *Emphysème Boursouflure*, Fr. *Enfisema*, Ital. *Inflation*, *Wind Dropsy*.

Classif. — 3. *Class*, 2. *Order* (*Cullen*). 6. *Class*, 2. *Order* (*Good*). IV. Class, II. Order (*Author*).

1. Defin. — *Soft, elastic tumefaction, occasioned by the presence of air, or of any other gaseous fluid, introduced or developed in cellular parts.*

2. Although the sub-cutaneous cellular tissue is the most frequent *seat* of emphysema, yet other parts of the cellular structure may be also affected, either separately and independently, or in connection with it. Those parts of this tissue, which are the most lax and the least loaded with fat, are most frequently and extensively inflated; and parts pressed upon by unyielding structures, or by the action of muscles, although they may give passage to the air, admit not of its accumulation. — J. P. Frank thinks that lean persons are most liable to emphysema: this may or may not be the case; but there can be no doubt of these persons being more generally and extensively affected than those who are fat. When air is infiltrated into the cellular tissue, it may be diffused or conveyed, by the motion of contractile parts, to places remote from that at which it was introduced.

3. Emphysema may be *divided*, according to its *seat*, into — (*a*) *External*, or of the sub-cutaneous cellular tissue; and, (*b*) *Internal*, or of internal viscera. The former may be more or less general, as regards that situation; the latter is commonly limited in respect of these viscera, but is often the source in which the former originates; the admission of air into the cellular tissue of the respiratory passages, by a solution of continuity in the lining membrane, or by rupture of the air cells, being the cause of the great majority of cases of external emphysema. It may also be considered, in connection with the modes in which it is produced — with reference, *a.* to its spontaneous evolution; and, *b.* to its origin in a solution of continuity in some part of a surface communicating with the external air — to its *intrinsic*, and *extrinsic* forms. The division into *symptomatic* or *traumatic*, and *idiopathic* or *spontaneous*, is faulty; inasmuch as the spontaneous secretion of air from the blood into the cellular tissue, is merely a rare phenomenon contingent on far advanced states of disease; and as the introduction of air from without into this texture is not a symptom, but an accidental occurrence — is not a necessary or even a frequent consequence of a wound or injury, but dependent only upon certain circumstances or changes connected with such injury. — I shall therefore consider, *firstly*, the *Intrinsic*, or spontaneously contingent form

of emphysema; and, *secondly*, the *Extrinsic*, or the accidental traumatic conditions.

4. I. The INTRINSIC, or *Spontaneous Contingent Emphysema*, is evidently dependent upon a more advanced state of the same general condition of the frame which gives rise to collections of air in other parts, and which, in its slightest grades, often occasions similar accumulations in the bowels and uterus; the air in such cases being secreted from the blood, and consisting, most probably, of certain combinations of hydrogen and azote, or of carbonic acid. Dead bodies become emphysematous from the gases disengaged during the process of decomposition; and a part which is gangrenous, is often also emphysematous from this change. But in these, the colour and cohesion of the parts are remarkably altered, and other proofs of decomposition are also present. In all diseases affecting the circulating fluid, as typhoid or adynamic fevers, especially those usually called malignant, and where the blood is contaminated by the absorption or introduction of morbid secretions or fluids, the exhalation of air into the cellular tissue and hollow viscera often takes place immediately after death; and, in some instances, it is observed in parts before life is extinct. MORGAGNI remarked it in an advanced stage of fever following the repulsion of a chronic eruption (*Epist.* xxxvii. sect. 22.); FABRICIUS HILDANUS notices its supervention after small-pox; and WILMER, from the absorption of putrid matters. I saw lately an instance of its appearance under the integuments in the vicinity of carious dorsal vertebræ, in a young lady. It was limited in extent, but elastic and crepitating. It is most frequently met with in warm and unhealthy countries, and in certain epidemics. I have seen it in the malignant fevers of warm climates; it has occasionally been noticed in epidemic yellow fever. Dr. W. HUNTER (*Med. Observ. and Inquiries*, vol. ii.) and J. P. FRANK (*De Cur. Hom. Morbis*, l. vi. p. 38.) observed it very generally in an epidemic affecting horned cattle: the latter physician refers to its frequency in the last stage of an epidemic fever that raged in some parts of Germany in 1772, and of a similar fever that prevailed in Italy in 1789; the emphysema appearing about the neck and face, and sometimes extending to other parts of the body. HUXHAM (*Med. Observ. and Inquiries*, vol. iii. p. 33.) remarks its connection with putrid fever and sore throat, as well as with scurvy; and records a case where it supervened, the patient recovering nevertheless. I saw a case of it in scarlet fever that terminated fatally, and another that recovered; and I agree with HUXHAM in considering its appearance about the neck and upper part of the breast as not rare in this and similar diseases. The only question as to these cases was, whether or not the air was evolved or secreted from the blood, or was introduced from without at some part of the respiratory passages in the manner about to be explained. FRANK and some other writers likewise notice its supervention upon erysipelas, when the latter is prevalent in crowded hospitals. MM. RULLIER and DELAROCHE have seen it occasioned by poisoning.

5. The *intrinsic* or spontaneous appearance of emphysema in such cases may be imputed to the partial decomposition or alteration of the circulating fluids consequent upon failure of vital power. This is evidently the case in some instances, especially when the swollen parts are discoloured, and when it comes on near the period of dissolution. But cases sometimes occur where no evidence of decomposition can be traced, depression only of vital power being present. J. HUNTER, FRANK, BAILLIE, HOME, DAVY, and others, have adduced evidence of the evolution of air from the blood-vessels independently of such change. The experiments of Dr. EDWARDS prove that azote, and the other constituent gases of the atmosphere, are more or less absorbed into the circulation, and afterwards discharged from it, chiefly by the mucous surface of the respiratory organs and digestive canal; and that these actions are regulated by the state of the vital energies of the system. It therefore cannot appear surprising that air should be extricated into the areolæ of parts of the cellular tissue, as well as from mucous surfaces, in certain states of morbid vascular action connected with depressed vital power. Besides, we know that air is secreted into the sound or air-bladder of numerous species of fish. As to the chemical constitution of the air which is spontaneously evolved in cellular parts, we have very imperfect information. It is very probably nearly the same as that found in the digestive canal, and which consists chiefly of azote, carbonic acid, hydrogen, and certain of its combinations. In a case recorded by M. BALLY (*Lond. Med. and Phys. Journ.* for June 1831.), in which general emphysema occurred immediately after death, with signs of dissolution of the blood, the air was evidently of the last description; it having taken fire from the flame of a taper, and burnt with a blue and white flame; and the edges of the aperture through which it escaped having been consumed. Gaseous fluids may be evolved also in the cavities of the peritoneum and pleura: but generally in consequence of the decomposition of fluids, &c. previously affused in these situations; although they may likewise be secreted by these surfaces; or common air may accumulate in the pleural cavities, owing to a communication with the vesicular structure of the lungs. (See PERITONEUM, and PLEURA.)

6. II. EXTRINSIC, or *Accidental Traumatic Emphysema*, sometimes appears in the course of various diseases, and from external injuries — of those maladies in which the respiratory functions become especially affected, more particularly the expiratory actions; and from laceration, rather than from puncture or incision, of parts concerned in these functions. It always proceeds, unless in a remarkably rare form of this species, from the passage of common air into the cellular tissue, through a breach of continuity in some part of the respiratory apparatus. — (*a*) It may take place from rupture of the membrane lining the *nasal fossæ*, or from wounds communicating with the lachrymal sac or duct; the air passing into the cellular tissue, upon forcibly blowing the nose. M. MENIÈRE instances two cases of this description. J. P. FRANK mentions its occurrence from playing on wind instruments, whilst the insides of the cheeks are abraded or lacerated. M. RULLIER states that the prisoners in the *Bicêtre* at Paris produced it by puncturing the inside of the cheek, and forcing the breath into the puncture.

7. (*b*) Emphysema is not infrequently occasioned by injuries of the *larynx* or *trachea*, especially when the parts are lacerated by wounds perforating them, particularly when the external outlet is partially obstructed; and by surgical operations on the neck (A. Burns). Rupture of the rings of the trachea will also produce it. Schreger adduces an instance of it from fracture of the thyroid cartilage. Ulceration in these situations, with sthenic vascular action, can hardly be followed by this contingency, as the lymph effused in the areolæ of the surrounding cellular tissue quickly coagulates, and prevents the introduction of air. But when ulceration occurs in connection with asthenic action, emphysema may supervene; as the lymph thrown out in this state of the system is not coagulable, and consequently cannot prevent the air from being forced into the cellular structure.

8. (*c*) Emphysema often proceeds from *rupture of the air-cells*, and interlobular cellular tissue, the air escaping into the latter, and passing along it to the superficial parts of the body, owing to the entire state of the pleura. When the rupture is confined to the air-cells, the air passes no further than the lobule in which the lacerated cells are situated; but when the connecting tissue is also torn, the air escapes into it, and along its areolæ, by the root of the lungs and mediastinum, until it reaches the cellular tissue of the throat, producing a crepitating and an elastic swelling above the clavicles, which is soon diffused over the face, chest, and trunk. This form of emphysema is occasioned chiefly by violent efforts, and straining, as lifting heavy weights (Hicks, Menière), and child-labour (Hamilton, Halliday, Blagden, Bland, Simmons, &c.), and by obstacles to respiration, as in hooping cough, pneumonia, bronchitis (Desbois, Ireland, &c.), hysteria, &c., and in cases where a foreign body has fallen into the trachea (Louis, &c.). I have seen it occur in the advanced stage of measles complicated with severe pulmonary affection. I lately attended a case of this description with Mr. Austin, in which the only matter of doubt was as to its having arisen spontaneously, or from the interruptions to respiration in the way now explained. But the great difficulty of breathing that was present in consequence of infiltration of air into the interlobular tissue and mediastinum, readily pointed out its origin in this case, as it will in all others of the same kind. Dr. Drumbreck has recorded a similar instance, in which he could find no appearance of rupture in the bronchial lining; but it is in the vesicular structure where it should have been looked for; and there it is manifested chiefly by the effects in question. The emphysema that is rarely observed in the course of diseases of the lungs characterised by dyspnœa, and of rabies, hysteria, &c., is evidently of the kind now described.

9. (*d*) *Lacerations* or *perforations* of the *pleuræ*, costalis and pulmonalis, and *lung*, by fracture of the ribs, and penetrating wounds, are the most frequent causes of emphysema. When the fractured end of a bone lacerates both pleuræ, and the superficial portion of lung, the inspired air sometimes passes from the vesicular structure of the latter, accumulates in the pleural cavity, and is forced, by efforts at expiration, through the breach in the costal pleura, into the cellular tissue. Frequently, in consequence of the effusion of blood or lymph, the wound in the lung is in a short time so far closed as to prevent the further escape of air into this cavity; that which was effused being absorbed, and respiration becoming less laborious. In this case, the emphysema soon subsides, owing to the absorption of the infiltrated air. But it occasionally happens that the wound in the lung continues open; and, upon each dilatation of the chest, air is drawn into the pleural cavity, and forced by each expiration into the cellular tissue of the thoracic parietes, until the inflation becomes enormous. When this occurs, respiration is remarkably laborious; inspiration is very rapid; expiration is slower, and, more forced, and is quickly succeeded by inspiration; the whole process being short, and apparently attended by an effort to expand the lungs, which are compressed by the air accumulated in the pleura. Emphysema is less frequently occasioned by penetrating wounds of the thorax and lungs, than by lacerations from fractured ribs; owing to the more constant effusion of blood or lymph from the wound in the lung after the former than after the latter, as shown by the experiments of Hewson; and to the escape of the air from the pleural cavity by the external outlet in the thoracic parietes. It sometimes, however, arises from this cause; closure of the wound in the integuments, or some other obstruction in its more external part, occasionally allowing the air accumulated in the chest to be forced into the cellular tissue during expiration. Penetrating wounds of the chest very seldom produce emphysema, unless the lungs be wounded, and then the reason of its occurrence is obvious. But they may occasion it without any injury of the lungs, owing to the air being more readily drawn into the pleural cavity during inspiration, than expelled from it during expiration.

10. (*e*) *Ulceration* of the pleura costalis and pulmonalis, and of the lung, has in rare instances produced emphysema, chiefly as a consequence of circumscribed empyema, that has opened into the bronchi. In this case, a communication is formed by ulceration between the cellular tissue of the thoracic parietes and the vesicular structure of the lung, the surrounding pleuræ being generally adherent. An abscess in the parietes of the chest likewise may point internally, and, having produced adhesion of the pleuræ, burst into the lungs, and be followed by emphysema. But this last result will not occur in either of the above cases, unless the surrounding tissue is permeable by air, owing to coagulable lymph not having been formed in it. If this tissue be impermeable, then the air will only replace the matter that is evacuated, and give rise to circumscribed emphysematous swelling or swellings, as in a case recorded by Dr. Duncan (*Trans. of Med. and Chirurg. Soc. of Edin.* vol. i. p. 455.) A still more rare form is that following empyema which has opened externally through the thoracic parietes. Ulceration may also take place in the lungs, and through the investing membrane, either from a vomica or tubercles, and the air be drawn into the cavity of the pleura; and, having accumulated there, forming pneuma-thorax, be forced through an ulcerated opening in some part of the costal pleura, into the cellular tissue of the thoracic parietes, and be thence diffused to a greater

or less extent over the body. Cases of this kind have been described by KELLY and HALLIDAY.

11. (*f*) The rarest form of *extrinsic* emphysema is that consequent upon the escape of air, through a rupture or ulcer of the internal coats of some portion of the alimentary canal, into the sub-serous cellular tissue, and the diffusion of it through this tissue. HALLER (*Opusc. Pathol.* vol. iii. obs. 31. p. 309.) met with a case of this kind in a female; and M. MARJOLIN (*Archives Génér. de Méd.* t. xi. p. 112.) records an instance of it after a contusion of the abdomen which had ruptured the small intestines. MM. CHABERT and HUZARD (*Observ. sur les Animaux Domest. &c.* 8vo. Paris, 1792.) state that this form is not rare in ruminating animals.

12. III. DIAGNOSIS.—Emphysema of the sub-cutaneous cellular tissue is readily recognised by the uniform, light, elastic, and crepitating swelling constituting it. But it is often by no means so easy to determine the manner in which it has arisen. What has been adduced above on this subject will generally enable the inexperienced practitioner to recognise the different forms of its origin.

13. IV. PROGNOSIS.—Our opinion of the termination of emphysema will necessarily depend upon the causes that have produced it, and the state of the respiratory functions. The inflation is, in itself, but of little consequence, as air may be introduced to a great extent into the sub-cutaneous tissue without giving rise to any serious results,—unless, indeed, in a cachectic and asthenic state of frame, when puncture or laceration of this tissue, or of the integuments is very liable to be followed by gangrene of the part, as in the case recorded by M. MENIÈRE. ARISTOTLE and PLINY allude to a practice of inflating the sub-cutaneous tissue of animals, with the intention of rendering them speedily fat. SCHULZE states, that this process makes them first dull; and that the emphysema generally disappears in two or three days, after which they recover their spirits, acquire a voracious appetite, and, in a few weeks, become very fat. HALLER, GALLANDAT, and SOEMMERRING, adduce similar facts in proof of the introduction of air into the cellular tissue being in itself perfectly innocuous; and ACHARD contends that the insufflation of carbonic acid gas into this tissue is the best mode of administering this fluid in the treatment of disease. FABRICIUS HILDANUS (*Cent.* iii. observ. 18. p. 369.), DIONIS, AMBROSE PARÉ, and KERAUDREN (*Bullet. des Scienc. Méd.* t. iii. p. 422.), mention instances of the insufflation of air into the sub-cutaneous cellular tissue of children, with the intention of exciting compassion, or of showing them as curiosities. SAUVAGES states, that a soldier was similarly inflated during sleep, to an enormous extent, without any further inconvenience than the impediment it occasioned to the respiratory actions. I therefore infer, with M. BRESCHET (*Dict. des Scienc. Méd.* t. xii. p. 20.), that the prognosis in emphysema is altogether dependent upon the disease or injury on which it is contingent, and not upon itself, or even upon its extent; the degree to which the respiratory functions are disordered being the chief indications of danger, as evincing the effusion of air either into the sac of the pleura, or into the interlobular cellular tissue of the lungs. Spontaneous intrinsic emphysema may be viewed as generally a fatal occurrence.

14. V. TREATMENT.— i. Of *Intrinsic Emphysema.*—This species can be remedied only by restoring the depressed vital power, and removing the morbid condition of the local and general circulation on which it depends (§ 4, 5). The means most appropriate to these ends have been described in the articles BLOOD (§ 157.), and DEBILITY (§ 38.), to which the reader is referred. Scarifications and punctures have been recommended when the inflation is considerable; but there is great danger, in this state of disease, of gangrene following puncture of the skin, especially if it be resorted to in hospitals, or in confined or ill-ventilated habitations. More benefit will follow gently stimulating and astringent liniments and epithems applied to the emphysematous surface and vicinity, and active stimulants, tonics, and antiseptics employed internally.

15. ii. *Contingent Extrinsic Emphysema* must be treated with strict reference to the nature of the injury that has occasioned it, and the state of the respiration.—When it has arisen from penetrating wounds of any part of the respiratory apparatus, enlargement of the external wound will generally be requisite, in order that the air may have a direct external outlet. If it proceed from fracture of a rib, the application of a bandage may be serviceable, if the breathing be not materially oppressed; but when respiration is difficult, and pneuma-thorax is present, a bandage is generally injurious, by preventing that degree of dilatation of the lungs which is absolutely requisite to the continuance of life. If the pneuma-thorax from this species of injury, in addition to the external emphysema, be so great as to threaten suffocation, it will be necessary to make an opening directly into the pleural cavity as much as possible in the situation of the lacerated pleura costalis. If the inflation be so extensive as to prove, of itself, an impediment to the respiratory actions, and if the vital powers be not greatly depressed, and the frame not cachectic, several punctures, at a considerable distance from each other, may be resorted to. When the emphysema is more obviously dependent upon rupture of the air-cells, and the escape of air into the interlobular tissue, &c., *anodynes* should be administered in order to lower the force of the respiratory action; and *bloodletting* practised, to lessen the quantity of blood to be acted on by the inspired air. In most instances of traumatic emphysema, the abstraction of blood is requisite, unless the patient is sufficiently reduced by hæmorrhage consequent on the accident. If inflation take place to a very great extent, punctures sufficiently deep to reach the cellular tissue may also be practised in this class of cases, but only in the circumstances and with the precautions now stated. M. DESBOIS advises, in preference to scarifications or punctures, the surface to be enveloped in cloths moistened with camphorated spirit, or a slightly astringent lotion. Unless the inflation by its extent greatly embarrass respiration, little need be attempted beyond the means now mentioned. In cases, however, characterised by great difficulty of breathing consequent upon penetrating wounds of the chest, or fractures of the ribs, or on ulceration, and which are generally preceded by pneuma-thorax, paracentesis of the chest some-

times cannot be dispensed with. But it is necessary, previously to performing this operation, to observe and determine early and accurately, by auscultation and percussion before the inflation becomes extensive, in which pleural cavity the air has accumulated; because an opening made on the sound side, by causing collapse of the lung, would have a fatal result, as in a case recorded by Dr. Halliday. The seat of the injury, and the part at which the emphysema first appeared will generally indicate the situation where it should be performed. (For *Emphysema of the Lungs*, see Lungs —*Emphysema of.*)

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EMPYEMA. See Pleuræ — *Diseases of*.

ENDEMIC INFLUENCE AND DISEASES.

Classif. — General Pathology. — *Ætiology*.

1. This subject is considered in many of its more general relations, in the articles Climate, and Disease; but there remain a few observations, which do not fall under these heads, to be made at this place. The word *endemic* has usually been applied to that *influence* exerted by the geology, soil, water, and air of a particular district or country, and by occupations and modes of living, upon the constitution and health of its inhabitants; and the more common and uniform results, or the consequent forms of morbid action, have been denominated *endemic diseases*. Although Hippocrates directed attention to endemic influences in his *Treatise on Airs, Waters, and Localities*, but little notice was taken of the subject by medical writers until about the end of the seventeenth and commencement of the eighteenth century, when several works on the maladies prevalent in particular districts, and a few on endemic diseases generally, made their appearance. Before this period, however, Caius had offered some observations connected with endemic influence in his work on the *Sweating Sickness*. A few remarks of the same kind are to be found in Andrew Borde's *Dietary of Health*; and in Ramesey's *Origination of Worms*, &c. The earliest work that treated of the general endemic diseases of England was published in London in 1672, by Claromontius, a native of Lorraine, and dedicated to James Duke of Ormond, to whom he was probably domestic physician. In an address to the London College of Physicians, he apologises to that learned body for having encroached, he being a foreigner, upon a province which peculiarly belonged to them. The apology, as remarked by Dr. Duncan, was a tacit rebuke, and the severest he could have given, to a body which, even to the present day, has hardly interested itself in the advancement of medical science. In his enquiry, he enters upon the consideration of the extent to which venæsection is required by the nature of the endemic diseases of this country; and concludes that, although well-timed bloodletting is a judicious practice, yet purging is, upon the whole, oftener required, and better adapted to their cure. After the treatise of this enlightened writer, others appeared, which comprised subjects connected with endemic influences and diseases, either incidentally or specially. But sufficient reference will be made to them at the end of this article.

2. A reference to the topics treated of in the articles Climate, and the *Causation of* Disease, will show that endemic influences are recognised rather by their effects than by positive characters, or manifest and demonstrative properties; and that they are results of several coincidences of physical phenomena and moral conditions, which often vary, and consequently give rise to modified effects. When we reflect that they are consequences of the geology, soil, elevation, temperature, prevailing winds, vegetation, and the vicinity of wood and water; and not of these merely in their various states and associations, but of these in connection with the avocations, the modes of life, and the quality of the food of the inhabitants, modified by moral agencies; we cannot be surprised at the diversity and importance of the resulting effects, and at the general uniformity they frequently present, in certain circumstances or combinations of these causes. In estimating endemic influences in relation to the resulting maladies, there are other agents, besides those now enumerated, that should be taken into consideration. The indolence or activity of the inhabitants; their privations and comforts; their states of filth or cleanliness; their habits of life, and employments; their ignorance and mental improvement; and their social, moral, religious, and political conditions; are most material elements in the general amount of endemic causation. It should not, however, be overlooked, that these diversified agencies act and react in developing, counteracting, or entirely removing each other; that the circumstances of locality will modify the moral and social conditions of its inhabitants; these latter, in their turn, giving rise to numerous collateral changes, and to important alterations even in the conditions of surrounding nature, as demonstrated by the march of civilisation and social improvement in both the old and new worlds. A casual view of the influence of elevated and mountainous situations upon the physical and moral condition of its inhabitants, in relation to those of the plains, or of low, confined, and miasmatous localities, especially within the tropics, and in some of the more southern countries of Europe, will sufficiently

prove the importance of this subject; and if we take a closer view, so that the individual effects upon the frame and on the mind become apparent, the propriety of studying it in its practical bearings must be evident.

3. It was stated in the article CLIMATE, that the constitutions of the natives of a particular country should be considered in many respects as products of the soil and climate, more especially when its physical circumstances are different from those which most generally obtain on the face of this globe, and are productive of disease in the more civilised races of our species. In such a country the human frame has become adapted to the climate to so great a degree as to render it a distinct variety from the rest of the species. We observe this in most low and swampy districts within the tropics, and eminently in Africa, many places of which could not be long habitable to others of the species constituted in any respect differently from the negro. The native frame, being thus assimilated to the climate, and modified by, and suited to, its endemic influences, is not injuriously impressed by them. But when persons whose constitutions are formed by influences of a different, or even of a modified, character, migrate to a country differently circumstanced, disease will sooner or later ensue. This susceptibility to endemic influences different from those to which the constitution has been accustomed, and by which it has been most remarkably modified, is evident in all the races of man, and is evinced more or less in all changes of climate; — by the inhabitant of elevated situations, when he visits the low grounds and plains, even under the same latitude; by the native of northern Europe, when he visits the shores of the Mediterranean — still more manifestly when he migrates to hot climates—and much more remarkably when he resides in low and marshy intertropical districts; by the negro, the Malay, and the Hindoo, when they pass from the warm, moist, and low plains, on which they have been reared, to more elevated situations, or to temperate or cold countries; and so on, as respects all classes of our species, when the change involves a change also of the physical conditions of surrounding nature. This susceptibility is most remarkable in youth and early manhood, and diminishes gradually until age advances, and then the powers of life more readily sink when the change is made to a more unhealthy locality.

4. As endemic influences are frequently the result of certain conditions of locality independent of difference of latitude, or even of temperature; and often depend upon one or two circumstances connected with wood and water, or with the nature of the soil, or with elevation merely above the level of the sea; a change of situation apparently slight, may be essentially great, owing to these or other circumstances, and be followed by the injurious impression of the resulting influences upon persons not accustomed to them. The waters of large towns, that are, to a certain extent, impregnated by decomposed animal matters, seldom materially disorder the bowels of those accustomed to them, unless their impurity be very great, although they may otherwise affect the health; but they will seriously derange the bowels of persons, even in the vicinity, who have not been in the habit of using them, as shown by the different effects of the water of the Seine, at Paris, upon the inhabitants, and upon strangers in that city. Impurity of the water is, in all climates, an important source of endemic diseases, particularly of those seated in the digestive canal and circulation, as dysentery, diarrhœa, and fever; but the soil and vegetation, in connection with the extent to which they are watered, with high ranges of temperature, and with situation particularly in respect of elevation, adjoining acclivities, woods, &c., are the chief sources of these and all others of this class of maladies. The inhabitant of the high lands in the interior of Mexico is seldom affected by fever; but if he remain any time in the low grounds on the coast, in the same latitude, as at Vera Cruz, he is as liable to be seized by the malignant remittent endemic in that place, as the person who has migrated from Europe.

5. i. *Of the chief Sources of Endemic Influence.* — Low marshy places, and grounds subject to inundations, or saturated with moisture, and abounding with the exuviæ of organic substances; thick woods and jungles, particularly in warm climates; argillaceous soils, and the deep alluvial earth in the bottom of valleys, on the banks of rivers, or near the level and shores of the sea or of large lakes, or the embouchures of rivers, especially if subjected to a high temperature; are most productive of endemic diseases, which vary in character with the range of temperature, in connection with the degree of humidity, the extent to which the soil is exposed to the direct rays of the sun, and the prevailing states of the atmosphere. It may be inferred from the writings of the ancients, particularly those of HIPPOCRATES, LIVY, TACITUS, PLUTARCH, and DIONYSIUS of Halicarnassus, that the insalubrity of these places was well known to them, and that the means of removing and counteracting it were as well understood then as at the present day. HIPPOCRATES, in his *Epidemics*, states that the city of Abydos had been several times depopulated by fever; but the adjoining marshes having been drained by his advice, it became healthy. The lake Averna, mentioned by VIRGIL, is, probably, a poetical exaggeration of the effects arising from marshes; and the deeds of Hercules, the metaphorical record of his success in removing these sources of disease.

6. Pools and ditches containing stagnant water, or nearly or altogether dry, after warm weather; and grounds used for the cultivation of rice; are also important sources of endemic influence. The former, in the vicinity of villages, frequently receive animal exuviæ, which render the exhalations from them much more noxious; and the latter are especially injurious to white cultivators. The extent of disease proceeding from this source has been shown by LANCISI, BAILLY, MONTFALCON, IRVINE, TARGIONI, GROTTANELLI, and others, to be, in many places of Italy, Sicily, and Greece, so great, as to occasion more than two thirds of the average mortality. The exposure of a rich, wet, and low soil, abounding with vegetable matters undergoing decay, after repeated irrigations and inundations, to a powerful sun, is the circumstance to which the insalubrity of rice-grounds, and many other places, chiefly is owing. In all intertropical regions, where the nature of the locality admits only of a rice culti-

vation, Europeans are more or less subject to endemic disease; and although the dark races are much less liable to it, owing to the adaptation of their organisation and functions to this particular soil and climate, yet they are occasionally affected by it in a slighter degree, and in a modified manner. Inundations, whether from the sea, or from the swelling of rivers, or from an admixture of sea with river water, render low grounds particularly insalubrious upon their being exposed to the action of the sun's rays. Sea water, owing to the quantity of animal matter it contains, soon becomes offensive when it stagnates on a soil abounding with vegetable substances; and the inundated grounds and islets in the course, or at the mouths, of rivers, are generally left covered, when the waters subside, by mud and slime, which become an additional source of miasmata. The inundations by the sea, which have occurred in many places in Holland, have been the cause of much disease, upon the exposure of the soil to the sun during the following summer and autumn.

7. When low and moist grounds, and deep or rich soils, which have been covered by large trees or by water, are cleared, or exposed to the action of a warm sun, especially in a hot country, they emit more noxious emanations than in their unreclaimed states; and they generally continue so to do, particularly during moist and warm weather, and after long continued droughts following heavy rains, until they are completely brought under cultivation, and even for ages afterwards, in warm countries, near the level of the ocean, or the sea-shore; — circumstances which combine to make so many places in the West and East Indies productive of disease. Rich soils covered by large trees, and other bulky vegetable productions, are thereby protected from the action of the sun; and the exhalations which are given off from them, during warm and moist states of the air, are confined by these productions to the situations which produce them. Dr. RUSH states, that the endemic disorders of Pennsylvania were converted, by clearing the soil, from intermittents and mild remittents, to bilious and malignant remittents, and destructive epidemics; and that it was not until the soil had been subjected to cultivation for a number of years, that a tolerable degree of healthiness was procured. The district of Bresse, in the Lyonnais, when well wooded, was comparatively healthy; but now, deprived of its woods, the low and wet soils being exposed more to the action of the sun, the exhalations from these, and from its numerous marshes and stagnant pools, are no longer confined by surrounding forest trees; and, consequently, endemic diseases of a severe character are very prevalent. Similar instances are to be found in the works of DEVÈZE, MONFALCON, and BAILLY.

8. There are various circumstances connected with the production and diffusion of exhalations given out from the soil, that require attention from the medical practitioner. Some of them are noticed at another place (see DISEASE, § 55, 56.); but it seems fully established, that dead animal matter and exuviæ in situations producing these exhalations, contribute most remarkably to their noxious effects. In warm countries, or in hot seasons in temperate climates, the places which are most productive of malaria, generally, also, abound the most in animal substances undergoing decomposition. The circumstances which render vegetation quick and luxuriant, generate immense swarms of insects and reptiles, the exuviæ and dead bodies of which mingle with vegetable matter in a state of decay, and give rise to miasms, particularly during moist states of the air, much more noxious than those resulting from vegetable matter alone. I have always considered the number of insects and reptiles, with which a place abounds, as more indicative of its insalubrity, than almost any other circumstance. Malaria may be conveyed a considerable distance from its source, and be condensed in the exhaled vapour, when attracted by hills or acclivities in the vicinity, and when there are no high trees or woods to confine it, or to intercept it in its passage. Owing to this circumstance, high grounds, near exposed marshes, are often more unhealthy than the places immediately adjoining, that are on a level with them.

9. There are no circumstances that tend more to increase the sources of endemic influence, than high ranges of temperature, and calm states of the air. The effects of these vary remarkably with the quantity of humidity exhaled, and with the conditions of the air, in respect of horizontal and vertical currents, and of electricity. However productive the sources of malaria may be, and however rapid the evaporation from them, the effects will be comparatively slight, if there be a quick renewal of the atmosphere passing over their surfaces, preventing the stagnation and concentration of the effluvia emitted by them. A high temperature, particularly with exposure of the soil to the sun's rays, penetrates to the lower alluvial strata; and, if it be attended by protracted dryness, occasions wide fissures in the upper strata, through which the moisture of the lower passes in the form of vapour, which is often more noxious than the emanations from a wet or marshy situation, especially when the soil is argillaceous or absorbent. It is also indirectly owing to temperature, and the greater capacity it gives the air for moisture, that the marshes of warm, or even of temperate, climates are infinitely more unhealthy than the bogs and peat mosses of northern countries. High temperature and humidity, together with richness of soil, generate succulent plants which contain saccharine and oleaginous principles, and carbonaceous and hydrogenous elements, with a portion of azote; and which rapidly pass, either altogether or partially, through the alternate processes of growth and decay. The vegetable productions, also, of hot countries, especially those which are most abundant, possess much less of the antiseptic principles, with which those of cold climates abound, particularly tannin, creosote, the terebinthinates and their associated resins, the gallates, &c., which are found largely in the plants contributing to the bogs and peat mosses of the latter. Besides, the marshy places, and the surfaces of alluvial soils, in warm countries, contain more animal matters undergoing decomposition, than in cold and temperate regions; and are subject, in alternate succession, to periodical rains and long droughts — are alternately inundated, and exposed to the direct action of the sun. Stillness of the atmosphere, by favouring the accumulation of malaria

in the lower strata, and in circumscribed limits, increases the injurious influence of this agent upon the human economy. Hence the danger of exposure to its sources during still and humid states of the air, at the close of the day, when it is condensed in the descending moisture; or at night, or approaching dawn, when it is unrarefied by the solar heat, and not yet carried to the higher regions by the ascending or vertical currents of the atmosphere, and when the system is most exposed to its impression. During moist states of a warm atmosphere, also, the equilibrium of its electrical conditions is disturbed; the relative electrical states of this fluid, and of the body, is also considerably modified; and the changes produced upon the blood in the lungs, by respiration, are somewhat retarded. These effects are materially influenced by the situations and circumstances now adduced, and the respiratory functions remarkably impeded by them.

10. The good effects of a quick renewal of the air, in unhealthy places — of high winds, hurricanes, and thunderstorms — in dispersing and altogether sweeping off the exhalations from the soil, and from decayed animal and vegetable matters, must be apparent. The more violent commotions of the air are the means employed by Providence to dilute, or entirely dissipate, those noxious agents, and to prevent their pestilential accumulation in the situations which have been described. It has been observed, especially in warm climates, and in hot seasons in temperate countries, that, when the air has been long undisturbed by high winds or thunderstorms, and at the same time hot and moist, endemic diseases have assumed a very severe, and even epidemic, character. Numerous facts illustrative of this have been adduced by Rush, Webster, Chisholm, Clark, Devèze, Bancroft, and others. It is generally in hot miasmatous countries, and after prolonged seasons of drought and still states of the air, that tornadoes occur in hot climates, and thunderstorms in temperate countries, purifying and refreshing all the objects exposed to them, and preventing the occurrence of these severer forms of disease which would otherwise supervene.

11. Although the localities and related conditions described above are sources of diseases, chiefly in warm climates, and in temperate regions during hot seasons, they are not entirely destitute of influence in cold countries; their ill effects being generally in proportion to the height and duration of the summer temperature, and to coincident circumstances. In northern temperate latitudes, and inland situations, the dryness of the air, especially during low ranges of the thermometer, and when the surface of the earth is sealed by an icy congelation, not only does the human frame enjoy a perfect immunity from terrestrial emanations, but it experiences an accumulation of positive electricity, and increased activity of all the functions. The changes produced by respiration are most complete; the nervous and circulating systems evince increased tone; animal heat is rapidly generated to replace that carried off by the surfaces, the body acquires the phlogistic diathesis, and diseases present the sthenic forms.

12. ii. *Effects of Endemic Influence.* — *A.* The exhalations from the situations now described, at the commencement, during, and after heavy rains and moist states of the air, generally occasion agues, dysentery, scurvy, scorbutic dysentery, enlargements of the liver and spleen, cretinism, scrofula, rickets, &c.; and if the temperature be high, the various forms of remittent and continued fevers, in addition to these. The same localities during warm and dry seasons, and after protracted drought, produce bilious and malignant fevers, of a remittent and continued type, cholera, diseases of the liver, and inflammations of the alimentary canal; the intermittent and remittent fevers prevalent during the colder seasons, passing into a more continued type, and bilious or malignant form, after great or continued heat. This change in the character of the endemic with the temperature and seasons, was well illustrated by the history furnished by M. Kirchoff (*Journ. Complément. des Scien. Méd.* Jan. 1827.), of the diseases following the partial inundations by the sea of some parts of Holland, in the winters of 1825 and 1826. He states that the waters used for domestic purposes were brackish; and the ponds and ditches, which were usually limpid during the spring, became greenish on the surface, and offensive. At this time, agues prevailed amongst workmen exposed to the exhalations from these sources. As the summer advanced, and the waters were more completely drained off, the effluvia were more concentrated, and fevers assumed a remittent type. In the months of August and September, fever presented more of the continued character, with periodical exacerbations, particularly of the pains in the head and back, and closely resembled the endemic of low and moist situations within the tropics, — the circumstances occasioning it having been in every respect similar. In the majority of cases, the liver was affected. It has been shown by writers on the fevers endemic in Hungary, that agues are most prevalent during spring; and that remittents, continued fevers, and dysentery, become more common during summer and autumn. Indeed, endemic fevers are modified, from the more simple form of ague to the most malignant remittent or continued type, by the particular circumstances in which they originate, — as the miasms become more concentrated, or consist more of the effluvia of decayed animal substances, — by the warmth of the season and climate, — by the humidity and dryness of the air, — and by the constitution and predisposition of the patient. As these vary, so does the particular character of the disease. Intermittents present every type, and various complications; and remittents, numerous grades and forms — the bilious or gastric, the inflammatory, the bilious inflammatory, and the asthenic or malignant. Continued fevers, also, assume a mild, an inflammatory, a gastric, or an adynamic form. Not infrequently, the intermittent passes into the remittent, and this latter into the continued type; and either may be followed by dysentery. Each of these states of fever may be simple or complicated; the principal local affection being different, as well as diversified in kind, in different cases, and appearing sometimes so early as to seem the primary disease, frequently in the advanced progress of the fever, and occasionally not until its latter periods. Either of these forms of fever may commence mildly and insidiously, and yet soon pass into dangerous local derangement and disorganis-

ation; others may begin with great excitement, rapidly terminating in exhaustion and depravation of the circulating and secreted fluids; some present great depression from the beginning, the powers of life never rallying throughout, or very imperfectly, with an unnatural state of all the secretions and soft solids, and a tendency to dissolution of their cohesion, which rapidly advances, especially in warm countries, as soon as respiration ceases. In certain circumstances, particularly when great vicissitudes of temperature and weather cooperate with the strictly endemic causes, or with improper living, impure water, &c., dysentery becomes as prevalent as fever, or entirely usurps its place; or the fever assumes a dysenteric character, or passes completely into dysentery; this latter malady producing even a greater rate of mortality than fever itself. (See art. Dysentery.)

13. *B*. Whilst rich soils, and warm, low, moist, and marshy situations, are productive of disease affecting chiefly the circulating and secreted fluids, and the abdominal viscera, by lowering vital power, especially as manifested in the nervous systems; elevated, cool, or temperate and dry districts favour the developement of vital energy, especially as expressed in the nervous, muscular, and circulating systems, and in the thoracic viscera; and produce diseases of a phlogistic character, as sthenic inflammations of the lungs and circulating organs, of the membranes of the brain, and of the other serous and fibrous structures, hæmorrhagies, rheumatism, and fevers of an inflammatory type.—These diseases, however, although the most prevalent, can scarcely be said to be endemic in these latter localities, they being much less frequent than the maladies of the former situations. It should, however, be recollected that the respective endemic influences of districts are not so deleteriously exerted on the native inhabitants, as upon those who have lately removed to them; and that, though they may affect the constitutions of the former class, and give rise to certain diseases in preference to others, yet those diseases are not so acute or violent in them, as in the latter. This circumstance is well illustrated by what is constantly observed in warm countries productive of terrestrial emanations. There, the native inhabitants are either scarcely affected by them, or are liable only to agues, bowel complaints, enlargements of the spleen, or slight ailments referrible to the large secreting organs, excepting on occasions of these exhalations becoming more concentrated or energetic than usual. But persons who have removed thither from healthy localities, in cold or temperate climates, sooner or later are seized by fever, generally of a remittent, or continued type, often assuming an inflammatory or malignant form, and frequently associated with violent local determinations; and it is not until after the frame has been assimilated to the climate by such attacks — usually called the seasoning fever — that agues, dysentery, and the milder forms of disease, appear in such persons. On the other hand, the inhabitants of low or miasmatous situations, who have removed to elevated and mountainous districts, are much more liable to diseases of the lungs, to rheumatism, and to inflammations of a sub-acute or chronic form, than the natives of these latter places; and if the change at the same time involves a change from a high to a low temperature, the liability to pectoral maladies is still further increased.

14. *C*. When persons have migrated to a country abounding with the sources of endemic diseases, a period of longer or shorter duration, according to the activity and concentration of the malaria, and the predisposition of the individual, usually elapses before they are attacked by these maladies. In Rome, and other malaria districts in the south of Europe, as well as in many of those in the eastern and western hemispheres, where the exhalations are not very active, several months, or even a year or two, pass before the unacclimated are seized by fever, unless the exposure and predisposition (see Disease — *Predisposing Causes of*) be great. Whilst in many situations, where the emanations are more concentrated, or consist of an admixture of those given off both by vegetable and by animal matters in a state of decomposition, particularly in warm climates and seasons, the first exposure to them is often productive of the most active forms of fever, and in a very short time after the exposure occurs. This is commonly observed in respect of young unseasoned sailors and soldiers, who, coming from a pure air, in a state of high predisposition, are often subjected to these emanations in their most active states. Persons arriving in warm miasmatous districts, from temperate and healthy places, are affected with a celerity and severity generally in proportion to the fulness of their vascular systems, to the rigidity of their fibres, and to their nearness to the epoch of early manhood; but various exceptions to this occur, arising out of the habits of individuals, the susceptibility of their nervous systems, the extent of their exposures, and the states of their minds and moral emotions.

15. *D*. Although the white races of the species will live to an advanced age in warm districts productive of endemic disease, especially if they have removed thither after the constitution has been fully developed; yet their offspring will very seldom reach maturity, or survive the epoch of childhood, if they continue to reside in such situations; or, if they arrive at manhood, they will very rarely reach an advanced age. Dr. Jackson states, that white persons, born and residing in the more unhealthy districts of Lower Georgia, seldom live to forty; and that, at Petersburgh, in Virginia, they rarely reach twenty-five. He saw, at this latter place, a person who was only twenty-one; and although he had never been confined by severe sickness, yet he was weak and decrepit: so injuriously does endemic influence operate upon the constitutions of the white variety, even when it fails of inducing acute disease. Bruce records similar instances among the white natives of the banks of the Nile, in Abyssinia; and other illustrations have been observed by myself in some parts of Africa. Children born of European parents in India require to be sent to Europe to acquire due maturity and strength; for they very seldom arrive at puberty in India. The case, however, is different when one of the parents belongs to the indigenous inhabitants; but there can be no doubt, that, were a colony of the white races conveyed to the low miasmatous localities within the tropics or in more temperate regions liable to very hot seasons, it would, in a very few generations, become extinct, if intermarriage did

not take place with the natives, or if it were not supplied from time to time from more salubrious places. Whilst a change to a more unhealthy climate is best endured by those who have arrived at full maturity, change to an equally or a more healthy climate is especially beneficial to very young persons, unless in the case of removal of individuals belonging to the dark races to a temperate country, from the hot climate in which they are indigenous.

16. *E.* Besides fevers, dysentery, and the slow blight of the constitutional powers, the localities above described induce, in the white races, diseases of the spleen, liver, and pancreas, both in unassociated forms, and as complications with fevers and dysentery. Among their less obvious effects may be enumerated scurvy, and foul ulcers of the lower extremities. The great prevalence and obstinacy of these latter in miasmatous situations have not been sufficiently attended to, although Baglivi had noticed the circumstance in Rome, and Cleghorn in Minorca. Indeed, in all low places productive of malaria, injuries and sores of the legs heal with great difficulty, whilst those of the head recover rapidly. Hippocrates and Celsus seem to have been aware of this fact. They both notice the frequent association of indolent ulcers of the legs with enlargement of the spleen,—which is remarkably common among the cultivators of rice-grounds, both in the south of Europe, and in other quarters of the globe.

17. There are some situations, which do not fall within the description given above, productive of diseases almost proper to them; or which are comparatively rare elsewhere; as *cretinism*, *bronchocele*, *plica* or *matted hair*, *Guinea worm*, *tarantulism*, *pellagra*, *&c.* These depend in great measure on the water, in conjunction with modes of living, and various other circumstances.— (*a*) *Cretinism* (see this article) is endemic in the deep ill-ventilated valleys of the Alps and Pyrenees, in Carinthia and the Vallais, in the mountainous parts of Tartary and China, in some parts of the south of France, and in Salzbourg. It seems not to have been unknown in this country, two or three centuries ago, in the situations where bronchocele and rickets — very nearly allied diseases — have continued to be common. — (*b*) *Bronchocele* is very frequent in the situations now particularised, especially in the valleys of the Alps, where it was equally prevalent in the times of Pliny and Juvenal; in Derbyshire; in Behar, and some other mountainous districts of northern India; in similar situations in Java (S. Raffles) and Sumatra; in Bambara, in the course of the Niger (M. Park); and in Mexico, and some other parts of South America (Humboldt). It is most prevalent in females after puberty; and is, in my opinion, often connected with interrupted or irregular catamenia. —(*c*) *Plica*, or *matted hair*, is not noticed by the ancients, and it is doubtful when it first appeared — probably some time between the thirteenth and fifteenth centuries. It is most common in Poland and Lithuania; but it is met with occasionally in Transylvania, Hungary, the southern parts of Russia and Tartary, and more rarely in Switzerland, Belgium, and Prussia: but it is not so frequent, even in Poland, as it was a century ago. It proceeds chiefly from want of cleanliness, especially in respect of the hair, and to wearing too warm coverings on the head (Kerckhoffs, Larry, Alibert, &c.). There appears to be frequently an hereditary predisposition to it; but the cause now assigned is evidently the most influential in producing it, assisted by the use of unwholesome water (Vicat). It is most common amongst the poorest classes. According to Dr. L. Kerckhoffs (*Med. Trans. of Coll. of Phys.* vol. vi. p. 27.), it is not infectious (see art. Hair).— (*d*) *Tarantulism* (see Chorea, § 18.) was formerly endemic in Apulia, but is now by no means so frequent (Laurent and Merat). This species of irregular convulsive or hysterical affection, in which the moral emotions seem more disordered than the physical powers, was imputed by Sir T. Browne, Boyle, Kircher, Baglivi, Mead, and Sauvages, entirely to the bite of the tarantula spider, which probably is an exciting cause, in certain states of the nervous system, although neither the only nor the chief cause. Cornelio, Serao, and Cirillo, physicians in Naples, and M. Nollet, have taken juster views of its origin; and refer it rather to the state of the nervous system in connection with the moral emotions, than to this insect. Indeed, it is extremely probable that it is often feigned, or frequently occurs, without any such accident as that to which it is so commonly imputed; for very nervous and fanciful females may persuade themselves that they are stung by this insect, in order to account for their ailments, conformably with the vulgar opinion, and may thereby induce that form of irregular chorea or hysterical affection to which the term tarantulism or tarantismus has been applied. M. Merat (*Dict. des Sciences Méd.* t. liv. p. 345.) infers that the inhabitants of Apulia, owing to situation and climate, are liable to nervous and spasmodic affections; and that, among others, this is apt to supervene, — from their ardent and choleric dispositions, and their love of dancing and music. In Calabria and the Apennines, where chorea and convulsive affections are common, tarantulism also occurs (Ferrus). — (*e*) The *Guinea worm* (*Dracunculus*), the long thin worm which is sometimes found in the inhabitants of certain localities, generally under the integuments, and so named from the circumstance of its having been first accurately observed in the natives of Guinea, is now seen in other countries. It appears from Plutarch to have been met with in the inhabitants near the Red Sea. It occurs among the negroes in most of the low marshy situations of intertropical Africa (Welsch, Bruce, Park, &c.); in the slaves, and sometimes in the whites, in the West India islands (Chisholm, Thomas, &c.); in Bombay, and along a great part of that coast, as well as in some other maritime districts of India (M'Grigor, Milne, H. Scott, Grant, &c.); and in the islands of the Persian Gulf (Kæmpfer). — It is observed chiefly during the months of November, December, January, and February, in both the East and West Indies. M. Dubois found, in parts of the Carnatic and Madura, more than one half of the inhabitants of some villages affected by it. Dr. Chisholm (*Edin. Med. and Surg. Journ.* vol. xi. p. 145.), Dr. Smyttan (*Trans. of Med. and Phys. Soc. of Calcutta*, vol. i. p. 179.), Dr. Anderson, and several others, state that it is met with chiefly in those who use wells made in argillaceous soils, impregnated with salt or percolated

by sea water. M. DUBOIS adds, that the inhabitants of villages who take water from one well are subject to this worm, whilst those at the distance of only half a mile, who resort to a different well, are not affected by it. Other writers, in addition to those named above, agree in ascribing it to brackish waters containing the ova or embryo of this worm. The circumstance of this animal having been rarely found out of the human body has induced Dr. MILNE (*Edin. Med. and Surg. Journ.* No. 106. p. 112.) to suppose that the substance taken for it has been a diseased lymphatic vessel; but the evidence of its independent existence furnished by Dr. H. SCOTT (*Med.-Chir. Rev.* vol. iv. p. 182.) and Dr. R. GRANT (*Edin. Med. and Surg. Journ.* No. 106. p. 114.) has set the matter at rest. As to the manner in which this worm becomes lodged in the sub-cutaneous cellular tissue, much doubt exists. It must either insinuate itself through the skin from without; or its ova escape the action of the alimentary juices, and pass along with the chyle into the circulation, and thence into the cellular tissue, where, having attained a certain growth, it excites the irritation preceding its expulsion. But if it pass by this latter route, how is it that it is never found in the cellular or other parts of internal organs, where it may be expected to produce dangerous, if not fatal, effects?

18. *F.* In low, moist, and cold districts, liable to frequent vicissitudes of weather and temperature, catarrhal and rheumatic affections, croup, bronchitis, scrofula, rickets, and tubercular diseases, are more or less prevalent; and in those similarly situated on the sea coast, where the inhabitants live chiefly on fish — particularly on stale or dried fish, or the grey kinds — chronic eruptions on the skin are common. In large towns and cities, where a confined and impure air cooperate with the anxieties of business, the exhaustion of mental exertion or of dissipation, the luxuries of refinement, the conflict of the passions, and the excitement of the different moral emotions, disorders of the nervous system frequently implicating the manifestations of mind, are more common than in the country, and much more so than in imperfectly civilised states of society.— My limits will admit only of a simple reference to other endemic diseases — to the prevalence of trismus and tetanus in the West Indies; of elephantiasis in these islands, and in the East, as well as in Africa; of the yaws in the negro race; of the pellagra in Lombardy and the Milanese; of the beriberi in the East Indies; of hepatic colic (see COLIC, § 20.) in Spain and the West Indies; and of ophthalmia in Egypt. Some of these may be imputed to obvious physical causes; as the ophthalmia of Egypt to the reflected heat, and the dust in the air; or pellagra and some cutaneous diseases, to dirty habits and unwholesome food: but there are others that cannot be explained without ascribing them to the cooperation of a variety of circumstances, as shown in the articles on these maladies. In illustration of the influence of occupations in producing a certain train of morbid actions in those similarly circumstanced, it may be stated, that amongst the children and young persons employed in cotton mills, more especially in Manchester, chorea, which is comparatively a rare disease, is one of the most common; scrofula, tubercles, and debility in all its states, being likewise very prevalent; and that, in the somewhat older work-people, chronic rheumatism, in all its forms, is remarkably frequent. The protracted periods of occupation in a very hot and moist air, and generally in a standing posture; the sudden exposure to a cold atmosphere on every occasion of leaving the factory; and the want of due sleep, of exercise in the open air, and often of sufficient nourishment, independently of various moral causes; sufficiently explain the endemic prevalence of these diseases in the large manufacturing town now mentioned. (See ARTS AND EMPLOYMENTS — *as Causes of Disease.*)

19. iii. *Of the Mode of Operation of Endemic Influence on the Economy.*—The endemic causes productive of the more acute and malignant diseases were suppposed by CULLEN to be direct sedatives, not merely lowering vital power, but also inducing spasm of the extreme capillaries; and that, if the vital energy of the system is not entirely overpowered by them, reaction supervenes in order to overcome this spasm, and thus fever becomes developed. Other pathologists suppose that marsh effluvium acts as a stimulant or irritant; and that the debility which it obviously occasions, is either consecutive, or a state of exhaustion. Neither of these hypotheses accounts for the whole phenomena which diseases, arising from this cause, evince throughout their course, although either explains many of their symptoms. That malaria depresses vital power, contaminates the circulating and the secreted fluids, and weakens the vital affinity or cohesion of the soft solids, is shown by its more immediate, as well as by its consecutive, effects upon the living body, and by the fact of dead animal matter running faster into putrefacfaction in situations where it abounds. Its septic operation on sores and wounds is often evinced during life. It has been repeatedly proved, that substances fabricated of silk, woollen, and even of cotton and flax, exposed to marsh exhalations, very rapidly undergo decay; silk and woollen becoming putrid, and cotton and linen assuming a dingy or yellow hue, and afterwards losing their cohesion. These effects are generally rapid and complete, in proportion to the moisture and warmth of the air, and the concentration of malaria in it; and so well are they known, M. MONFALCON states, that they are generally recognised by the more intelligent inhabitants of Italy and the south of France, as indications of the insalubrity of particular places and seasons.

20. iv. *Of preventing the Production of Endemic Causes, and of counteracting their Effects.*—*A. Of preventing the generation of malaria.*—(*a*) *Draining* marsh grounds is one of the most efficient modes of preventing the formation of malaria; but it should be recollected, that uncovered drains and ditches are fruitful sources of endemic influence.—(*b*) *Embankments* thrown up against inundations from rivers and the sea, are also important means of prevention; but, if they be not quite adequate to the purpose, they may aggravate the evil, by preventing the water from retiring with sufficient rapidity.—(*c*) In situations admitting of neither of these means being employed, then advantage will often be derived from *covering them entirely with water*; for lakes do not exhale miasmata until after the mud and soil of their bottoms and sides have appeared above the surface. SENAC states, that the outskirts of a

large town became unhealthy as soon as the mud at the bottom of some adjoining morasses was exposed to the sun and air; but that disease disappeared when they were completely inundated. Dr. ROLLO mentions, that mild intermittents prevailed in St. Lucie during the rains, when the pools and marshes were filled; and that dangerous fevers appeared after their slimy surfaces became exposed and completely dry. Mr. ANNESLEY records similar facts in relation to various places in the East Indies. The ditch round the ramparts of Geneva was once drained, and sickness prevailed in the vicinity, but disappeared when it was again filled. And the water-courses and beds of rivers that are dried up in summer, particularly in warm countries, and thereby become sources of malignant fevers, are quite innocuous when filled (FERGUSON, &c.).—(*d*) *Clearing the soil* from its more bulky vegetation will be beneficial only when an assiduous cultivation is adopted, without the necessity of having recourse to a very abundant irrigation. In many circumstances, however, this measure will greatly aggravate the insalubrity of a district, as shown above, especially in respect of low swampy places within the tropics, or near the sea. Facts illustrative of this, have been often observed in both the old and new worlds.—(*e*) Protecting the soil in which large cities are built, particularly when situate near the embouchures of rivers, &c., from the action of the sun, by a closely laid pavement; intersecting the strata of earth by large deep sewers, conveying the exuviæ and other impurities beyond the reach of the inhabitants, and in such a way as to prevent the escape of emanations from them, in the midst of a dense population; and removing places of sepulture beyond the outskirts of cities and towns; are measures of the utmost importance to the health of the community.

21. It is established beyond a doubt, that the narrow winding streets of towns built in low situations, or in the vicinity of marshes, are, especially when the houses are high, actually conducive to health; inasmuch as the exhalations transported from thence, have a less ready access to all parts of them, the horizontal currents of air being more completely intercepted by the nearest buildings: also, when the streets are narrow, and the houses high, the sun cannot act upon the soil, which necessarily becomes saturated with animal exuviæ, unless deeply intersected and purified by drains and sewers. The importance of this consideration was not overlooked by the ancients, as appears from the remark of TACITUS, on the rebuilding of Rome after its destruction by Nero. "Erant tamen, qui crederent, veterem illam formam salubritati magis conduxisse, quoniam angustiæ itinerum, et altitudo tectorum non perindè solis vapore perrumperentur. At nunc patulam latitudinem, et nullâ umbrâ defensam, graviore æstu ardescere." (*Ann.* l. xv. 43.)

22. *B*. Whilst the above measures have reference chiefly to the prevention of the formation of terrestrial exhalations, there are others that may be employed to *confine them to the sources whence they issue*, when the former means are ineffectual, or cannot be put in practice. It is very probable that many places, the insalubrity of which was recognised and guarded against by the ancients, have actually become more unhealthy in modern times, owing to the accession of alluvial soil washed down from the higher grounds in the vicinity; to the accumulation of decayed organised matter and mineral detritus at the mouths of rivers, and in the bottoms of lakes, which have been thereby converted into marshes; to the neglect of the drainage and cultivation which a former crowded population was enabled to preserve; and to the removal of those screens of trees which confined the exhalations to the place that generated them. The importance of these considerations has been insisted on by LANCISI and BROCCHI, in respect of Italy; by MONFALCON, with reference to France; by ANNESLEY and myself, in regard to warm climates; and by M'CULLOCH, as respects this country. It was remarked by PLINY, and some others, among the ancients, that trees absorb the exhalations which prove injurious to man; and the observation is perhaps just: but whether trees simply obstruct the transit of malaria from its source, and confine it there, or actually absorb it along with the moisture in the air, and dew which rests on their leaves; or whether they act in both ways, in addition to their shading the soil from the action of the sun; the power they possess, in low and marshy situations, of moderating the generation of malaria, and confining it to its source, is indisputable. It is, therefore, important to plant trees around, and more especially to leeward of, unhealthy places (§ 5.), in order to screen persons living in their immediate vicinity from their influence. Owing to the extent to which trees, high houses and walls, and intervening water not liable to become stagnant, protect places near the sources of malaria from its effects, is to be explained the fact of the inhabitants of one side of a street, or road, often escaping ague, whilst many of those living on the other side are affected; and of the crew of one ship being seized with fever, while those of another, somewhat further removed from the shore, escape.

23. *C*. There are other means, besides those enumerated, *which both destroy and counteract, or otherwise remove, the causes of endemic maladies.*—(*a*) In the case of impure water, filtering it, especially through charcoal; boiling it before it is used, or passing it through lime; preserving it in iron tanks on board ships; and adding to it a small quantity of either of the chlorurets, when it cannot be otherwise deprived of a portion of animal matter; are very important precautions. When sewers, drains, ditches, and other confined sources of impure air cannot be removed, or covered so as to prevent the emission of effluvia, the chloruret of lime should be thrown into them from time to time. A solution of the same substance, or either of the other chlorurets, ought also to be liberally employed in the wards of crowded hospitals, whenever the air becomes close and foul, in order to prevent the prevalence of fever, dysentery, erysipelas, and gangrene; and should also be poured down the privies. Similar precautions ought also to be employed in crowded transports and ships of war, as well as in camps and besieged towns, more especially if disease appears. But this means is only subsidiary to free ventilation; and is most to be confided in when the latter cannot be established. By having recourse to these disinfectants, the sickness that sometimes arises from the leakage of sugar, or the decomposition of vegetable matter collected

in the hold or between the timbers of ships, and from the action of bilge water on chips or shavings, as recorded by Sir W. Burnett and other able observers, and the ill effects contingent on the steeping of flax and hemp, may be entirely prevented.

24. (*b*) Whatever progress is made in civilisation, in the cultivation of the soil, and in the useful arts of life, tends to diminish the prevalence of endemic diseases. Improved modes of culture introduce a greater abundance of wholesome nourishment, and, together with a more extensive commerce, render subsistence much less precarious than in the ruder states of society. It is chiefly owing to these circumstances that scurvy, dysentery, and diseases of the skin, are much less common now than formerly. These, also, aided by personal and domestic cleanliness, much better clothing, and a freer ventilation of houses, hospitals, prisons, &c., have tended greatly to diminish the general amount of mortality. As respects prisons, the diminution of disease, chiefly resulting from stricter attention to cleanliness, ventilation, and diet, shown to have taken place in those of France, by M. Villerine, is most striking. At Lyons, from 1800 to 1806, the annual mortality in the prisons was 1 in 19; from 1806 to 1812, it was 1 in 31; from 1812 to 1819, it was 1 in 34; and from 1820 to 1826, 1 in 43. A similar amelioration has also been remarked in the prisons of Rouen, and some other large towns in that kingdom. Although other diseases may appear, there can be no doubt that those that are more strictly endemic diminish before the progress of civilisation and the increase of the comforts of life.

25. (*c*) The healthiness of the inhabitants depends much upon the choice of residence. This obtains, especially in warm climates, in respect of both casual and permanent residents. Where the winds blow from particular quarters, at certain seasons and hours of the day, buildings or encampments should be placed so as to be, during the night especially, to windward of the principal sources of endemic disease. Ships, also, should be anchored, as much as possible, with a regard to this precaution, or at a distance from an unhealthy coast sufficiently great to admit of the dilution of the malaria, or of its absorption by the water, before the winds conveying it reach them. When a temporary residence must be to leeward of a swamp, then some advantage may accrue from lighting fires between it and this source of disease, particularly during night, and from double tents, within which gauze or fine net curtains are kept spread. Buildings either near, or to leeward of any source of malaria, or standing on a deep, moist, or argillaceous soil, should be very high; the ground floor should be left unoccupied, and be open on every side to permit complete perflation; and that side ought to be always shut, on which the prevailing night or land winds blow, or towards the place from which unhealthy exhalations proceed. The inhabitants should also sleep near the tops of the houses, where, if built high, they will generally be placed above the more concentrated vapour and miasms, and, in great measure, beyond their influence; for, although gentle acclivities or hills in the vicinity will often attract malaria, or be swept by currents of air conveying it, yet precipitous elevations and high houses, even near its sources, will frequently escape, as, from its specific gravity, it is confined chiefly near the surface of the earth.

26. (*d*) The diet of persons exposed to noxious exhalations should be easy of digestion, and nourishing, but not heating. Animal food should be taken sparingly, and spirituous liquors and strong wines laid aside. The lighter and thinner wines may be used in moderation. In hot climates or seasons, exercise in the heat of the day, or while exposed to the sun's rays, ought to be avoided; but it should be regularly taken without causing fatigue. Such medicines as will promote the secretions and excretions, particularly those of the liver and bowels, may be resorted to when these functions require aid. For this purpose, two or three grains of blue pill, with the aloes and myrrh pill, may be taken at night, and equal parts of the compound infusions of gentian and senna in the morning. When exposure to malaria, either at night, or early in the morning, is to be dreaded, a moderate dose of bark or sulphate of quinine, with camphor or some warm spice, as Cayenne pepper, may be taken previously to such exposure. A fire should be lighted in the apartment, or near it; and care be taken to exclude the raw night air, especially in the direction of the sources of miasmata. On occasions of this kind, smoking cigars will be serviceable. The tenour of the mind should also be duly regulated. The depressing passions and ideas, and all undue excitement, as being liable to be followed by depression, ought to be avoided. A calm, confident, and well-employed mind—moderately occupied, and interested with its pursuit,—unruffled by gusts of temper or passion — not weakened by inordinate indulgence of the desires — with a sufficient gratification of the wants and wishes to give a foretaste of more perfect enjoyment, and to leave still more to aspire after, so that the capacity of gratification be not exhausted, — is that state which most successfully opposes the impresspression of endemic influence, which, assisted by the sensual indulgences of some, the ill-regulated passions and dispositions of others, and the carelessness of many, prove so destructive to human life.

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ENTERITIS. See Intestines — *Inflammation of*.

ENURESIS. See Urine — *Incontinence of*.

EPHELIS. Syn. — 'Εφήλις (from ἐπὶ, and ἥλιος, the sun). *Maculæ Fuscæ*, Plenck. *Epichrosis Ephelis et Lenticula*, Good. *Ephelides*, Alibert. *Ephélide*, Fr. *Spotted Discolouration of the Skin.*

Classif. — 10. *Gen.* 3. *Order*, 6. *Class*, (*Good*). 1. *Gen.* 8. *Order*, Maculæ (*Bateman*). I. Class, V. Order, (*Author*).

1. Defin. — *Discolourations of the skin, varying from a yellowish grey to a dark brown, and from minute points to large patches, and either scattered, confluent, or corymbose.*

2. I. Forms and History. — Hippocrates applied the term ephelis to the freckles produced by the sun; but he also extended it to the spots sometimes seen in the faces of pregnant females. This extension of the term was adopted by Oribasius, Aëtius, Actuarius, and Gorræus; and carried even much further by Plater, Sauvages, and Alibert. Other words have been employed by modern writers, as a designation either for ephelis generically, or for certain of its varieties, as will be stated hereafter; but, as this appears to have been the original one, I shall adopt it here. The change of colour characterising it, is not seated in the cuticle, but in the pigmentum which gives the hue to the skin. It seems, in some instances, connected with a deficient tone of the extreme vessels; and is very variable in its progress, occasionally coming on slowly, sometimes rapidly and extensively. It is often of long duration, or even permanent; and in other cases it soon disappears, either spontaneously, or after the application of some lotion. In itself, it cannot be considered to require medical interference; but certain of its forms are important, as symptoms of internal disorder. It may be divided into two species — the *lenticular* and *diffused*.

i. Lenticular Ephelis. Syn. — *Ephelis Lenticularis*; *Lentigo*, *Lenticula*, Auct. Lat.; *Ephelis Lentigo*, Sauvages and Todd; *Lentigo Ephelis*, Frank; *Pannus lenticularis*, Paget; *Ephélide lentiforme*, Alibert; *Freckles*.

3. This species is *characterised* by its fawn or brown colour, the spots being generally very small, and always under the size of a lentile, disseminated, or in clusters; and without any elevation of the cuticle, or attendant irritation. Dr. Todd has very properly divided it into two varieties — viz. that which is congenital or dependent upon the complexion, and consequently sometimes hereditary; and that which is caused by the sun.

4. *A. Congenite Ephelis*; Φακὸς, Gr.; *Tâches de Rousseur*, Fr.; *Ephelis Lentigo materna*, Todd; *Congenite Freckles.* — This variety occurs most frequently in persons of a very fair complexion, with a delicate skin, and yellowish or reddish hair; and sometimes in those with a very white skin, and dark hair and eyes. The spots are lenticular, persistent, and not confined to the parts exposed to the light; but are in some cases disseminated over the body. They frequently do not become very apparent until some time after birth, or even not until the child is five or six years old. The darkness of the discolouration varies as above (§ 1.), with the colour of the hair or eyes, and usually remains till old age.

5. *B. Solar lenticular Ephelis*; *Lenticulæ Solares*; *Maculæ Solares*, Plenck; *Ephelis a Sole*, Sauvages; *Lentigo æstiva*, J. Frank; *Summerflecken*, *Sonnensprossen*, Ger.; *Evanescent Freckles.* — This is a common lenticular discoloration, occurring in young persons, especially females,

during spring and summer, and disappearing in winter; and limited to parts exposed to the sun. Those who live in cities, or keep much within doors, are very liable to it when exposed to the sun and fresh air. The deepness of the discolouration generally varies with the colour of the hair; and the spots are most numerous in the face, particularly of those who go bareheaded, or insufficiently shaded from the sun's rays.

ii. Diffused Ephelis. — *Ephelis Diffusa*, Todd.

6. This species is *characterised* by the irregular, diffused, and large patches, which vary more widely in colour than the foregoing species; and are sometimes distinct, sometimes confluent. It has been made to comprise certain discolourations, arising from various causes, and presenting very different appearances. Some of these proceed from the direct action of heat and light, and others are symptomatic of an internal affection.

7. *A. Idiopathic diffused Ephelis — Ephelis diffusa Idiopathica* (Todd) — presents two very distinct forms; that caused by the heat of fires, and that by the sun and air. — (*a*) The blotches produced by artificial heat — *Ephelis ignealis* (Sauvages), *Ephelis spuria* (J. P. Frank), *Lentigo ab Igne*, (J. Frank), *Tâches de Brûlure*, Fr. — are generally seen on the legs, arms, and thighs of persons who sit near the fire, without any covering intervening between these parts and it. They are usually of a mottled character, and often assume a livid, or purple, or purplish red, colour, especially when the surface is exposed to cold. They are met with chiefly in females. — (*b*) *Sun-burn*, or the diffused and general discolouration — *Nigredo a Sole* (Sennert), *Fuscedo Cutis* (Plenck), *Ephelis umbrosa* (J. Frank) — is merely the dark colour acquired by the skin after the protracted action of a high range of solar heat and atmospheric temperature, aided by the influence of the air, more especially sea air, and salt water.

8. *B. Symptomatic diffused Ephelis, Hepatizon, Macula Hepaticæ* (Sennert), *Vitiligo Hepatica* (Sauvages), *Kelis fulvescens* (Swediaur), *Chloasma* (the Franks), *Ephelis diffusa Symptomatica* (Todd), *Pannus Hepaticus* (Paget), *Ephélides Hépatiques* (Alibert), *Tâches Hépatiques* (Fr.), *Leberflecken* (Germ.). — This form of discolouration varies much in shade, and in the size of the patches. It is usually of a pale dirty yellow, or of a yellowish brown, or a light tawny shade; or it passes from a saffron to a rhubarb hue. The patches are occasionally preceded by itching, are sometimes very slightly elevated, and then terminate in desquamation of the cuticle. They appear most frequently on the neck, over the regions of the liver and kidneys, on the groins, on the forehead, and sometimes about the mouth; and are generally distinct; but they usually run into each other as they extend, and often form groups or wide blotches. When slightly elevated, and followed by desquamation of the cuticle, they nearly approach the *Pityriasis versicolor* of Bateman; and in this state are very dry and unperspirable, while the surrounding skin is soft and moist. They are either persistent, or of short duration. The transient form of this discolouration is very common in delicate females, particularly those whose uterine functions are disordered, and at the period of the catamenia. They occasionally appear suddenly, and disappear as speedily after a few hours; but they often remain a very considerable time, especially when they are connected with suppression of the menses (the *Chloasma Amenorrhœum* of J. Frank), or with conception (the *Ephelis Gravidarum* of Plenck, and the *Chloasma Gravidarum* of Frank). — This form of ephelis is also sometimes connected with chronic disorders of the liver; but more frequently with those of the stomach and large bowels, and with those of the uterine organs. It is occasionally attendant upon hæmorrhoids; and is very readily excited in those liable to it, by vexation and anxiety of mind. It is also very generally connected with a state of the digestive organs, characterised by a craving appetite, and imperfect digestion and assimilation.

9. II. Treatment. — The *Lenticular Ephelis* is frequently a matter of serious consideration to the fair sex; and ingenuity has been often tortured for means of removing it. — (*a*) In respect of the *congenite variety* (§ 4.), the remark of Celsus, as to the folly of those who attempt to remove it, is perfectly just. — (*b*) That variety, which is caused by the summer heat — the *solar lenticular ephelis* (§ 5.) — may be *prevented* by the use of veils and wide-brimmed hats; which will frequently assist its removal, when already produced. The articles — nostrums, cosmetics, &c. — which have been recommended for it, are beyond the possibility of enumeration; every perfumer, &c. being possessed of a panacea. Gently astringent and discutient lotions and poultices have been most commonly employed. From the time of Hippocrates to the present, lotions and liniments with bitter almonds have been recommended. Celsus advised a liniment of resin with a little fossil salt and honey; Actuarius, one with vinegar, honey, and bitter almonds; and Geoffrey, ox-gall, either alone, or with liquor potassæ. Dr. Thomson mentions a weak solution of corrosive sublimate in the emulsion of bitter almonds; and Dr. Bateman, a drachm of either sulphuric or muriatic acid, in half a pint of water, in the form of lotion. Dr. J. Frank prescribes the chloric acid in rose water (♏ xij. — xx. to ʒ vj.); and Dr. Withering, an infusion of horseradish in milk. Sour buttermilk is frequently employed in country places as a cosmetic wash. Besides these, a decoction of powdered lupines, or tares, or of the narcissus root, or of the seeds of the garden cucumber; also poultices prepared from these, and from a great variety of roots; have been recommended. The balsam of Mecca, with superacetate of lead, in the form of pomatum; washes with the juice of sorrel, or with lime-juice and camphor mixture; also this last, with nitrate of potash, or with milk of sulphur, or with Venetian soap dissolved in lemon-juice; rubbing the parts with a slice of lemon or sour apple; solutions of zinci sulphas, in emollient vehicles; and of the sub-borate of soda in rose water or orange-flower water (F. 334.); have also been employed, and frequently with success. Most of these are best applied at night, and washed off in the morning.

10. ii. The *Diffused Ephelis*, when proceeding directly from artificial or solar heat (§ 7.), disappears gradually upon the removal of the cause; and requires no further consideration. The *symptomatic states* are important only as symptoms of internal disorder; and, as being generally

connected with imperfect secretion, excretion, and assimilation, these functions should be assisted by mild, cooling, and alterative purgatives, light diet, and moderate exercise. Very small and frequent doses of blue pill or hydrarg. cum creta may be given with Castile soap and taraxacum, or with the aloes and myrrh pill, if the catamenia are scanty; or with ox-gall, in addition. The internal use of the *kreosote* may also be tried. I have prescribed it, in one case of this kind, with great benefit. Sulphurous mineral waters may also be taken; and lotions with the sulphuret of potash, or with nitre and camphor julap; or sulphuretted fumigating baths resorted to.

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EPIDEMICS. — *Epidemic Diseases*; 'Επιδῆμια, 'Επίδημος, 'Επιδήμιος (from ἐπὶ among, and δῆμος, people). *Epidemia*, *Epidemius*, *Epidemicus*, *Morbi Epidemici*, *Morbi Publici*, *Morbi Populares*, Auct. Lat. *Epidemie*, Fr. *Volkskrankheit*, Germ. *Epidemia*, Ital. *Epidemy*, *Epidemic Influence*, *Epidemic Constitutions.*

CLASSIF. — GENERAL PATHOLOGY.

1. EPIDEMICS are *such diseases as occasionally prevail more or less generally in a community, at the same time or season, and depend upon a common cause.*—They recur at uncertain periods; and continue to prevail for a time varying from two, three, or four months, to as many years, or even longer. When their spread is most extensive, or throughout countries differently circumstanced as to climate, &c., or when they are universal in their attack, they have often received the appellation of *Pandemic* (πανδήμιος or πάνδημος, from πᾶς, all, and δῆμος, people). When, together with their very general prevalence, they occasion a very great mortality, they have usually been denominated *pestilential* (see art. PESTILENCE). They are commonly acute and febrile, and often rapidly run their course. They appear at any season of the year; but most frequently in autumn, summer, and spring. They are distinguished from *endemic* maladies by the circumstance of these latter being occasioned by peculiarity of situation. But it should be recollected, that endemic diseases may be converted into epidemics of a very fatal kind, by those *influences*, either obvious or inferred, to which attention will be directed in this article; and which, acting either separately or in combination, modify the character, whilst they cause the prevalence, of disease.

2. I. CAUSES, &c. — The *Influences*, whence epidemics proceed, may be traced in many instances; and in others, particularly those that are pestilential, they cannot be inferred with the same degree of probability. Certain epidemics have manifestly arisen out of combinations of circumstances, the nature and operation of which admit not of dispute, whilst some have presented only certain elements of their causation, others being wanting to explain fully all the phenomena observed. — *A.* Amongst the most important elements of *epidemic influences*, are those *endemic sources* which are amply described in the articles CLIMATE (§ 3—32.); DISEASE — *Causation of*; and ENDEMIC INFLUENCE (§ 5.). These sources often perform very important parts in the causation of epidemics, upon the addition of some other cause, either manifest or concealed; endemics being sometimes the parent stock upon which epidemics are engrafted; the latter varying in character with the nature of the superadded cause, or causes, especially those which are about to be noticed. Several of these additional causes may consist merely of certain changes from the usual course of the seasons, which obtain in these localities; as prolonged drought, or protracted rains; and still more, the former following the latter; and particularly if conjoined with increased temperature. As long as the temperature continues low, very material changes in the state of the seasons may not be productive of any increase of disease in unhealthy situations, unless other causes come into operation, as infection, deficient or unwholesome food, &c. HUFELAND states that, in 1815 and 1816, in the north of Germany, the seasons were remarkably wet, and the temperature low, and yet the public health was very good; that intermittents and low fevers were rare, even in marshy localities; inflammations and rheumatism being the predominating maladies. In warm countries, however, protracted and heavy rains generally occasion epidemic disease, especially in low and marshy places, during the subsequent hot or dry season, or when great numbers of persons are crowded in a small space; and, moreover, impart to it an asthenic and infectious character. Of diseases originating in local sources, becoming infectious and epidemic, I could adduce several instances in modern times. LIVY (l. xxv. 26.) states, that, during the siege of Syracuse by Marcellus, 213 years B. C., a pestilence broke out in both armies; and that it occurred in autumn, and in a situation naturally unhealthy. "At first," he observes, "persons sickened and died, owing to the unwholesomeness of the place; afterwards the disease spread by infection, so that those who were seized were neglected, or abandoned, and died; or their attendants contracted the disease." He further adds, that the dead affected the sick, and the sick those in health, with terror and pestiferous stench; that the disease was more fatal to the Carthaginians than to the Romans, who, in this long siege, had become accustomed to the air and water; and that, in the same year, an epidemic visited Rome and the adjoining country, which was remarkable rather for passing into chronic affections, than for the mortality it occasioned. Although some of the sources of endemic disease may, by the aid of concurrent causes, as in the instance now quoted, give rise to epidemics, yet pestilential epidemics otherwise originating, as in infection, have sometimes spared places which have seemed to abound the most in certain causes of insalubrity; but this has occurred only when

those places have emitted a powerful stench, and ammoniacal vapours, or other strong odours, which have either counteracted, or neutralised, the exhalations or miasms which have spread the infection.

3. *B*. The *seasons* have a very remarkable influence upon certain epidemics, as those of yellow fever and plague; and but little on others, as pestilential cholera, influenza, &c. As respects those epidemics which are less universal and fatal, the influence of the seasons is more or less manifest.— In *spring*, various forms of angina, croup, bronchial affections, inflammations of the lungs and pleura, catarrhs, rheumatism, hooping cough, tertian or quotidian agues, and the febrile exanthemata, as measles, &c., are usually most prevalent.— In *summer*, certain of the above diseases will often remain, with continued fevers of various forms, erysipelas, smallpox, stomach and bowel complaints, &c. — In *autumn*, the diseases of summer either continue, or become more prevalent, especially cholera, dysentery, and colicky affections; and quartan or irregular agues, remittents, sore throat, scarlatina, inflammations, or obstructions of the abdominal viscera, &c. are also frequent. — In *winter*, inflammations of the thoracic and respiratory organs, rheumatism, and low or typhoid fevers, are most common; and in close or crowded places, infectious effluvia, either from the sick or from accumulated filth, are readily generated, when the air in heated apartments becomes stagnant. Hippocrates had remarkedt hat, when the seasons are regular, diseases are also more regular in their course; and, unless during the prevalence of epidemics, the observation appears just.

4. *C*. The *weather* has a considerable influence on the prevalence of the more common diseases. Protracted droughts are unfavourable to pulmonary diseases, with the exception of bronchorrhœa, and frequently excite inflammations and inflammatory fevers. During, and soon after, very wet seasons, gastric, remittent and intermittent fevers, catarrhal and rheumatic affections, dysentery, diarrhœa, and sore throat, are often epidemic. The frequent recurrence, or the continuance, of high and cold winds, occasion catarrhal, pectoral, inflammatory, and rheumatic diseases; and warm or hot winds induce remittent and bilious fevers, cholera, ophthalmia, &c. Calm humid states of the air promote the spread of continued fevers, and all infectious and contagious maladies; and similar conditions of the atmosphere, conjoined with great heat, favour the prevalence of adynamic and malignant fevers of a continued or remittent type; whilst very hot and dry seasons give rise to synochal and ardent fevers, to bilious remittents, cholera, and inflammations of the liver, stomach and bowels.

5. Although the states of the atmosphere here enumerated, very frequently produce the effects ascribed to them respectively, yet other causes aid their operation. Writers, from Hippocrates downwards, have attributed too much to irregularities and sudden vicissitudes of season in the production of epidemics, more especially of those which are very general or pestilential. I believe that this cause is instrumental chiefly in augmenting the number of cases of the diseases common to a country; and that it is very seldom the only, or even the chief, source of wide-spreading or pestilential maladies, although it may aid their generation and diffusion. On this point I cannot agree with Dr. Hancock, M. Fodéré, and some other modern authors. That this dictum of Hippocrates was not altogether believed, even in ancient times, may be inferred from the frequent exceptions to it adduced by historians and medical writers. Tacitus (*Annalium*, l. xvi. 13.), when noticing the epidemic that raged at Rome in the year 68, states, that there was no irregularity of season, or weather, to account for it. The plague that prevailed so long, and spread so generally, between the middle and end of the sixth century, and which has been fully described by Procopius and Evagrius, who were witnesses of it, was in no way dependent upon irregularity of season, but was evidently propagated by infection. The following remarks of Evagrius are, according to the experience of every candid observer, perfectly characteristic of an infectious pestilential epidemic: — "Some perished by once entering into, or remaining in, the infected houses; some, by touching the sick. Some contracted the disease in open market: others, who fled from infected places, remained safe; while they communicated the disease to others, who died. Many who remained with the sick, and freely handled the dead bodies, did not contract the disease." (*Eccles*. *Hist*. l. iv. cap. 29.) The pestilence called the Black Death, which visited nearly all the then known world in 1347, 1348, 1349, and 1350, was equally independent of irregularity of season, or deficiency of food. Parker (*Antiq*. *Brit*. p. 360.) states, that it first appeared in the south of England, about Christmas, 1348, and amidst the greatest abundance of provisions. Thuanus and Riverius, when noticing the epidemic that broke out in France in 1580, remarked, that the crops that year were plentiful, and the sky serene; so that it was thought that the disease was produced rather by the influence of the stars than by the malignity of a corrupt air. Webster (*On Epidemic Diseases*, vol. i. p. 323.) admits, that the summer in 1665, in England, when the plague commenced in London, was very temperate, the weather fine, and the fruits good. All the writers of the day agree that no cause of pestilence could be observed in the states of the seasons. The epidemics of our own days also prove that, although irregularities of seasons and weather, particularly in the endemic sources of disease, may aid in the diffusion of pestilential maladies, or give rise to increased prevalence of the common diseases, they are by no means amongst the chief causes of the former.

6. *D*. In connection with, and often resulting from, irregularity and inclemency of seasons, *unwholesome* and *deficient food* sometimes performs an important part in the production of epidemics, — a fact which seems to have been well known and guarded against by the inspired lawgiver, Moses. In *Deuteronomy* (ch. xxviii.), the Israelites are warned against transgressing his laws; and are threatened, as a consequence of disobedience, with the diseases of Egypt — the botch, the scab, and the emerods; maladies known at present, by the names of elephantiasis, leprosy, and plague, respectively, to prevail in that country; and in *Numbers* (ch. xi.), they are stated to have been seized by pestilence from eating a great quantity of the flesh of quails, which had fallen in surprising numbers around their camp, after having been

long destitute of animal food, — a consequence of the circumstances in which they were placed, and of the unwholesome nature of their food. Fodéré states that, during 1815, 1816, and 1817, in several parts of Italy and France, the inhabitants were oliged to have recourse to such roots and herbs as they could procure, the grain having been remarkably scarce and of bad quality; and that, in consequence, scurvy, diseases of the skin, and malignant and infectious fevers, became very prevalent among the lower classes. A similar circumstance was observed at Marseilles in 1812 and 1813; and in Ireland, on several occasions since the commencement of the present century; typhoid and low fevers, and dysentery, being the most prevalent results. Diseased or unripe grain, or alterations which it may have undergone in granaries, and the admixture of seeds which are injurious with it, are also very influential agents of disease. In years of scarcity, both grain and roots are often prepared for food before they have acquired due maturity; and in that state derange not merely the alimentary canal, but also the nervous and circulating systems, at a period when want and debility have rendered them more than usually susceptible of disorder. Malignant fevers, dysentery, convulsive affections, scurvy, ergotism, raphania, &c. have, in numerous instances, proceeded chiefly from diseased or altered grain. M. Fodéré mentions, in addition to the more specific effects of ergoted rye (see Ergotism), its causing abortions to become epidemic.

7. (*b*) Flesh of animals, and fish, when diseased, or tainted, are not infrequently productive of most dangerous maladies. Epidemics often commence among the lower animals; especially horned cattle and sheep; and the use of the diseased flesh may occasion malignant diseases among the human species. Whether or not infection may be conveyed from these animals whilst alive, to man, during epizooties, has not been ascertained, nor, indeed, has the question been fully entertained. That it can be thus conveyed in respect of some maladies, has been proved in modern times. Fodéré adduces a very convincing proof of the ill effects of diseased flesh in the production of dysentery and typhoid or adynamic fevers. At a period when the French troops, in the late war, were in want of provisions, over-driven cattle, some of them diseased chiefly from this circumstance, were killed before time was allowed them to recover their fatigue. Their flesh was remarkably red, and passed quickly into decomposition. Most of those who partook of it were seized with febrile and malignant dysentery. During the French war in Prussia, Germany, and Italy, the sound meat and grain were often carried off by the victorious armies, leaving the unhealthy animals, &c. to the inhabitants, who became, from the nature of their food, the prey of epidemic fever and dysentery. The blood and viscera of these animals are generally most noxious, from being especially affected; and it is fully established that these parts become principally diseased in the persons who are seized by these maladies from this cause. The muscular flesh of cattle attacked by an epizooty much sooner presents appearances of alteration after death, than that belonging to such as are healthy. It cannot, therefore, fail of being productive of disease in those who partake of it, notwithstanding the effect of cookery in counteracting its noxious tendency.

8. (*c*) The agency of unripe, stale, or otherwise unwholesome fruit, and of stale and diseased fish of any kind, in the production of certain epidemics, is fully shown in the article Disease (§ 46.), and in the sequel.—(*d*) The operation of unwholesome water, although especially manifested in the causation of endemic distempers, is also productive of those that are epidemic, particularly on occasions of inundation of the sea; as observed on several occasions in Holland, Italy, and many places within the tropics. — (*e*) M. Fodéré states, that during a tour lately made in the Low Countries and French Flanders, he learnt that functional and organic affections of the stomach were sometimes epidemic there, from the use of spiced spirits and cordials, and the practice of adding lime and alkaline substances to the beer to prevent it from becoming acid. The well-known exclamation which Shakspeare puts in the mouth of Falstaff would lead to the inference that lime was very generally used, in the sixteenth century, to remove or prevent acidity in the white wines then drunk. This, however, is a cause rather of endemic than of epidemic diseases. The ill effects of adding deleterious narcotics to beer — even to the small-beer — in this country, although satisfactorily shown in the production of a great variety of disorders, chiefly of the digestive organs and nervous systems, seldom manifest themselves in a form so specific as to be recognised as epidemic or even endemic.

9. *E. a.* Several writers on the epidemic appearance of certain diseases, finding that neither of the foregoing description of causes could account for them, have had recourse to various supposititious agents, of the nature of which they are entirely ignorant, and even the existence of which they have not been able to demonstrate. These agents have been supposed by some to be a malaria or principle of a peculiar kind, generated by the prolonged action of the sun, or by heat, upon low absorbent soils, and exerting a very noxious operation on the human constitution; and by others, to be a peculiar aura, or fluid, which has escaped from more deep-seated parts of the earth; and, although altogether incognizable to the senses, yet most destructive to human life. The former opinion is maintained by many, especially by Jackson, Ferguson, Devèze, O'Halloran, Dickson, Robertson, &c.; the latter, also, by a numerous body of physicians. Noah Webster endeavoured by most laborious research to connect the appearance of epidemics with volcanoes, earthquakes, and comets, — supposing that they all depend upon the same cause, or that the changes produced by the latter give rise to the former, either directly by their action on the human frame, or indirectly by blighting the productions of the earth, and thereby deteriorating the chief articles of food. In struggling through a dry and meagre enumeration of epidemics — slight as well as pestilential — furnished by this writer, the reader is often amused by the attempts to connect an influenza, or some other epidemic, in Europe, with an earthquake in America or in Asia, or with a comet that had appeared two or three years either previously or subsequently, or with some such phenomenon, as the fall of meteoric stones,

10. *b.* Other authors have ascribed an unusual prevalence of disease, or the appearance of pestilential epidemics, chiefly to the states of electricity in the air, and on the earth's surface. That certain conditions of this agent should affect the animal economy, and either predispose it to be infected by the exciting causes, or of itself be a principal cause, of disease, is probable; but we have no direct proof of any connection between epidemics and known changes in the electrical states, either of the air, or of objects on the earth's surface; and even granting that such connection exists, there is no evidence that this agent can produce the morbid effects ascribed to it. It is impossible to reconcile the modes in which epidemics are observed to diffuse themselves, or the peculiar and novel characters they often assume, or the very opposite physical circumstances in which they occur, merely with changes in the electric fluids, often of inappreciable and insensible kinds. Indeed, experience rather shows that the body may be made the medium of a very energetic electrical, or electro-motive, action, without any injury being inflicted on it; and it is only when a very powerful and very manifest current of either the negative or positive electricities strikes, or passes through it, that life is thereby in any way affected.

11. *c.* Numerous instances have occurred of the lower animals participating in the fatal effects of an epidemic constitution, and they have been adduced by modern authors as proofs of the existence of a noxious effluvium in the air, however it may have been generated. Thus it has been observed, that epizooties have preceded the prevalence of fevers; that catarrhal affections in horses have been followed by influenza; that birds have either forsaken the vicinity of a town ravaged by a pestilence, or have fallen dead when flying over it; and that numerous species of animals, particularly domestic animals, have died in houses visited by pestilential maladies. These phenomena have been adduced as proofs of the existence of some one of the agencies placed under this head. Without disputing their actual occurrence, or attempting to reduce them to their exact dimensions, from which they had been exaggerated for the purposes of argument, I will receive them as they have been described by those who have adduced them in support of their views. — 1st. As respects epizooties in connection with epidemic fevers, LANCISI, RAMAZZINI, and still more modern writers, have furnished much information. It has very frequently been observed, when the prevailing fevers have been an exaggerated form of the endemic of the country, or when endemic sources have been manifestly concerned in their causation, that the lower animals, especially horned cattle and sheep, which derive their sustenance chiefly in places productive of malaria, are the first to experience its effects, when it is more than usually active or concentrated. This is nothing more than what might be inferred *à priori*. We know that remittent and continued fevers, in various forms, are frequently epidemic, especially in marshy countries in the south of Europe; are chiefly dependent upon local sources, aided by heat, crowding, imperfect ventilation, neglect of cleanliness, and the state of society; and are often either preceded or accompanied by epizooties. Such occurrences are as old as the records of history extend; and have been adverted to in the Books of MOSES, as well as in those of the PROPHETS. HOMER has signalised the connection, and EUSTATHIUS and SPONDANUS have explained it, in their commentaries on the Iliad, as satisfactorily as any philosopher of the present day. EUSTATHIUS, the celebrated critic of the twelfth century, ascribes the disease that broke out in the Grecian camp, in the tenth year of the siege of Troy, to immoderate heat and gross exhalations: and DE SPONDE, or SPONDANUS, as he is commonly called, conceived the circumstance of the mules and dogs having been affected before man, to have been owing to their natural quickness of smell, rendering the exhalations sooner perceivable and operative; and to their feeding on the earth with prone heads, whereby effluvia are more readily inhaled, and before they rise so as to affect man, or become diffused in the air.

12. A connection similar to the above, and evidently proceeding from the same sources, especially in warm or dry seasons, consequent upon the inundations of low grounds or marshes, is mentioned in various places by LIVY. That the epidemics, which were thus consequent upon or attended by epizooties, were of the nature I have contended for, may be inferred from the following notice he has recorded of an epidemic fever which was remarkably destructive in the year of Rome 576: — "Pestilentia, quæ priore anno in boves ingruerat, eo verterat in hominum morbos. Qui inciderant haud facile septimum diem superabant: qui superaverant longinquo, maxime quartanæ implicabantur morbo. Servitia maxime moriebantur; eorum strages per omnes vias insepultorum erat. Ne liberorum quidem funeribus Libitina subficiebat. Cadavera intacta a canibus ac vulturibus, tabes absumebat; satisque constabat nec illo, nec priore anno, in tanta strage boûm, hominumque, vulturium usquam visum." (L. xli. 21.) Here the commencement of the disease amongst the cattle, its subsidence into the intermittent type, its greater prevalence in the lowest classes, and the absence of birds of prey from the infected atmosphere, are proofs — 1st, of its having originated in malaria, and possessed the characters distinguishing this class of fevers; and, 2d, of the effect of the contaminated air and diseased bodies on animals of prey. The destructive epidemic that ravaged Rome in the year A. D. 187, and many parts of Italy, was attended, rather than preceded, by a disease in cattle. HERODIAN (L. i.) ascribes it to the great concourse of people assembled from all parts of the earth, and to an unfruitful year, and consequent famine, — causes most likely to generate infection, particularly when aided by others which are seldom absent under such circumstances. Although this connection of epizooties and epidemics may be explained as was attempted by EUSTATHIUS and SPONDANUS, yet it is not improbable, that cattle confined together in a state of disease will generate an effluvium, remarkably injurious to man; that the use of the flesh of diseased animals, as may be inferred to have been the case in the epidemic last noticed, will have a similar effect; and that, when aided by other noxious agents, both these causes will occasion an infectious malady, which will spread with great rapidity and mortality under the circumstances

in which these epidemics were observed. The facts already adduced (§ 7.), support this inference; the following further tend to confirm it: — Livy, Dionysius of Halicarnassus, and Orosius mention a destructive pestilence which Rome and its territory experienced 464 years B.C. It seems to have occurred in autumn, and to have arisen from the crowds of countrymen and herds of cattle received within the walls of the city. "Ea colluvio," Livy remarks, "mixtorum omnis generis animantium, et odore insolito urbanos, et agrestem, confertum in arcta tecta, æstu ac vigiliis angebat, ministeriaque in vicem ac contagio ipsa vulgabant morbos." (L. iii. 6.) The circumstance here so very explicitly stated, the vicinity of the Pontine marshes, and the state of the surrounding country admitting of inundations from any unusual rise of the Tyber, fully explain the occurrence of this epidemic. About ten years afterwards, another epidemic ravaged Rome, and was connected with famine and disease among cattle. In the year of this city 325, or twenty-five years subsequently, a remarkable drought and famine visited the Roman territory, the springs of water even having been dried up. Livy states, that "multitudes of cattle thronged round the arid fountains, and perished with thirst. Diseases followed, first invading cattle, and infecting the rustics and the lower classes of people, and then extending to the city." (L. iv. 30.) Dr. Hodges states, that the plague of London in 1665 was preceded by sickness among cattle, and that bad meat was consequently sold to the poor so cheap that they fed upon it to excess,—a circumstance that could not fail of predisposing them to be affected by its principal causes.—During the epidemic of New Orleans in 1819, cattle, sheep, and horses were affected, evidently owing to the concentrated malaria concerned in causing the disease.

13. 2d. It has been supposed that the death or absence of birds during an epidemic is evidence of the dependence of such epidemic upon terrestrial exhalations. But it should first be ascertained at what period this phenomenon occurs; for if it precede the disease in the human species, then it may be inferred that these exhalations are concerned more or less in causing that disease. But if it take place during the course of the epidemic, then it may arise from the infection of the atmosphere by the exhalations from the sick; the feathered creation, owing to the extent of their respiratory organs, and to their relatively large consumption of air, being very susceptible to changes in this fluid. I believe that the phenomenon in question has occurred only during *pestilential* epidemics, where the sickness and mortality have been very great; and that it has proceeded from this latter cause. This is proved by the circumstances in which it has been observed. Thucydides states, that, during the plague of Athens, birds that prey on human flesh entirely disappeared. Analogous facts were noticed by Diemerbroeck during the plague of Nimeguen; by Sir J. Fellowes, during the epidemic of Cadiz; and at Dantzic in 1709, according to Short. It has likewise been remarked that domestic animals have died, during these epidemics, similarly affected to man. In these cases, the infection has manifestly extended from the latter to the former; the air having been contaminated by the effluvium exhaled from the sick.*

14. F. The *putrefaction of animal substances* has been supposed by many to occasion disease in those who come within the sphere of the exhalations thus produced, and even to generate a malady which has become infectious, and has, partly thereby, and partly from other concurring causes, prevailed to an epidemic, or even pestilential, extent. It is not, however, merely dead animal bodies, or considerable collections of putrid matter, but also heaps of filth exposed in the streets, or animal excretions and exuviæ, subjected to a warm and stagnant air, and neglect of domestic and personal cleanness, that are thus injurious. These latter may be less energetic agents than the foregoing; but they more frequently exist, and are more common concurrent causes. The injurious effects, however, of putrefying animal substances have been denied by Dr. Bancroft and others, by a species of argumentation more specious than solid — by a kind of medical special pleading, of which we have had more, since the commencement of this century, than is consistent either with facts or with the advanced state of general science. Animal substances in a state of decay will produce effects, varying with the temperature and humidity of the air, with the concentration of the exhalations proceeding therefrom, and with the state of individuals, or of the community, exposed to them. A candid appreciation of the facts which have occurred to most experienced observers, in connection with those recorded by creditable writers, will, I believe, warrant the following inferences: — 1st. That in low ranges of temperature, the emanations from putrid animal substances will seldom be productive of marked effects, unless they accumulate or become concentrated in a stagnant atmosphere — unless they be assisted by

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* The above occurrences were common in the pestilential epidemics that have visited the south of Spain since the commencement of the present century. The following illustrative facts have been observed by myself: — Some years ago, malignant puerperal fever, proceeding from a contaminated state of the air in the wards of a then crowded and ill-ventilated lying-in-hospital, had attacked nearly all the patients. The cat kept in the house died at that time, soon after having had kittens, with all the characteristic symptoms of that malady. During the prevalence of cholera in London, in 1832, a parrot, in the apartment of a person who had this disease, died with all the symptoms of it. Due precautions having been used to prevent its extension to the rest of the family, no one else was affected by it. Some other birds, in different parts of the house, escaped. That a very sensible effluvium is given off from the sick, and long adheres to the clothes of the attendants, is proved by the following occurrence: — During the summer of 1833, I was called, by Mr. Faxon, to a patient violently attacked by pestilential cholera, at a considerable distance from my house. I took occasion, directly after one of my visits to this patient, to call upon two relatives of my own, residing about a mile and a half from the house of the patient; and, although I walked that distance, they both, upon entering the room, enquired respecting the peculiarly unpleasant odour I had brought in my clothes. I professed perfect ignorance of its existence, and of any cause for it. They had no idea, nor do they even now know, that I had been visiting a person in cholera. They were both seized with this disease on the following day, but recovered. No one else in the house was affected by it; and no other cases occurred in the vicinity, or within a mile of them in every direction, for long afterwards. This fact will, of itself, explain several important circumstances connected with the spread of infectious epidemics, and show the difficulty of accounting for the source or manner of infection; although infection, either direct or mediate, has, as in these cases, undoubtedly taken place,

imperfect ventilation; — 2d. That the combination of these exhalations with those emitted by decayed vegetable matter, and by deep absorbent soils, gives rise to effects of greater severity than those occasioned by either operating separately; and that the intensity of these effects will depend upon the temperature, humidity, and stillness of the air, and other concurrent circumstances; — 3d. That emanations from dead animal matter, in the various states in which it is met with, are capable of causing, even of themselves, serious effects, as shown in the article Dysentery (§ 23.); and that, when aided by high ranges of temperature and humidity, they are often productive of extensive disease, which usually assumes, especially in a crowded population, and calm atmosphere, infectious properties; — 4th. That even when they have not been the chief element or cause of the epidemic constitution, they have been, not unfrequently, concurring agents.

15. It is recorded in the *Magdeburgh History*, that, in the year 394 or 395, swarms of locusts covered Judea; and were driven by the wind into the sea, and washed on the shore of Palestine: they filled the air with fœtid effluvia, which occasioned pestilence among men and cattle. In this case, the high temperature of the country, very probably famine — the frequent consequence of swarms of these insects — and other causes, concurred in the production of this epidemic. It is likewise stated in the same history, that swarms of locusts covered a great part of France in 874, and were driven by the winds into the British Channel; and, having been washed on shore, caused such a stench and sickness, aided by a famine, as to destroy about a third of the inhabitants of the French coast. I have stated that the *dysenteries* (see that article), which have been very generally epidemic immediately after very destructive pestilences, have been occasioned chiefly by the exhalations proceeding from the immense number of dead bodies, and by the presence of animal matter in the water. It is more, even, than probable, that pestilences are perpetuated in large cities from this circumstance; and that the prolonged epidemics, of which Rome, in her rise, in her acmé, and in her decay, was so frequently the seat, were partly owing to this cause, which neither burning nor burying the dead bodies could prevent. During the very prolonged pestilence that ravaged Rome in 262 and 263, the air is described by Eusebius to have been so corrupt, as to form on the surface of objects a mould or tabid dew, such as proceeds from putrid bodies: — "Ros quidam tabidus e cadaveribus putridis;" — or, as Cedrenus expresses it, "Ros saniei mortuorum similis apparebat."

16. *G. Infection and contagion* are amongst the most important agents in the spread of certain epidemics; but great misapprehension has existed, as to the extent of their influence, the exact parts they perform, and their mutual connection. Many writers have erred remarkably in viewing epidemic diseases as being necessarily infectious, and even contagious; and others, in considering them entirely devoid of infectious and contagious properties. The importance of determining in how far they possess either property, and are diffused in consequence; and the great interest of the subject, in medical, commercial, and political points of view; have given occasion to much and to warm discussion—a great part of which has not been calculated to advance the cause of science, or to elevate the medical character in public estimation. The subject of contagion, in all its relations, is fully discussed in the article Infection. I can, therefore, only allude briefly to a few of its connections with epidemic maladies.

17. 1st. A foul air may be generated by the crowding of many into a small space, even in health, but more especially in a state of disease, as in hospitals, &c.; or by the presence of only a very few in the same apartment, if their ailments be attended by copious discharges, as in puerperal and dysenteric cases, &c.; and this air may infect those who breathe it in a state of predisposition, with fever, dysentery, &c.; persons thus infected, communicating the disease to others similarly predisposed, and under the circumstances about to be stated (§ 18. 2d.). Thus I have seen puerperal fever generated in the wards of a lying-in-hospital, from the air having become vitiated by the discharges; and nearly all the females, who have been exposed to the action of the contaminated air soon after delivery, affected by it; the disease being, moreover, conveyed from one patient to another by means of the accoucheur. Foul and phagedenic ulceration, hospital gangrene, erysipelas, dysentery, inflammation of veins, &c. may also be produced, and become even epidemic to a certain extent, in this way.

18. 2d. Disease may take place sporadically, or from local causes, and owing to various circumstances acting either in close succession or coëtaneously; the circulating and secreted fluids, and even the soft solids, may be so changed during its course, as to emit an effluvium, contaminating the surrounding air, and thereby infecting many of those who breathe this air in a sufficiently contaminated state; and thus it will be propagated to several, and from those to others — especially under favourable circumstances of temperature, humidity, electrical conditions, and stillness of the air, and of predisposition on the part of those who come within the focus of infection. Thus disease may become *infectious and epidemic*, aided by the constitution of the air and other circumstances; and, after a time, cease and entirely disappear, with the circumstances which combined to propagate it.

19. 3d. A person may be either infected in the manner now stated, or seized by a malady which always evinces infectious properties under circumstances favourable to their development, as typhoid or adynamic fevers; or by one obviously contagious, and propagated by a palpable virus, as small pox, &c.; and be removed to a district where the physical conditions, aërial and terrestrial, as well as the states and manners of the inhabitants, favour its spread to others; or the morbid miasm or matter may be conveyed, by means of some inanimate substance embued with it, to a distant place thus circumstanced, and the disease be there propagated for a time, then subside, entirely disappear, or again break out, according to the concurrence or disappearance of one or more of the causes aiding in its diffusion. In these cases, the disease becomes *epidemic from in-*

fection, and generally disseminates itself gradually at first, but with rapidly increased celerity as its victims accumulate, until either it exhausts the numbers of those predisposed, or the circumstances favouring it disappear, and others occur counteracting its diffusion.

20. 4th. The same disease may appear simultaneously in a number of persons distant from each other, and between whom no communication has taken place; and affect a great part of a community—those who are secluded, as well as those who mix with the rest of their species; and it may disappear after a time, without sufficient evidence being furnished of its possessing either infectious or contagious properties. Disorders thus appearing may be termed *simply* epidemic.

21. 5th. Disease may first appear as now stated (§ 20.); but, in certain situations and circumstances, as in low, filthy places; in crowded and ill-ventilated streets and houses; in stagnant, moist, impure, or other states of the air; from the confinement of a number of sick in small space; want of cleanliness, or bad habit of body; in states of physical and mental depression, &c.; may assume a more malignant character, and emit an effluvium, which will become either a superadded cause concurrent with apparent or concealed antecedent causes, in diffusing the malady, or a principal agent of infection, or possibly even of contagion, to which the others are entirely subsidiary. In this case, the epidemic is consecutively infectious; and a person, who, being infected, removes into a district which the disease has not yet reached, may, under the circumstances, and in the way stated above (§ 18, 19.), propagate it there: but if these circumstances do not exist, this occurrence will not take place; and thus the epidemic will be limited to the place where the constitution of the air, and the conditions, physical, social, and moral, of the inhabitants, combine to favour the operation of such infectious effluvia as may be generated and accumulated around the sick.

22. 6th. Certain diseases may appear, either in a sporadic or endemic form, or in a simply epidemic state (§ 20.); and, owing to the manners and circumstances of the community, be propagated only to members of the same family, or to those in very intimate communication with the affected; for, although commonly observed in the above forms, and, in ordinary circumstances, without evincing any infectious property, they have sometimes been transmitted to those who either sleep with, or inhale the breath of, the person affected, as in croup, and in some other diseases of the respiratory organs; or live in the same apartment with him, as occasionally remarked in respect of erysipelas, dysentery, &c.

23. Epidemics present themselves in one or other of these modes, according to the combination of the elements or agents co-operating in their production; and to the influence of these elements, either in predisposing the system to, or in directly exciting, certain trains of morbid action. Thus it will be seen that epidemics are either—(*a*), not manifestly infectious (§ 20.); (*b*), or conditionally infectious, owing to the cooperation of certain circumstances (§ 18.); (*c*), or primarily infectious and contagious,—the epidemic constitution, or state of the atmosphere, &c. favouring their general diffusion. This last class, or that primarily and generally infectious, is characterised—*α*. by the specific forms which the diseases comprised in it assume; *β*. by their nearly determinate duration; *γ*. by their propagation under very different circumstances, although favoured by various atmospheric conditions; *δ*. by their little disposition to relapse, or return; *ε*. and by their affecting, with few exceptions, the system only once. From the foregoing, also, the fact may be explained, that the same disease, when occurring sporadically, often presents no infectious properties; but, when prevailing epidemically, generally evinces them more or less remarkably; the states of the air, the circumstances of the community, physical, social, and moral, and various other agents contributing either to the development of new properties, or to the manifestation of those which would have been otherwise latent or concealed.

24. *H.* The last element in the causation of epidemics, to which I shall briefly allude, is *mental depression*, in every form it can present itself. This, although a source of predisposition, rather than an element of the epidemic constitution, is one of the most influential causes in the spread of disease, particularly those that are pestilential. An army, during the success of a campaign, seldom presents more than sporadic cases of disease, unless they are subject to great privations, and even then, little illness may occur. But, during reverses, panic, disappointment, &c., particularly if such reverses be attended by their usual concomitants—by crowding, privations of all kinds, inattention to cleanliness, exposure to night air and malaria, &c.—epidemic sickness is a common result. The fear of the disease, amounting often to panic, which is very generally experienced upon the approach or breaking out of an epidemic, is not only one of the causes of its rapid diffusion, but also of the suddenness and fatality of the attack, usually remarked at its accession. The mental distress so generally diffused in the seats of war, is a very powerful concurrent cause of the diseases which are commonly attendant upon it; and this, as well as other contingencies, will, at least partly, explain the prevalence of sickness after earthquakes, in places where they have been most severely felt.

25. *Conclusions.*—*a.* It may be inferred from the foregoing, that, although any individual element of epidemic causation will of itself be insufficient for the production of the effects observed, more especially of wide-spreading or pestilential diseases, a concurrence of several, in various grades and forms, aided by a number of incidental circumstances, must, in the present state of our knowledge, be viewed as their true sources;—that neither infection, although the most influential agent, perhaps; nor terrestrial malaria, nor mineral vapours—the favourite agent of SYDENHAM, and of many recent writers; nor exhalations from dead animal matter; nor intemperature of season or weather; nor famine, scarcity, or unwholesome food; nor crowding of the living—the healthy, or the sick; nor filth; nor stillness, humidity, warmth, or other conditions of the air; nor depressing motions and passions; nor any physical, social, or moral vicissitude; will, singly, account for epidemics: but that the association of several, or of two or more, of these causes, in

various grades of predominance, is necessary to their occurrence, diffusion, and continuance.

26. *b.* That miasms generated by the sick in one or other of the modes stated above (§ 17, 18. 21.), and accumulated in a close air, or transmitted by means of fomes, or contagion by a palpable virus, are either primarily or consecutively (§ 19.) concerned in the production, or in the propagation, of all fatal, malignant, wide-spreading, or pestilential epidemics.

27. *c.* That the appearance of epidemics is owing to the rare concurrence of the elements just enumerated, and probably of others of less importance, whether acting as specific, exciting, or predisposing causes; and that infection, in any of its forms, will seldom or never give rise to the epidemic prevalence of a malady, unless it be aided by one or more of the above elements of an epidemic constitution, more especially such as occasion a stagnant and impure state of air, and depress the spirits of, or otherwise predispose, the community.

28. *d.* That the specific form which an epidemic assumes, depends upon the association of the causes in which it originates, and which favours its diffusion, but more especially upon the infectious miasm concerned either primarily or consecutively in producing it; and that its character may change, and become either more virulent upon the addition of a new cause or element, or less so on the abstraction of one or more. Thus, small-pox, scarlet fever, true yellow fever, pestilential cholera, plague, typhoid fevers, the adynamic forms of dysentery, and measles, require a concurrence of causes to their epidemic appearance, that will act chiefly in predisposing the community to be impressed or affected by their respective infectious miasms; these miasms being their specific exciting causes, without which they could not continue to present the same forms, or each one could no longer generate its like. When the predisposition to be affected by the specific miasm — whether such predisposition be inherent in the frame or intrinsic, or temporarily induced by external agents, as the state of the air, or other extrinsic influences — is limited to a very few of those coming within the sphere of its operation, then sporadic cases only of the malady will present themselves: but when, in consequence of the combined action of several causes, or of a peculiar but unknown state of air, the predisposition is more or less general, the disease will become epidemic; the nature, severity, and number of these causes, whether extrinsic or intrinsic — whether physical, social, or moral — determining the intensity of its character, as well as promoting its diffusion and continuance, until it exhausts itself, by affecting all those predisposed, or some change takes place which abstracts, or otherwise changes, the principal concurrent and predisposing agents. The salutary results sometimes observed during epidemics, from a violent storm, are obviously occasioned chiefly by the dissipation of an infected atmosphere; and those, as yellow fever, which require a high temperature as a principal concurrent cause, subside upon the setting in of cold weather.

29. *e.* The history of epidemic diseases, more especially small-pox, plague, yellow fever, pestilential cholera, hooping cough, and exanthematous fevers, show that, although the concurrence of the causes enumerated above, are commonly concerned in their production as epidemics, they, nevertheless, sometimes rage violently without such concurrence having been observed. This can be explained only by inferring either the presence of these causes in a slight grade, or the existence of some quality in the atmosphere, independently of them, favouring the propagation of disease, or predisposing the community to infection: for, although measles become epidemic usually in winter and spring; and scarlet fever in summer and autumn, as observed by Sydenham; yet the same association of circumstances, at these respective seasons, does not always give rise to them; and they sometimes appear at other times, and even prevail very extensively. It is notorious, also, that small-pox, before either inoculation or vaccination was introduced, was often propagated with difficulty at one time, and with remarkable readiness at another, and yet the concurrent circumstances were sometimes apparently the same; and, although the usual epidemic agencies generally favoured its spread, yet it occasionally became extremely prevalent without their apparent aid. It must, therefore, be inferred, that there is a state of air either arising out of some of those changes insisted upon above, in peculiar but not manifest states of association, or consisting of an entirely unknown quality, that is sometimes instrumental in spreading infectious or epidemic maladies. The history of the progress of pestilential cholera fully illustrates this inference.

30. *f.* As the association of causes and circumstances, already specified, and a peculiar or unknown state of the air, are mainly concerned in the rapid diffusion of disease; and, as it is evident that these are but occasionally, although often suddenly, formed, the epidemic spreading with a rapidity in proportion to the suddenness and the degree of the change; so it may be inferred, that the return to the natural or healthy state of things may be equally sudden with the departure from it, and the epidemic abate with proportionate celerity. Much, however, should be attributed to the circumstance that, when an infectious epidemic occurs, it speedily seizes the most susceptible, and spreads rapidly until they are exhausted: it then subsides, and entirely disappears, either from this circumstance, as in the yellow fever at Gibraltar in 1813; or from a change in the concurrent circumstances and state of the air, as on several occasions in the south of Spain; or from the infectious miasm becoming less malignant in its passage through numerous persons, or from the circumstances influencing the disease in its progress.

31. *g.* That the germs of infection may lie dormant for a time, whilst either the concurrence of manifest causes, or the concealed constitution of the atmosphere, is unfavourable to their development. But as soon as the one or the other, or both become favourable, and predispose the frame, the infection assumes activity, and the distemper spreads accordingly.

32. II. *a.* Of the Precursors of Epidemics. — It is obvious that the true and only precursors of epidemics are their *Causes*. The phenomena preceding the more pestilential diseases have been too often magnified or misinterpreted, either from ignorance, or for the purposes of argument. One

of the precursors most insisted on by writers, is intemperature of the seasons; but it has been shown above, that although this may be a principal cause of the prevalence and aggravation of the endemic diseases of a country, it has only a concurrent influence in producing malignant or wide-spreading epidemics — some of the most pestilential not having been thus preceded; and, even where it has been remarked in its most intense forms, it has operated chiefly in favouring the generation of infection, and in predisposing the community to be impressed by the infectious miasm. The circumstance of nearly all epidemics commencing among the poor, and being most destructive to them, is a manifest consequence of their earlier and much greater exposure to, and predisposition to be affected by, the exciting causes — more especially such as are specific and energetic — than persons in good circumstances; and of the concurrence of causes occasioning epidemics, taking place chiefly in the former class, and very rarely in the higher grades of society.

33. *b.* Another precursor, on which much stress has been laid, viz. disease and mortality in the lower animals, is one which has likewise been shown, even when it precedes an epidemic, which is only occasionally the case, to be the necessary consequence of their earlier or greater exposure to its chief causes. In some unhealthy climates I have visited within the tropics, where malignant remittent fever, agues, and dysentery, in various forms, according to the habit, constitution, &c. of those who arrive, or are resident in it, are constantly prevalent, the more perfect animals, as horses, cattle, sheep, dogs, &c., soon die, evidently from the concentrated exhalations almost constantly evolved from a humid soil, and other endemic sources. This circumstance proves that the epidemic which is thus preceded is merely an aggravated form of the endemic of the place, more generally diffused through the community, owing to the concurrence of additional causes, than is commonly observed; and not a new or different distemper, unless either infectious miasms have been evolved by those first affected, and, having become a superadded cause of great activity, have thereby changed the character of the epidemic, or infection has been introduced originally, and favoured in its operation by the terrestrial exhalations, state of the air, &c., which occasioned at first the mortality in the lower animals, and the aggravation of the endemic disease. But in this latter case, the mortality in animals, as insisted upon above, will have been posterior to the commencement of the epidemic; as fully shown in the accounts furnished by the aggravated plague, or "*black death*," which extended over Europe during 1348, 1349, and 1350; and in the progress of pestilential cholera. Both **Barnes** and **Wood** expressly state that the fatal murrain among cattle, that accompanied the black plague in England, in 1349, was several months subsequent to the appearance of this plague; and **Hecker** remarks,—"Of what nature this murrain may have been, can no more be determined, than whether it originated from communication with the plague patients, or from other causes; but this much is certain, that it did not break out until after the commencement of the black death." (p. 70.)

34. *c.* Some authors have viewed the aggravation of the sporadic and endemic diseases of a country as forerunners of pestilential epidemics, and have considered an occasional occurrence, or a mere coincidence, as an intimately connected phenomenon. Much misapprehension, also, of a different kind, as will appear hereafter, has arisen on the subject. Dr. **Mead** and Dr. **Heberden** have too easily admitted that malignant or putrid fevers often precede plague; and various writers have contended that yellow fever commences as the bilious remittent of the country, — the latter passing into the former by such insensible grades, that a difference between them cannot be assigned. This last assertion, although made by some of the ablest of the non-infectionists, and insisted upon by all of them, is very properly denied by those who consider yellow fever to be distinct from even the worst forms of endemic fever. The diagnosis between them, the establishing of which is of so much importance in the controversy, is given in another place. But that there is a wide difference in the causes, the symptoms, the duration, the mortality, the morbid changes, the contaminating effects, &c. of both, I am morally convinced. One of the most recent, ablest, and most moderate writers on this subject, Dr. **Hancock**, believes in the gradual and imperceptible change of malignant fever into plague, and of remittent into yellow fever. But I cannot agree with this opinion. There is, doubtless, much difficulty sometimes in distinguishing a very violent case of bilious remittent, from yellow fever; or a severe one of adynamic continued fever, from a certain form of plague; and the difficulty is greatly increased by the fact, that the infections of yellow fever, and of plague, are propagated chiefly by the concurring aid of those causes and circumstances which respectively give rise to, and favour the prevalence of, bilious remittents and adynamic fevers; and that, without such aid, these infections cannot occasion their respective distempers in a pestilential or epidemic form. Great stress has been laid upon the prevalence of fevers in London, at the time of the appearance of the great plague. But fevers were necessarily more or less prevalent in the then circumstances of the city; and it does not actually appear that they were more so at the time, when the first cases of plague occurred, than on other occasions. The imputed prevalence of a malignant fever, which **Sydenham** mentions (see *Works*, p. 105—107. and 123. *of Leyden edit. of* 1726.), occurred during the spring of 1665, — some months after the first cases of plague — and was considered by him, for reasons which he assigns, especially its difference from all other fevers that he had ever seen, as a variety of that pestilence. How could it, then, be the forerunner? Did the writers who lived subsequently know more of the matter than **Sydenham** and others, who saw the commencement of that plague, as well as its decline; at which latter time, this milder form of the plague — this malignant, spotted, or putrid fever, as it was called for the purposes of deception, as shown hereafter — began to predominate, owing either to the change in the temperature of the air, or some other alteration in the epidemic constitution. But, even admitting that fevers were actually prevalent before, and during the commencement of that pestilence, the association of

causes giving rise to their prevalence was, at that epoch, exactly such as would favour the action and propagation of the infection of plague, provided it had been introduced either by an infected person, or by fomites. That such introduction took place, and that the pestilence spread in consequence of the concurrence of causes productive of fever, is more probable, independently of the strong evidence of the fact, than that the circumstances usually occasioning fevers should have generated a progressively malignant distemper, until plague was at last produced. Our knowledge of pathological phenomena does not warrant this latter inference; for if such progression without any specific difference existed in respect of these maladies, we should surely see, on some occasions, the infection of plague give rise to fever, just as the confluent, often produces the distinct, small-pox; or the malignant, the mild, scarlatina;—or, without reference to cause, we should sometimes observe plague subside into common fever; as we often see malignant remittents lapse into ague.[*] The same reasoning equally applies to the supposed passage of remittents into true yellow fever — an error which is fully exposed at other places (see § 43., and Fever, Yellow).

35. *d*. Several writers have insisted upon the appearance of malignant fevers, during and after the decline of plague, as a proof of the convertibility of the one disease into the other; and have referred to Sydenham's account of the plague of 1665, in support of their argument. But he distinctly infers that the malignant, or spotted fever, as it was named in the bills of mortality, was a variety of that pestilence, which continued during 1666, chiefly in that form, when it ceased to be epidemic. It is not improbable, however, that though many of the cases of the malignant fever seen after the decline of the plague, were milder cases of this distemper; yet some may have been — especially at a later period — actually cases of adynamic fever, occasioned by the contamination of the air, by the exhalations arising from so many thousand bodies scarcely covered by earth in the crowded churchyards of the city, and pits in which they were thrown, within the short period of a few weeks, and during a warm season; fever and dysentery affecting, owing to this very obvious cause, many of those whom the infection of plague had spared, or who returned to London after the epidemic had ceased. The circumstance, also, so much relied upon by Schenk, Horst, Short, Hancock, and others, of continued fevers, dysenteries, small-pox, and measles, when raging epidemically, being frequently forerunners of plague, and sometimes reappearing upon, or following, its decline, is certainly no proof of the convertibility of either of these maladies into pestilence; but merely shows that, during epidemic constitutions, in which other diseases usually propagated by infection had become very prevalent, plague likewise spread rapidly owing to its infectious property — its contingent appearance after these maladies commenced, having depended upon the introduction of the pestilential infection, which was but little guarded against at the time when Schenk and Horst wrote, and not at all in the Mahomedan countries where this occurrence has been noticed by Jackson and others.[*]

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[*] Upon a careful examination of Sydenham, Baynard, Hodges, De Foe, &c., it is manifest that the malignant spotted fever, said to have prevalent at the commencement and decline of the plague, was actually this distemper, reported as fever for the purposes of concealing its existence; and that, where this fever actually existed, it was one of the forms that plague very commonly assumes, especially during low ranges of temperature, as at that season. De Foe (whom I consider especially deserving notice as to this point, as he had no medical doctrine to support) states, after describing the introduction and commencement of plague in St. Giles's, in December, 1664, that, early in May, 1665, "it had gotten into several streets, and several families lay all sick together; and, accordingly, in the next weekly bill, the thing began to show itself: there was, indeed, but fourteen set down of the plague, but this was all knavery and collusion; for St. Giles's parish buried forty in all — most of whom, it was certain, died of the plague." In the next week's bill, but nine were set down to the plague; "but, on examination more strictly by the justices of the peace, it was found there were twenty more, who were really dead of the plague in that parish; but had been set down of the spotted fever, or other distempers, besides others concealed."—"Now the weather set in hot; and, from the first week in June, the infection spread in a dreadful manner; and the bills rose high, and the articles fever, spotted fever, &c. began to swell: for all that could conceal their distempers did it, to prevent authority shutting up their houses," &c. (*Hist. of Great Plague*, p. 6. and 7.) A reference to the bills of mortality will show, that, at the time the plague first appeared in London, there was no particular prevalence of disease. The attempts thus made to conceal the existence of plague have been equalled in the present day, during the prevalence of a different malady; and in more places than London. The reputed predominance of putrid and spotted fevers, therefore, believed in by Mead and Heberden, who wrote long afterwards, was altogether a mistake; which originated as I have now shown, and was actually subsequent to the appearance of the first cases of undoubted plague.

[*] The non-infectionists insist upon *four things*; the truth of which they take for granted, and make the bases of their arguments in proof of their doctrine. The *first* is, the passage of fever into plague, and of remittents into yellow fever. I have shown, particularly, in other articles, that no such transition takes place; and that it did not take place in the great plague, to which especial reference has incorrectly been made in proof of it. That pestilential infection spreads most readily in circumstances productive of continued and remittent fevers, is fully admitted; but the difficulty of distinguishing between these fevers and the pestilential epidemics is not so great as the non-infectionists are desirous of showing as an argument in favour of the opinion that the latter are only higher grades of the former, and devoid of specific differences.

The *second* is, that prevailing diseases are banished while epidemic pestilence rages. This only occasionally and partially obtains; and, when observed, is owing chiefly to the circumstance of a great part of those persons, who, from exposure and predisposition, would probably have been affected by the usual endemic diseases of the place, being actually such as are most obnoxious to the attack of pestilence. Pestilential cholera did not banish other diseases during its prevalence; or, at most, did so very partially: and similar facts have been remarked in respect of other pestilences — both plague and yellow fever. The great plague furnishes no grounds for the statement, that I can find in the writers on it the most deserving of confidence, more particularly as there actually appeared to be no prevailing disease at the time when the first cases of plague occurred. Facts should be duly investigated, before they are made the bases of important inferences. How many "false facts," furnished by the ignorant, the prejudiced, and the emissaries of interested traders and chartered companies, have been adduced in support of this and other parts of the doctrine, are best known to those who have devoted long and patient study to the subject.

The *third* statement is, the reappearance, upon the decline of pestilence, of the prevailing diseases which preceded it, — a circumstance of only occasional or even rare occurrence: 1st, because pestilences are only occasionally so preceded: and, 2dly, when they are so preceded, these diseases do not always disappear; nor, when they disappear, do they always return. I appeal to facts. Let them be scrutinised; and, when diseases which prevailed at the breaking out of pestilence, return after it has ceased, the occurrence is to be explained either as hinted at above, or by referring to the influence of existing endemic sources, and the causes usually concurring

36. *e.* The appearance of swarms of insects has been likewise considered as a forerunner of epidemics. After mild and open winters, when the cold has not been sufficient to destroy the eggs and larvæ of insects; and during moist and warm springs and summers, when warmth, moisture, and animal decay have contributed to their extraordinary generation; various species of both insects and reptiles have sometimes become so numerous, especially in low and humid districts, as to destroy the vegetable productions, to occasion scarcity, and, by the decay of their exuviæ and dead bodies, to increase the local sources of diseases. They have thus contributed to the causation of an epidemic constitution, and, perhaps, in some instances, have directly produced disease. In such cases, they have either preceded or attended the commencement of the epidemic. The common insects of a country have been said to have disappeared during the prevalence of pestilence. If this have occurred, it may be referred to the operation of the same cause to which the disappearance of, or death of, birds was imputed (§ 13.). But the non-infectionists, who have endeavoured to torture an argument in favour of their views out of the latter circumstance, have not ventured to affirm, as they did in respect of the disappearance of birds, that an unusual absence of insects or reptiles has been ever remarked as a forerunner of pestilence.

37. *f.* As to the influence of comets, meteors, earthquakes, the breaking out of volcanoes, &c. in causing epidemics, or even in indicating their approach, there is not the least evidence, notwithstanding NOAH WEBSTER's labours to demonstrate it. Coincidence may have been sometimes remarked: but it would require a tolerably uniform antecedence of the former in respect of the latter, to show any relation between them, either as cause and effect, or as concurrent results of one general or pervading cause.

38. III. NOTICES OF SOME EPIDEMIC CONSTITUTIONS OF AUTHORS. — In *illustration* of what has been already advanced, I will take a brief view of some epidemics, and the causes to which they have been chiefly imputed by those who have recorded them. Epidemics and pestilences of recent occurrence, as well as some of very early date, are referred to in other and more appropriate places. RAMAZZINI records, that the years from 1689 to 1694 were wet, the winters mild, and inundations frequent; and that periodic fevers of an unfavourable kind, and diseases of the bowels, were epidemic; which he attributes chiefly to the irregularity of the seasons, and to the failure of the crops. But these were manifestly only a part of the elements which contributed to the causation of these maladies; the warmth of the climate, the great quantity of rain, and the frequent inundations, with their more direct results, being equally, if not much more, powerful agents. BAGLIVI describes the epidemic constitution of 1703 to 1705, and imputes it chiefly to the seasons, which were mild and rainy in winter and spring, and dry in summer and autumn. Earthquakes were frequently felt during these three years, in the States of the Church; and caused great alarm in the minds of the inhabitants, contributing thereby to the prevalence of disease. He states, that apoplexies and sudden deaths were very frequent; and that they had been also prevalent during 1694 and 1695, throughout Italy. Although he attibutes them chiefly to irregularity of the seasons, it is more than probable that the wars, and the attendant evils, which devastated that country during these years, were equally concerned in their production. COTUGNO and SARCONE have described an epidemic, which was very fatal in Naples in 1764, which followed irregularity of seasons, and a scarcity of grain; and which appeared

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with them or increasing their activity. Those "prevailing or minor epidemic diseases," which these writers (see Dr. HANCOCK, in *Cycl. of Pract. Med.* vol. ii. p. 82.) have viewed, not merely as the forerunners of pestilence, but as convertible into it, must be either epidemic or endemic, otherwise they cannot be said to prevail. If the former, which the writer just referred to admits, where are the facts? — Can they bear scrutiny? None have been adduced that can stand the test. If the latter, the circumstance might be expected, *à priori*, occasionally to occur, and is no proof either of the convertibility of the endemic into an epidemic pestilence, or of the absence of infection. The distemper to which this statement is most applicable, and regarding which it has been especially made, is yellow fever, as it requires a certain concurrence of causes for its development, especially in temperate climates which are chiefly and commonly productive of endemic fevers. Those causes are also the principal predisposing and concurrent agents in the diffusion of the infection of yellow fever, which thereby attacks a large proportion of those who might otherwise have been seized by the endemic maladies — the predisposition to infection, occasioned by those causes, favouring an attack of the pestilential epidemic, which thereby takes the place of the endemic disease. Can it be a matter of surprise, or should it not rather be expected — (*a*) upon the breaking out of epidemic yellow fever, which requires a high range of atmospheric warmth for its existence, and which, therefore, can occur beyond the tropics only at particular seasons, which are also those of remittents, that these latter or other endemic diseases should prevail? — (*b*) or, after great numbers have left the place where it has appeared, and the population is thereby greatly reduced; and when three fourths, or even more, of those who remained are attacked by it, as in the epidemics in the south of Spain; that the endemic diseases that prevailed, and which generally do prevail, at these seasons, should then not be heard of, or entirely disappear? — (*c*) or that, when the inhabitants who had departed have returned, and seeing that an attack of one disease does not necessarily preclude an attack of a different disease, remittents and other endemic disorders should reappear to a greater or less extent, according to the intensity and combination of causes producing them, after the pestilential epidemic has ceased? A careful investigation shows that the phenomena connected with this and other pestilences are actually such as may be inferred *à priori*, conformably with the doctrine which imputes them, viz. plague, yellow fever, and pestilential cholera — the chief pestilential epidemics with which we are acquainted — to infection.

The *fourth* and last statement of the non-infectionists, to which I shall here allude, is, that "no pestilential epidemic is one form of disease" (*Op.* cit. p. 82.), or of unvarying type; and they adduce this as an argument of such epidemic being an aggravated form of the diseases endemic to the place in which it breaks out. But what is the foundation for this statement? Actually none: for, however much the pestilences just enumerated may vary in grade and severity, they present, individually, such speciality of features, wherever they are observed, as readily enables the well-educated, the careful, or the candid observer, to distinguish them from diseases which approach them the nearest in character; and are as unvarying as small-pox, measles, or scarlet fever — if, indeed, they be not much more so. We see these latter maladies vary in severity, but they still preserve the same specific features; so do the pestilences in question. We, moreover, see the infections of those familiar and domestic diseases very limited, or scarcely at all diffusing themselves, at certain times and seasons; and, at others, spreading rapidly, generally, and in severe forms; — the same is also observed in respect of plague, yellow fever, and pestilential cholera. The principal difference between the epidemic manifestations of these two classes of distempers is in the frequency and the seasons of their appearance; and this is owing to the nature of the causes concurring to aid the diffusion of their respective infections; and without which aid they could not prevail generally, or become epidemic.

first among the poor, presenting the various malignant forms of continued and remittent fever. Bleeding, emetics, purgatives, bark, opium, &c. were principally resorted to, but the mortality amounted to nearly one half of those affected. The intermittent, and subsequently the remittent, character which the epidemic assumed during its early progress, proved that the state of the seasons, and the abundant sources of malaria, which existed at the time, were concerned in its production: but the great malignity, with tendency to dissolution, in the fluids and soft solids, which characterised its advanced progress, evinced the operation of additional agents; and these were sufficiently apparent in the wretchedness of the lower classes, the bad quality of the grain, in the want of cleanliness and the general inattention to infection, excepting in the religious houses, which escaped.

39. M. **Fodéré** refers to the transactions of the physicians of Berlin, Augsbourg, Breslau, Presbourg, and Laybach, to show that the seasons were not the chief causes of the epidemic constitutions they describe. Indeed, at numerous periods, as well as at these, the seasons have been remarkably irregular, without disease becoming epidemic, unless where *endemic* sources have been very much increased by such irregularity, or where the evils of war, or scarcity, or some other element of an epidemic constitution, have been superadded. When diseases have prevailed, they have not always been influenced by the state of the weather and seasons alone, more especially when they have possessed infectious properties. **Sydenham**, although he once conceived that the epidemics of this climate could be accounted for by means of the sensible states of the air, subsequently confessed that they depended less upon these states than upon something in this fluid that could not be ascertained; a more extensive observation having proved the inaccuracy of his former opinion, and confirmed the inference at which **Hippocrates** had arrived. **Geoffroy** and others attribute the adynamic and infectious fevers, dysentery, and scurvy, which became epidemic in Paris and the surrounding districts in 1709, to the very severe winter and spring of that year. But a stricter examination has shown that much more was owing to the scarcity of provisions, to their increased price, from the imposts of a disastrous war, to the oppression and poverty of the lower classes, to the want of cleanliness, and more particularly to infection favoured by these circumstances, by the state of society and manners, and by inattention to ventilation, &c., than to the severity of the seasons, to which they had been imputed; this co-operation of the elements of an epidemic constitution protracting as well as extending the prevalence of these maladies, as might have been expected, *à priori*, during three years, and for some time after certain of these elements had begun to disappear. In proof of the accuracy of this view of the matter, I may add, that the early months of 1716 were equally severe in Paris, and yet no epidemic occurred; for the principal causes which came into operation in 1709 did not then exist. In 1726, the winter and spring, in the same part of France, were very cold and wet, and grain somewhat scarce; but there was little increase of disease, — scurvy being, as it always was during the preceding century and the early part of the last, one of the most common maladies of that country. But in 1740, a similar severity of these seasons existed, and was aided by the evils of war, by a much greater scarcity, amounting to famine in many places, and by infection, with the rest of the causes just enumerated; and the results were such as the well-informed pathologist might have inferred from this combination of agents, more especially when acting upon a population physically and morally constituted and circumstanced as the French of that period were: these results being infectious, adynamic, and malignant fevers; dysentery, diarrhœa, and scurvy. Cold and wet seasons, thick fogs, and winds that have passed over marshy and woody countries, are often productive of epidemic catarrh, hooping cough, sore throat, bronchitis, rheumatism, &c., especially among children, aged persons, and females; and, as additional agents come into operation — as scarcity, emanations from animal bodies, infection, or whatever depresses the powers of life — so the character of the epidemic changes, and the maladies above enumerated, or the exanthemata, supervene, and spread widely.

40. The malignant remittent fevers that raged in the summer and autumn of 1652, in Copenhagen (**Bartholin**); of 1657, in London (**Willis**); of 1669, in Leyden (**Sylvius de la Boë**); of 1691, in various parts of Holland (**Dekkers**); of 1684, in Helmstadt (**Schelhammer**); of 1695, in Rome (**Lancisi**); and of 1737, in Breslau (**Hann**); and which presented somewhat modified characters, with the variation in the circumstances producing them, were very generally imputed to the epidemic constitution of these seasons, by the authors just named. But the evidence they have themselves furnished of the state of the antecedent seasons, and of the great heat and protracted drought following inundations, and exposing places generally covered by water, together with various concurrent and subordinate circumstances, satisfactorily accounts for these epidemics. These cities were, for a time, owing to these causes, similarly circumstanced to places within the tropics surrounded by the sources of endemic diseases; and consequently the prevailing maladies were, in their most prominent features, the same as those which are common to such places, or which attack unseasoned Europeans visiting them. This was manifestly the case, on these occasions, as regards Copenhagen, Leyden and other parts of Holland, and Rome. London, in the middle of the seventeenth century, was still surrounded by marshes and low grounds on nearly three of its sides. These endemic sources, during very hot summers and autumns, particularly when these followed immediately upon wet seasons or inundations, always occasioned periodical and continued fevers, dysentery, &c.; and, aided by a crowded population, want of cleanliness and ventilation, the manners of the lower classes, by moist and calm states of the air, and possibly by certain electrical conditions, favoured not only the generation of the more common infectious fevers, but also the development and propagation of foreign infection, as that of plague, when introduced.

41. The fever characterised by disorganisation of the digestive mucous surface, — the *Mucous Fever*, of **Fodéré** and others; the *Febris Stoma-*

chali-epidemica, of ARNOLD; the *Adeno-meningeal Fever*, of PINEL; and the *Gastric*, the *Catarrhal*, the *Mesenteric*, &c., of various authors, — had been observed in an epidemic form, on various occasions, somewhat similar to that in which it occurred in Gottingen in 1760 and 1761, when it was accurately observed and described by ROEDERER and WAGLER. It then assumed a very severe form, modified into the remittent, dysenteric, nervous, adynamic, and infectious states by the circumstances which concurred in producing it. These years, as well as those immediately preceding them, were very wet, and, moreover, the epoch of scarcity and war, during which the city was besieged. Hence it cannot be a matter of surprise that agues, remittents, dysentery, scurvy; gastric, adynamic, and typhoid fevers, &c., should have successively appeared; or that either should have successively predominated; or that a fever of a mixed or complicated character, and very severe form, should have prevailed during the co-operation of these energetic elements or agents of an epidemic constitution. My limits will not permit me to take a further view of the epidemic constitutions of authors. Those described more recently by HUXHAM, HEBERDEN, SIMS, &c. are of easy access to most physicians, and furnish merely illustrations of what has been already advanced. The epidemics which have occurred during the last half century in America and the south of Spain are particularly reviewed in the article on YELLOW FEVER. I shall, therefore, only advert to certain topics connected with them, and state such inferences as observation and study suggest.

42. Many of the writers who have either seen or given an account of the epidemic occurrences of yellow fever, as DEVÈZE, JACKSON, FERGUSON, &c. have insisted particularly upon the agency of miasms extricated, by a powerful sun, from the soil, and of the electrical states of the atmosphere, in their causation. It is very probable that such miasms emanate from rich deep soils abounding with the elements of vegetable and animal organisation and life, during very hot seasons, and when they are fully exposed to the sun's rays; it is also probable that vicissitudes in the electrical conditions both of the air and of the bodies placed on the earth's surface occasionally take place; and it is possible that both these agencies may be occasionally coincident, or co-operate in certain localities. But we possess no evidence, even granting their existence, that they are capable of producing the effects ascribed to them. Their existence, however, is only a matter of inference from certain phenomena which cannot sometimes be otherwise satisfactorily explained, and not of demonstration; and although the proofs of the injurious operation of the former of these are more convincing than those yet furnished in respect of the latter, yet facts are still wanting to render the evidence in support of it complete. After a personal examination of many of the localities, both within and without the tropics, to which certain pestilential epidemics have been altogether ascribed by many writers, I cannot come to the conclusion that, under circumstances of the kind just stated, these localities could ever, of themselves, produce the very general and fatal effects characterising these pestilences; that even the warmest sun, the stillest atmosphere, and the longest absence of thunderstorms, which observation has ever shown to have occurred, — the conditions so strongly insisted upon by these writers, — could generate from them miasms of so noxious a nature as to occasion, by their unaided action, such pestilential epidemics as have occurred in various parts of America, and the south of Spain. That endemic sources of disease, especially the situations alluded to, give out miasms when long acted on by a hot sun; that these often become concentrated in a humid and calm atmosphere, or after autumnal showers; and occasionally are aided in their operation upon the human frame by the electrical states of the air; may be admitted; for an increased prevalence, and a more severe form, of fever is often observed in these situations, on such occasions. But after the most careful consideration long bestowed on the subject, and after a patient enquiry into the facts recorded, I cannot believe that these exhalations are the only, or always the chief, cause of these epidemics. That infection is a primary agent in the propagation of the disease, and that an infectious miasm is generated by the sick, cannot, I think, be denied by the candid enquirer into *all* the facts connected with the subject. But I believe that, without the physical changes and the consequent emanations alluded to, or some other concurring causes, the infection would not extend through the community, as these emanations, floating in the air, dispose the system to be impressed by the infectious principle, or otherwise aid its operation; or, in circumstances where the terrestrial exhalations have already produced much disease, the miasms from the sick become a superadded cause, increasing the severity of the epidemic, as well as the rapidity and universality of its spread. That an infectious principle is concerned thus primarily or consecutively in the production and propagation of pestilential epidemics, according as it may be introduced from some other quarter, or generated by those first affected, appears fully established by numerous circumstances, independently of various considerations derived from the nature of the particular epidemic, and of the antecedent and consecutive disorders, especially those endemic to the place in which it breaks out. Of these considerations, the following seem not the least important.

43. *a*. The localities to which certain epidemics, as yellow fever, are chiefly confined, have been, for many successive years, circumstanced, in respect of season and weather, similarly to the periods in which that disease has been most destructive; and yet the common endemic of the country only has been observed, in the form it usually puts on in that particular season.—*b*. True, or epidemic yellow fever differs not merely in degree, but also most essentially and in kind, from the endemic fever of these localities; consequently the former is not merely an aggravated state of the latter,—the one disease is as different from the other, as small-pox is from measles. — *c*. On all occasions on which the non-infectious properties of yellow fever have been argued for, the bilious remittent or severer forms of endemic fever of low situations in warm countries, and the ardent or seasoning fever of Europeans who have lately arrived within the tropics, have been assumed as identical with that malady. This error

has arisen from the occasionally yellow appearance of the skin in the bilious remittent, and the dark or coffee-ground vomiting sometimes seen before death in it and in the ardent fever. But these changes are not the same, even in the cases where they are most prominent, as those in the true yellow fever; and, as shown in another place, are owing to very different pathological states. — *d*. That the very essential difference between these diseases indicates their different origins; and a speciality of form in the various quarters where the epidemic malady has been observed, equally denotes its source in a specific cause. — *e*. That diseases which arise from terrestrial exhalations present numerous modifications, forms, and types; have all a tendency to relapse, or to return in some form or other, upon exposure to the exciting cause; and always occasion marked derangement, and ultimately organic change, of the liver, spleen, or pancreas, or one, or all: whereas the true or epidemic yellow fever, independently of the most irrefragable proofs of infection, possesses all the attributes of infectious diseases; attacks the frame only once, as shown by the most unquestionable evidence, British and foreign, derived from the epidemics of Spain and America; and leaves no organic changes of these viscera as sequelæ, even of its most malignant state. — The manner in which the very different diseases now referred to have been confounded the one with the other, by those espousing the non-infectious nature of yellow fever, whether from ignorance or unfairness, has led to the most serious consequences to the community; has misled the inexperienced, mystified the subjects in dispute, furnished grounds for a special pleading sort of argumentation, and, as will be seen in the articles FEVER and INFECTION, endangered the safety of fleets and armies, and even of kingdoms.

44. IV. GENERAL INFERENCES.—*a. Civilisation* exerts a most decided influence in diminishing the frequency and mortality of epidemics, especially those that are fatal or pestilential, as shown by their history at different epochs, and in different countries holding various grades in the scale of civilisation,—an amelioration evidently due— α. to a better cultivation of the soil; to more extensive commerce, and, consequently, to the less frequent occurrence of great scarcity, and to the improved diet and circumstances of the lower classes, in most European countries, in modern times; — β. to a favourable change in the manners and habits of the middle and lower classes, particularly in regard to cleanliness, social intercourse, and domestic arrangements; and to better ventilated and improved dwellings; — γ. to superior care in the separation and treatment of the affected; and to stricter measures for the prevention and counteraction of infection. Owing chiefly to neglect of these circumstances, the lowest classes, and the most wretched amongst these classes, are most frequently attacked — the mortality being also the greatest among them in proportion to the number affected.

45. *b. Different ages* are not equally affected by epidemics. The exanthematous fevers and hooping cough are most prevalent among, and fatal to, infants and children; influenza, to the aged and debilitated. Continued fevers, in adynamic and malignant forms, attack chiefly persons from fifteen to sixty; but are less fatal to them, than to those of earlier or later ages. Plague most frequently seizes adult persons of early or middle life, and generally males in somewhat greater numbers than females, — probably owing, in part, to more exposure, at this age and of the male sex, to the predisposing causes and to infection. Yellow fever attacks chiefly the young and middle-aged; but spares only those who have passed through it in former epidemics. Pestilential cholera, on the other hand, does not so often attack persons about puberty and the meridian of life, as those that are aged and exhausted; and it is usually more fatal in the latter than the former. When increased activity of endemic causes produces epidemic fevers, young children often suffer very remarkably; and the malady assumes, in them, gastric, choleric, or dysenteric forms.

46. *c. The mortality from diseases*, when they first appear in an epidemic form, is usually very great; but diminishes with the frequency of their recurrence, especially those which have sprung up since the early history of our science, and which are of a contagious or infectious nature. This has been the case with hooping cough, measles, syphilis, small-pox, and may probably be so with pestilential cholera. It is not so manifest with regard to pestilences appearing after long intervals: but these are usually much more fatal at their commencement, or during their early course, and less so at their decline. The first introduction of small-pox, syphilis, &c. among savage tribes, has been as destructive as the pestilences that occurred in the middle ages. This can be explained only as briefly stated above (§ 30.).

47. *d. As to the influence of epidemics on population*, it may be inferred, that the diminished prevalence of certain maladies, which formerly raged epidemically, is in some respects compensated by the greater frequency of other diseases, formerly of rarer occurrence; or the appearance of some previously but little or not at all known. — α. Since the introduction of vaccination, small-pox has rarely prevailed to a great or fatal extent; but scarlatina, measles, croup, inflammations of the bronchi and lungs, and cerebral affections, have evidently increased. The benefits, therefore, of vaccination may be said to be somewhat over-rated. It is remarked by M. SAY (*Cours complet d'Economie Politique*, t. iv. p. 385.), "When we hear it said, that, by saving a hundred thousand lives, vaccination has added a hundred thousand souls to the population, we may smile at the error, whilst we applaud the discovery." M. VILLERMÉ has deduced from his researches, that, in populous countries, and particularly in large towns and cities, and in the lower classes, small-pox is fully replaced by an increase of other dangerous diseases; but in districts furnishing sufficient subsistence and scope for increased population, and in the higher classes, this compensation is hardly or but slightly observed. Indeed, all preservative measures against the diseases of infancy act similarly, — in suppressing one cause of death, we more or less increase the activity of the rest.

48. β. In civilised countries, epidemics, although attended by a very great mortality, only

temporarily diminish the population; for it is uniformly observed, that the void is filled up, during the next few years, by a much greater annual average of marriages and births, and by an influx of strangers from other parts, the mortality leaving more abundant means of subsistence for those who have escaped. Destructive epidemics are most frequent in low situations and crowded cities; and epidemics of a slighter kind and commoner form often occur in these and other districts abounding with malaria; and, whether they be aggravated forms of the usual endemics, or infectious fevers, &c., they all indirectly tend to augment the number of marriages and births, whilst they increase the deaths and diminish the mean duration of life. These results are evidently owing to the more abundant means of sustenance and employment furnished by these places, than by mountainous and barren districts; and to the influx from more healthy parts; the excess of deaths over births being supplied from the latter source. The following statistic return, furnished by M. Bossi, prefect of the department of the *Ain*, in France, and which he has divided into four zones, according to the nature of the locality, illustrates this statement, and shows —

	1 Death annually to Inhab.	1 Marr. annually to Inhab.	1 Birth annually to Inhab.
In the hilly districts - -	38·3	179	34·8
Along banks of rivers, &c. -	26·6	145	28·8
In cultivated grounds -	24·6	133	27·5
In marshy places, &c. -	20·8	107	26·1

(For the *Prevention* of Epidemics, see *art.* ENDEMIC INFLUENCE (§ 20.) and INFECTION.)

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EPIGASTRIUM. Syn. — Ἐπιγάστριον (from ἐπὶ, upon, and γαστὴρ, the stomach). *Regio Epigastrica*. *L'Epigastre*. Fr. *Der Oberbauch*, *Ober-Schmeerbauch*, Germ. *Epigastrio*, Ital. *Pit of the Stomach*.

Classif. — General Pathology, &c. *Semeiology*, &c. Special Pathology.

1. I. Examination of its States. — A careful investigation of this region, and accurate interpretation of the phenomena it may present, are of the utmost importance in practice. The symptoms of disorder referrible to this part, must not, however, be estimated by themselves, but in conjunction with others furnished by the adjoining regions, by the general surface, by the pulse, by the state of the tongue, by the excretions, &c. — Attention was directed to this part in the diagnosis and prognosis of disease, from the earliest history of medicine. Hippocrates remarks, that it is a favourable symptom in fevers, when the epigastrium is supple, soft, equal, and free from pain.

2. i. *Altered or augmented sensibility* of this region, in any degree or kind, is an important indication of the seat, the nature, and the result of disease. In order to ascertain these points more accurately than can possibly be otherwise done, not only should the patient's account of his sensations be attended to, but the bared region should be carefully examined, when it can be done with propriety (§ 3, 4.). The *sensibility* of this region is greater than that of any other, more especially in thin delicate persons, and females — in the hysterical and hypochondriacal. It is increased in many acute diseases — frequently in fevers, of every type and form, very remarkably in gastritis, generally in hepatitis and diaphragmitis, particularly on pressure, and in inflammatory dyspepsia. Morbid sensibility amounts to acute pain, characterised by anxiety and a sense of vital depression or sinking in inflammations of the stomach, of the tendinous part and peritoneal surface of the diaphragm of the upper portions of the peritoneum and omentum, and of the gall-bladder and ducts; and in spasm of, or impaction of gall-stones in, the latter. In all these, tenderness is often extreme, and pressure is followed by sickness and desire to vomit. Pain is commonly dull, heavy, gnawing, or but little felt except on pressure, and deep-seated, in chronic inflammation of the liver, particularly of its substance; in hepatic abscess; in chronic disease of the gall-bladder and ducts, of the pancreas, and of the orifices of the stomach. It is burning and attended by nidorous, acrid, and acid eructations, in cardialgia and other dyspeptic affections, particularly in the gouty diathesis, or before a paroxysm of this complaint; or upon its retrocession, on which occasion this sensation is aggravated, and is attended by great anxiety and vital depression. A sense of heat or burning at this part often precedes an attack of hæmatemesis; and the same feeling, with acute, lacerating pain, anxiety, depression, remarkable tenderness, tension, and continued or repeated vomiting, characterise acute sthenic gastritis. When a fixed, deep-seated, occasionally lancinating, pain is felt at the upper part of this region, sometimes extending under the sternum, or between the left shoulders, or under the shoulder-blade, and is increased during or directly after eating, or is accompanied by difficult deglutition, or rumination, or by palpitations and irregular action of the heart, then organic lesions of the cardiac orifice of the stomach may be inferred. Similarly characterised pain at the lower part of this region and to the right, increased an hour or two after a meal, and sometimes attended by sickness, indicates the commencement of chronic disease of the pylorus; but in its advanced stages, these symptoms are felt much lower down in the abdomen, or to the right of this part. — Pain of this region is a symptom also of acute and chronic pericarditis, particularly at the upper and left portion of it; and is frequently complained of, especially after a meal, by females who wear tightly laced corsets, and during the latter periods of pregnancy. A sensation of gnawing, erosion, &c. frequently accompanies worms in the prima via, and, in some cases, the first months of utero-gestation.

3. ii. *Distension*, *tumefaction*, or *distinct tumour* of the epigastrium is seen in various diseases. Unusual *fulness*, or *elastic distension*, is generally occasioned by flatulence of the stomach, or by collections of air in the colon. In these cases, external pressure, if it be not prevented by increased sensibility, which is usually also present, often partially expels the flatus; and a tympanitic sound is emitted on percussion. Borborygmi are also troublesome, particularly when this symptom is observed in hysterical and hypochondriacal cases, or in flatulent colic. It also attends upon accumulations of bile in the biliary ducts and gall-bladder, and upon congestion of the liver; but in such cases, the fulness is partly owing to the disease of these parts, and partly to a contingent distension of the stomach by air. — *Tumefaction* of this region is frequently seen in hydrothorax, and in chronic pericarditis, with effusion into the pericardium; but most remarkably when the patient sits up. In the recumbent posture it is less evident. — Either swelling, or *distinct tumour*, is sometimes observed in enlargement of the liver, particularly of its left lobe, and in abscess of this organ. When the abscess points upon the diaphragm, and rises into the right thorax, swelling is occasionally not observed, but the patient generally complains of a dull or heavy pain, or soreness, with tenderness on pressure, in this part. In two cases of hepatic abscesses, in which I was very recently consulted by the practitioners attending them, there was very great, but diffused, swelling in the epigastrium, with pain and tenderness, in one; and no swelling, but deep-seated pain and soreness, in the other. The nature of the disease was recognised in both instances, and confirmed shortly afterwards by the sudden and profuse expectoration of the contents of the abscesses, which in both cases had opened into the lungs. The patients are still under treatment;

and, in one at least, there are hopes of recovery. Tumour in this region may be occasioned by great distension of the gall-bladder with bile, from obstruction of the common duct; but, in this case, it is more circumscribed and distinct than in abscess of the liver, is unattended by any appearance of inflammation of the external parietes, is often pyriform, and situated at the lower part of the region, and to the right, fluctuates obscurely, and often disappears after appropriate purgatives. Swelling of this part, in lean persons, may also be occasioned by enlarged or scirrhous pancreas, more rarely by distension of the duodenum, and not so often as is supposed by tumours about the pylorus, because, when they are sufficiently large to distend this region, they generally draw this extremity of the stomach below, and to the right of it. Fulness of the epigastrium is seldom occasioned by distension of the colon with flatus, or accumulated fæces, or by enlarged spleen, or by the effusion of fluid, until after the swelling has appeared to a very considerable extent in the adjoining regions; and then it is greatest at the lower part.

4. iii. *Pulsation in the Epigastrium* arises from the following causes: — *a*. Nervous susceptibility and irritation; — *b*. Inflammation of the aorta; — *c*. Aneurism of the aorta, cœliac, or superior mesenteric artery; — *d*. Adhesion of the pericardium to the heart; — *e*. Tumours at the root of the mesentery; — *f*. Tumours of the stomach, and scirrhus of the pylorus; — *g*. Enlargement of the pancreas; — *h*. Hypertrophy of the heart, particularly of its right side; — *i*. Enlargement of the vena cava inferior; — *k*. Hepatisation of the lower portion of the lungs; — *l*. Enlargement of, or abscess in, the liver. On the chief of these I shall offer a few remarks.

5. *a*. *Nervous pulsation* of the aorta and cœliac arteries is not infrequent. It comes on suddenly; and often continues long, chiefly in hysterical females, and hypochondriacal men, whose nervous system and digestive organs have been long debilitated or otherwise disordered. It is generally stronger in the morning than in the evening. Dr. BAILLIE met with a case that remained for many years. Dr. VALENTINE MOTT states that of a lady, in whom it occurred as a certain sign of pregnancy; but usually left her after the third month. I have seen it so violent that the pulsation could be observed through the dress, and the patient insisted it could be heard at some distance. (See AORTA, § 2. *et seq.*)

6. *b*. *Aneurisms* of the aorta and large arteries may occasion pulsation in this region; but they frequently have proved fatal without this symptom being noticed; and, where it has been remarked, the pulsation has not been strong. Mr. A. BURNS states, that aneurism of the cœliac artery is rarely a cause of this pulsation; and that, in about twenty cases of pulsating tumours in the region of this artery, not one of them turned out, upon dissection, to be disease of this or any other artery. (See AORTA, § 44.)

7. *c*. *Adhesion* of the pericardium to the heart, is sometimes a cause of pulsation; and that it should be, is obvious. Dr. MOTT thinks it one of the most frequent causes. Dr. HOPE describes the pulsation as peculiar, and distinguishes it by the epithets jogging or trembling; it is synchronous with the sounds of the heart. (See PERICARDIUM.)

8. *d*. *Tumours*, from enlargement of the glands at the root, or in the duplicatures, of the mesentery, are productive of pulsation when they become considerable and press upon the aorta, or cœliac or superior mesenteric artery. A case of this description is described by Dr. ALBERS. In a person whom I attended some time ago, and who had become very emaciated, a distinct pulsation in the umbilical region arose from this cause. Indeed, the pulsation, when thus produced, is rarely so high up as the epigastrium, and is sometimes felt in both regions.

9. *e*. *Tumours* developed in the *stomach*, or attached to its villous coat, and scirrhus of the pylorus, have been noticed, by BAILLIE, BURNS, MONRO, FRANCIS, and V. MOTT, as occasionally attended by pulsation. I cannot, however, agree with the last writer, in thinking that "the obstruction to the free passage of blood through the hardened" and enlarged parts occasions this symptom; but believe that, when they press upon, or come in contact with, the large arteries, especially the aorta, the pulsation is necessarily propagated to the external situation in which it is felt.

10. *f*. *Enlargement of the pancreas*, or of the *liver*, is probably more frequently a cause of epigastric pulsation, than tumours connected with the stomach; the enlarged and indurated viscus transmitting the pulsation of the aorta, as just stated. This cause has been noticed by BURNS, WARREN, V. MOTT, PORTAL, and myself. Dr. SEWELL considers that an enlarged pancreas is always accompanied with pulsation at the epigastrium. I think that such is not the case; and that, generally, the disease must be far advanced before this symptom attends it.

11. *g*. Of the other causes of pulsation at the epigastrium, I need only remark, that cases, in which it has been occasioned by enlargement of the *vena cava*, are mentioned by SENAC and A. BURNS. Dr. PEMBERTON thinks that the fluttering, sometimes felt at this region, is produced by congestion of the vena portarum, and the undulation communicated to it. Pulsation from *hepatisation* of the lower margin of the lungs, has been observed by A. BURNS and others. BERTIN, BOUILLAUD, and myself have noticed this as a symptom of inflammation of the aorta. (See art. AORTA — *Inflam. of.*) Its connection with *hypertrophy* of the heart, particularly of its right side, requires no remark.

12. iv. *In examining the epigastric region*, pressure should at first be very gentle, gradually increased, and be made in various directions. When the heart is diseased, it should be directed under the anterior cartilages of the upper false ribs; and, according to the situation of other organs or parts suspected of disorder, the pressure ought to be directed. When the patient almost involuntarily throws the muscles underneath into action, upon commencing the examination, acute disease of some part or other may be suspected. The state of the surface, in respect of moisture, temperature, softness, colour, &c.; and the sensibility, the elasticity, the degree of depression, fulness, pulsation, &c. of this region; are equally deserving of notice. In difficult or doubtful cases, *percussion*, particularly if aided by PIORRY's pleximeter, will be of service in giving information as to the presence of air, or of effused fluids, or of enlargement of the subjacent viscera.

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II. EPIGASTRIUM — CONTUSIONS AND CONCUSSIONS OF.

Classif. — I. Class, I. Order (*Author*).

13. Blows on the epigastrium, or falls, and concussions of the trunk, may give rise to the most serious consequences, and even to immediate death. The manner in which these effects are produced has not always been correctly estimated, although they are amongst the most familiar phenomena which present themsent themselves. A blow on the epigastrium may seriously affect the frame from its effect — 1st, upon the stomach; 2d, upon the liver, gall-bladder, or spleen, either of which it may rupture, particularly when congested, or in a state of disease; 3d, upon the digestive canal, some part of which may be ruptured by it; 4th, upon the diaphragm and respiratory organs; 5th, upon the actions of the heart; 6th, and lastly, upon the great ganglia and ganglial nerves. In a person in previous health, I believe, from an attentive examination of the phenomena consequent upon the injury, that the immediate effect is produced upon these ganglia, and is analogous to that occasioned by concussion of the brain. In some cases, the stomach or other parts enumerated, may suffer, according to the nature and the direction of the blow; as in a case recorded by Duponchal, in which the jejunum was ruptured; and in one seen by myself, many years since, in which the spleen, which had been much enlarged, was ruptured. A distended gall-bladder is, however, most obnoxious to this contingency, if it be distended with bile on the receipt of the injury.

14. i. Symptoms. — *a.* The patient generally falls to the ground, pale and motionless, with the most distressing death-like sensation. The skin is cool, damp, and pale; the breathing is feeble, often scarcely perceptible, and slow. The eyes are fixed, the countenance collapsed, the lips pale, and the pulse at the wrist scarcely perceptible, or irregular and intermitting, or not to be felt. The surface and extremities become quickly cold; the muscles are flaccid, the joints pliable; and, in some instances, the sphincters are relaxed. If the powers of life be not rallied at this time, all these phenomena increase, until the action of the heart and respiration entirely cease. If *death* follow, the blood generally continues fluid, the limbs flaccid, and cadaveric changes quickly supervene. The changes, in the most severe cases, somewhat resemble those produced by lightning. In some instances, one or more of the organs, above enumerated, are injured, either in conjunction with these changes, or independently of them.

15. *b.* These are the more direct effects, which may terminate rapidly in death when the injury has been severe. But when slighter, or when a judicious treatment has rallied vital power, a different train of symptoms appear. The patient is enabled to speak; he complains of pain and anxiety at the epigastrium, with remarkable tenderness; the pulse returns, and the surface recovers its temperature. At last, symptoms of intense reaction supervene: the pulse becomes full, strong, and quick; the epigastrium and abdomen tumid or tense; the eyes sunk and red; the face sharpened, pale, and anxious; the tongue and mouth dry, with great thirst, but generally without either sickness or vomiting; and pains are felt in the limbs, and different parts of the body, with restlessness. Such are the usual phenomena characterising the reaction, when no particular organ is seriously injured, or inflamed. The stomach, or the liver, or even the peritoneum, or one or more of them, often becomes inflamed in the course of the reaction, owing to the injury it had received. In this case, the particular signs of such lesion will be superadded; as constant vomiting upon taking matters into the stomach, and pain in the region of this viscus, when it is inflamed; tenderness and pain in the right hypochondrium and epigastrium, when the liver is affected; and so on as respects the other organs.

16. ii. Treatment. — The means of cure are very different at the different periods distinguished above. — *a.* In the *first* period, remedies should be promptly employed, but with caution. Internal stimuli are dangerous, from their liability to induce fatal inflammation, particularly of the stomach. External warmth, and hot stimulating baths, are generally beneficial, especially when aided by irritating frictions. In plethoric and robust subjects, cupping over the hypochondria, notwithstanding the depression, and abstracting a moderate quantity of blood, so as to give greater freedom of action to the heart and blood-vessels, will be of service. But experience has shown, not merely in one country, but in all, that animal warmth, derived from a recently killed animal, is the most effectual means of rallying the depressed powers of life in cases of this kind. Ambrose Paré advises the skin stripped from a sheep as soon as it is killed, to be wrapt round a person whose life is menaced by the first shock of a contusion. M. Larrey has resorted to it, in several cases, with instant benefit, one of which is detailed by M. Duponchal. M. Larrey states, that some sailors, shipwrecked on the coast of Labrador, were found by Esquimaux Indians almost dead with cold and fatigue; and that they were recovered by these kind savages, who enveloped their bodies in the warm hides of newly killed animals, and chafed their limbs with hot aromatic liquors, — a proof of the frequent superiority of even rude observation, to fine-drawn inferences from theory, the grounds of which have either been assumed without investigation, or received as the dictum of current but worthless authority. The inhabitants of Upper Egypt, according to M. Pugnet, resort to similar applications, to severe injuries; and analogous means, particularly warm eviscerated animals, applied over the trunk, and the almost living flesh of pithed quadrupeds, are in common use among the vulgar in northern countries, in cases of contusion, &c.

17. *b.* In the *second* period, or that of reaction, general and local depletions, the tepid bath and fomentations, camphorated and stimulating

embrocations or liniments, blisters over the epigastrium or abdomen, emollient and gently refrigerant drinks, and aperient enemata, are the principal remedies. Great caution should be exercised during convalescence, as to the patient's food and drink; the former of which ought to be chiefly farinaceous, and in small quantity at a time; the latter bland, and between the temperature of 70° and 90° of Fahrenheit's scale. If symptoms of inflammation of the stomach, or of any other part, appear during reaction, the treatment should be directed accordingly.

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EPILEPSY. Syn. — 'Επιλῆψια, 'Επιλῆψις (from ἐπιλαμβάνω, I seize, I attack). *Morbus Sacer*, Hippocrates. *Morbus Major*, Celsus. *Morbus Herculeus*, Aristotle. *Morbus Comitialis*, Pliny et Seneca. *Morbus Convivalis*, Plautus. *Morbus Lunaticus*, Aretæus. *Analepsia*, Riverius. *Apoplexia parva; Caduca Passio; Morbus Sonticus, Caducus, Astralis, Sideratus, Scelestus, Dæmoniacus, Deificus, Divinus, Sancti Johannis, fœdus, puerilis, insputatus; Peditio; Epileptica Passio; Cataptosis*, var. Auct. Lat. *Epilepsie, Mal-Caduc, Mal de St. Jean*, Fr. *Fallsucht, Die Fallende Sucht*, Germ. *Mal Caduco*, Ital. *Falling Sickness, &c.*

Classif. — 4. *Class*, 3. *Order* (*Cullen*). 4. *Class*, 4. *Order* (*Good*). II. Class, III. Order (*Author*, in *Preface*). See Convulsions.

1. Defin. — *Sudden loss of sensation and consciousness, with spasmodic contraction of the voluntary muscles, quickly passing into violent convulsive distortions, attended and followed by sopor, recurring in paroxysms often more or less regular.*

2. Epilepsy has been noticed by all the ancient writers; but by none so fully and accurately as by Aretæus. The sudden and frightful seizure of which it consists, induced them to refer it to supernatural causes; and hence originated several of the names which have been applied to it. Notwithstanding the very numerous results of observation accumulated by the ancients, and still more remarkably by the moderns, its nature and treatment are very imperfectly known. There is, perhaps, no other malady of which the treatment has been more empirical than of it; and this opprobrium must necessarily continue until our knowledge of its pathological relations is much further advanced than at present. In the *description* I am about to give of this disease, its more distinctly marked states will be *first* considered, and afterwards the varieties into which it has been divided, according to the modifications and complications it usually presents in practice. It will appear in the sequel how very nearly it is related to *apoplexy* on the one hand, and to *convulsions* on the other, — in its more *idiopathic* states, to the *former*, to *mania, maniacal delirium*, and *idiotcy*; and in its *symptomatic* states, to the *latter*, to *hysteria, ecstacy*, and some other nervous affections. But the relations and complications of epilepsy, and the transitions of it into these maladies, as well as of those into it, will be noticed hereafter; and the disease will be treated of as it actually presents itself to the practitioner, and not as it is usually described by systematic writers, who have viewed it (and, indeed, all other diseases) as a distinct species, and not as it commonly occurs — as a concatenation or group of morbid phenomena, which varies infinitely in form, intensity, and combination, and consequently approximates more or less nearly to other morbid actions, particularly of the same system or organ, and which may either pass into them, or appear in their course.

3. I. Description, &c. — In order to entertain satisfactory ideas of the nature and morbid relations of epilepsy, it should be studied as to — 1st, the phenomena which precede its evolution; 2dly, the signs indicating the approach of the paroxysm; 3dly, the paroxysm itself, and the phenomena immediately consequent upon it; and, 4thly, the intervals between the seizures. M. Andral has adopted a nearly similar arrangement, which, however, is merely a modification of that of J. Frank, the latter, upon the whole, being the preferable of the two. Having described the more regular states of the malady, I shall take a brief view of its varieties and complications.

4. *A. The phenomena preceding the evolution of the disease.* — J. Frank remarks that, of three hundred cases, the early history of which he had the opportunity of investigating, very few occurred in persons who had been perfectly healthy previously to the accession of the disease. This, however, had not escaped Riverius and Tissot, the latter of whom has treated specifically "*On the Diseases which precede Epilepsy.*" This malady attacks chiefly those persons who had been subject to convulsions during their first dentition; to tinea capitis, or other chronic eruptions in early life; to diseases of the head, violent affections of temper, or to disorders of mind; to an unbridled indulgence of the passions; to diseases of the ear; to affections of the glandular and lymphatic system; to worms, to chorea, or to hysteria, at any period previously to the epileptic seizure. Many of these antecedent disorders may be viewed either as predisposing or exciting causes; or as indications of those early disturbances of the nervous systems, and of the circulation of the cerebro-spinal centres, that lead on to further changes, when left to themselves, until the fully formed epileptic seizure is the result. Thus, it is not infrequently remarked that epileptic patients have, long before the accession of the disease, complained of tremors, cramps, vertigo, partial paralysis, disorders of sensation, chorea, stammering, palpitations, epistaxis, &c.; or have received injuries on the head. The relations of these with the seizure, as well as of those noticed above, must be obvious to all. There are also other disorders which precede the disease; but which, being more intimately related to its causes, will be noticed hereafter.

5. *B. Phenomena premonitory of the seizure.* — As this disease rarely attacks a sound constitution, or person previously in good health, so each paroxysm frequently is preceded by some indication or other of its approach. Instances, however, are common, of persons being seized without any intimation, and even in the daytime, as suddenly as if struck by lightning. Wedel, Henke, and J. Frank refer to several such. The last writer thinks it a rare occu-

rence; but I agree with Esquirol, in considering it by no means uncommon, particularly in the *idiopathic* form; the *symptomatic* form being generally preceded by some indication. In two cases at present under my care, the seizures are instantaneous and unexpected: and I have met with several such, chiefly in those idiopathically affected, or who have inherited the disease.

6. The *premonitory signs* of the fit are, generally, increased sensibility, or a sense of formication of the surface, or of some particular part, as the arm, back, breast, &c.; cramps; turgidity of the vessels of the head; redness of the countenance; a peculiar, anxious, or fixed look; heaviness or obtuse pain of the head; vertigo, or particular sensibility, or a feeling of emptiness or coldness in the head; a great paleness of the face, and paleness or blueness of the lips and gums; a deeper sleep than usual; sleeplessness, or sleep attended by startings or peculiar succussions of various parts of the body, or disturbed by singular dreams and visions, or by the nightmare; a sensation of sinking, or leipothymia, when falling asleep; unusual states of temper; irritability, or marked disposition to anger; various hallucinations, or spectral illusions; great timidity, or unusual depression or serenity of mind; anxious deportment; great hilarity or mental excitation: an uncommon feeling of strength, or of robust health; sudden loss of recollection, confusion of ideas, or forgetfulness; unsteady gait; a desire of motion, or an irresistible impulse to run forwards; shivering of the limbs; dimness of sight; red or black objects, or coruscations or scintillations, before the eyes; trembling of the iris, or alternate contractions and dilatations of the pupils; temporary loss of sight, double or partial vision, or strabismus; a rush of tears; deafness, or a sense of humming, roaring, or other noises in the ears; a morbid perception of colours, of odours, or of flavours; a sense of sweetness in the mouth; a flow of saliva; violent sneezing, hiccup, frequent yawning, attended by a feeling of anxiety at the præcordia; pandiculation; difficulty of articulation, or stammering; distortion of the countenance; spasmodic affections of the larynx; fainting, or leipothymia; palpitations; borborygmi; a sense of constriction in the fauces, throat, thorax, or abdomen; cramps in the stomach; great voracity, or unusual craving of the appetite; a copious discharge of watery or offensive urine, or hæmaturia; a peculiar fœtor of the fæces; more frequently eructations, nausea, and vomiting, or other dyspeptic symptoms; and still more commonly the *aura epileptica*. J. Frank saw the paroxysm preceded by an eruption, over the whole body, excepting the face, of the *vitiligo alba*. He states, that in twenty-one epileptics treated in the clinical wards of the hospital at Wilna, vomiting announced the paroxysm in seven.

7. More than two or three of the foregoing symptoms seldom exist at the same time; but they sometimes precede one another. Thus, in a case which I lately attended, the patient was unusually excited in the morning, was restless, could not sit in one place any time, and desired me not to call again, as he never felt better in health and spirits than he did at that time. As I had been seeing him from time to time, on account of an indifferent state of health, I requested his friends to watch him. In the afternoon, he turned pale, felt very cold, complained of pain in one eyeball, became sick, vomited, and instantly was severely seized. Another patient felt an unusual craving for food, with faintness, sunk and pallid features, most distressing sense of sinking, followed by violent palpitations; and directly afterwards, experienced a severe paroxysm; the pulse becoming irregular and intermitting during its continuance. The sensation of a *cold or warm aura* proceeding from some part, and ascending to the head, but very rarely descending from the head to another part, is one of the most common precursors of the fit. In some cases, the *aura* has been felt to terminate at the epigastrium. The places whence it most frequently proceeds are, various parts of the upper and lower extremities, the groins, hypochondria, abdomen, loins, uterine regions or vulva, along the vertebral column, and from the vertex to the occiput. Fernelius mentions its occurrence at the vertex; and Schelhammer, a case in which it commenced at this part, and proceeded to the arm. From whatever place the aura may arise, as soon as it reaches the head, or ceases, the patient loses all consciousness, and the fit is fully declared.

8. C. *Phenomena characterising and directly following the fit.*— It is only during the paroxysm that the characterised symptoms are observed. These may be so violent as to appear most frightful, or so slight or momentary as to be hardly observed, with every intermediate grade. This has led to the arbitrary distinction adopted by Esquirol, Foville, Calmiel, and Andral, into the *Grand* and *Petit Mal*. The former, or fully developed paroxysm, may be divided into *three stages.*—(*a*) In the *first*, or that of *tetanic rigidity*, the patient, either without any premonition, or after having felt one or more of the precursory signs above enumerated, generally utters a scream or exclamation, of which he has no recollection afterwards, and instantly falls backwards, if standing. Sometimes he runs some steps forward, or turns so as to describe a semicircle or circle, and then falls to the ground. Rarely he turns rapidly around more than once, as remarked by Kriegal, Wedel, Bang, Valentin, Löbenstein-Löbel, Esquirol, and J. Frank; or is thrown into a sort of dancing motion,—a circumstance which led Fabricius to describe a variety of the disease by the name of *Epilepsia Saltator*. Directly afterwards the whole body assumes an almost tetanic stiffness; the head is drawn backwards; the eyes are generally open, and directed from the usual axis of vision; the limbs are thrown out forcibly, and become rigid; and the muscles of the thorax and abdomen firmly contracted. The pulse is either irregular, or natural, or slower than usual. The face is very pale, unless cerebral congestion precede the attack; and the respiration is impeded by the spastic contraction of the thoracic muscles. Occasionally, one half of the body is more affected than the other; and erection generally occurs in the male, with retraction of the testes. This stage is usually of very short duration, passing in some seconds, or almost instantaneously, into the next.

9. (*b*) In the *second stage*, or that of *convulsion*, the phenomena differ in no respect from those characterising the tonic form of Convulsion

(§ 12.), excepting in the more profound insensibility attending it, which is so great that the patient may be subjected to the most painful applications without sensation being excited. The whole body is generally thrown into the most violent convulsions, so that, as **Aretæus** has remarked, the spectators dread the immediate extinction of life. The head is violently rotated, or tossed in every direction; the vessels of the head and neck are enormously swollen; the eye-brows, forehead, and scalp are much agitated or contracted; the hair is erect; the eyelids are either open, half shut, or convulsed; the eyes fixed, prominent, vacant, rolled about, or turned upwards, or out of their axis; and the pupils are either dilated, contracted, or natural; but the motions of the iris are very slow, or entirely abolished. This varying state of the pupils accounts for the different descriptions given by **Henke**, **Sprengel**, **Metzger**, **Schmidtmüller**, **Schmalz**, **Dressig**, and others. The face, which was generally at first pale, now becomes injected, tumid, and livid; the forehead contracted and wrinkled; the lips are at one time contracted, elongated, and pushed forwards, and at another drawn forcibly backwards; the teeth are gnashed; and the jaws so forcibly moved as to produce a remarkable stridor, or even to break the teeth. **Van Swieten** saw dislocation of the jaws owing to their violent action. The tongue is generally swollen, livid, forcibly protruded between the teeth, and more or less injured in consequence. The arms are tossed about violently or struck against the chest; and the hands and fingers rapidly perform the motions of flexion, extension, &c. The lower extremities are similarly convulsed. The thumbs are drawn inwards, and the toes incurvated. The convulsions are often more violent on one side than another. In some cases, much fulness of the abdomen and hypochondria is observed, often with borborygmi or singultus.

10. *Respiration*, which was at first interrupted by the spasm of the thoracic muscles, and performed as if the chest were placed under a load, or as in the act of strangulation or suffocation, until a state of partial asphyxy was produced, now becomes quick, short, irregular, and sonorous. The patient sometimes screams, or utters the most unnatural and prolonged sounds, or the most extravagant expressions, but more frequently moans piteously; and the forcible expirations throw out a white tenacious froth, sometimes coloured with blood, over the lips. **Tissot** has observed the saliva sometimes to possess a cadaverous odour; and **Macbride** and others have remarked, in rare instances, blood to escape from the ears: epistaxis is more common. The *pulse* is often quick and small, but it is felt with difficulty; and is usually irregular, becoming more distinct, slower, and more languid towards the close of this stage. The action of the heart is loud, vehement, or tumultuous; and that of the carotids much increased. Flatus is often expelled involuntarily, sometimes with the fæces and urine; and the erection is occasionally followed by a discharge of semen, or of the prostatic secretion. At last the convulsions subside; fœtid perspirations break out about the head, neck, and breast; the interrupted and convulsive respiration is followed by deep sighs; and the spasms of the muscles, by subsultus; vomiting or eructations sometimes occur, and the patient passes into the next stage. The duration of the first and second stages varies from less than one, to fifteen or twenty minutes. If they be prolonged beyond this, death is generally the consequence; which, in the most violent cases, may also occur in the first stage, from the asphyxy occasioned by the spasm of the respiratory muscles; or in the second, from the degree of cerebral congestion and its more direct effects.

11. (*c*) The *third* stage, or that of *collapse*, is the most prolonged, and is characterised by a continuance of the loss of consciousness, by the disappearance of the convulsions, by the deep and often snoring sleep into which the patient falls, and by the gradual return of the sensibility, which may be now momentarily roused by powerful excitants. The perspiration which had broken out at the close of the last stage becomes more copious and general, and continues for about an hour; the pulse is now fuller, softer, and sometimes slower; the respiration freer and easier; and after a while the patient awakes as from a deep sleep, and is restored to perfect consciousness; but is stunned, or wearied and exhausted, and complains of headach, or pain in the neck or occiput. Sometimes the eyes remain, for a considerable time, fixed, dull, or squinting, and the pupil enlarged. The patient has no recollection of what has passed. His speech often falters; and he occasionally feels greater weakness in some one limb or other. These symptoms gradually disappear, but disinclination to exertion remains.

12. *The duration of the whole paroxysm* is generally from five or ten minutes, in the slight and imperfect cases, to three or four hours. M. **Esquirol** has seen it continue five hours. I have seen it last more than four; and in one case seven hours, the seizure consisting of two fits, with an indistinct interval of soporose exhaustion. The long attacks generally consist of two or more short fits, a slight remission taking place between each. The *return* of the fits is extremely various in different cases. Several years may elapse between the seizures, as in a case in which I was recently consulted; or one, two, or three years may intervene. In a few cases, they have appeared every year at the same period, or even day. When they occur monthly, a stated day is more frequently observed, which often coincides with the new or full moon,—a coincidence much insisted on by **Galen**, **Aretæus**, **Arnold** of Villanova, **Gehler**, **Hoffmann**, **Mead**, and others. The interval of a lunar month is more commonly noticed among females, from the connection of the disease with the uterine functions. In some instances, the paroxysms occur every week, on the same day; and occasionally every day, or night, at the same hour; but they most frequently come on when first falling asleep, and are often, for a time, unsuspected or overlooked. Sometimes several slight seizures take place in one day; but their recurrence is often extremely irregular. When they are neglected, they usually either become more and more severe, or occur after shorter intervals. Consciousness and sensation being abolished, *pain* cannot be felt, during the fit.

13. The *slight or imperfect seizures*—the *Petit Mal* of French writers — are very varied in cha-

racter. They often precede, for months or years, the full evolution of the severe form of the disease. Generally they consist of loss of consciousness, and slight rigidity, spasm, or convulsions of a few muscles, or of one or more limbs, which continue only one or two minutes. In still slighter cases, the patient is seized with vertigo, loss of consciousness and sensation, and muscular collapse or slight spasm of a few muscles, and is, after some seconds, completely restored. In some instances, the eyes of the patient become fixed and vacant; he attempts to articulate, but is unable; loses consciousness for a very few seconds; and, upon recovering it, takes up the thread of discourse which the seizure may have interrupted, and endeavours to conceal the occurrence. Occasionally the slight seizures very nearly approximate those of hysteria, or are associated with several hysterical symptoms. In many instances, the patient does not fall to the ground, although he may have been standing at the time of attack; and in others, consciousness is not entirely abolished, the patient retaining a vague recollection of what passed in the seizure, upon recovery from it, as after temporary delirium or dreaming. These slighter fits may recur either frequently or very rarely, but they commonly return after short intervals, and sometimes as often as several times a day.

14. *D. Of the intervals between the paroxysms.* — After the fit, the patient complains of lassitude, of soreness of the limbs and of parts that have been injured, and is pale, sad, and fearful of its return. In some severe cases, the face is studded, particularly about the eyes and temples, with numerous small ecchymoses arising from minute extravasations from the extreme capillaries of the *rete mucosum* during the congestion to which they had been subjected in the paroxysm. In rare cases, vomiting or purging of blood is observed, owing most probably to sanguineous exhalation from the congested capillaries of the digestive mucous surface. Sometimes paralysis of a limb, more or less complete, or strabismus, or even irregular movements or convulsions, or various hallucinations, follow the severer attacks, and continue several hours, or even days. In a case to which I was very recently called, paralysis of the left arm, and severe pain in the right eye-ball and temple, continued after the fit — the former for some hours, the latter for several days. Deafness, watchfulness, terrifying dreams, slight or passing delirium, occasional convulsive movements (Aretæus, &c.), and fits of absence or forgetfulness, often afflict the patient, either for some time after an attack, or during the whole interval. Between the complete paroxysms, as well as before their evolution, the slight seizures, described above (§. 13.), in one or other of their forms — sometimes so slight as to amount merely to vertigo with momentary loss of consciousness, or spasm of some part — the *Vertige Epileptique* of French writers, are very common. Various signs of mental alienation often appear, which generally become more and more remarkable after successive, more frequent, or severer attacks, until insanity is the result. Epileptics commonly experience, during the intervals, various dyspeptic disorders; but their appetites are usually very keen, and seldom duly restrained. J. Frank states, that he has seen persons suffer little disturbance after a fit, and others display increased activity of both mind and body, until its approaching return; but this is a rare exception; the great majority, even of those who suffer the least, being incapable of devoting themselves to any undertaking with attention and perseverance.

15. II. Consequences and Terminations. — Persons long afflicted by the disease, gradually acquire a peculiar physiognomy, owing to the repeated distension of the vessels of the head, and to the frequent spastic and convulsive actions of the muscles of the face during the paroxysms. This is particularly the case in such as are addicted to masturbation — a baneful practice which is common among epileptics, and, indeed, a principal cause of their malady. This alteration of the features has been noticed by Aretæus, who mentions their pale or leaden complexion, and their languid dejected look: but Dumas and Esquirol have described it most accurately. The individual features become coarse; the lips thick; the lower eyelids swollen; the eyes unsteady, full, and prominent; the look vacant; the pupils dilated; the cheeks pale; the finest countenances plain; the muscles of the face subject to twitchings, or slight convulsive movements; the arms and limbs thinner than the rest of the body; and the gait peculiar. The functions of organic life likewise languish, obesity or emaciation being a common result. When the disease appears or continues after puberty, or the fits return frequently, the mental as well as the bodily powers become greatly impaired. These consequences are, however, in some respects connected with the states of nervous function, and the circulation within the head directly producing the seizures; the pathological conditions, which, at their commencement, and in slighter degrees, occasion the epileptic seizures, giving rise, in their advanced course and heightened grades, to various associated maladies. After the continuance of the disease, the patient is at first listless, incapable of energetic exertion, and sometimes hypochondriacal. He is liable to attacks of stupor, and complains of lassitude, flatulency; of various forms of indigestion, generally attended by a craving appetite; of great torpor of the bowels; of vertigo and tremors, &c. He is subject to deafness, amaurosis, and, in prolonged cases, to irregular muscular contractions, or paralytic tremors, to partial paralysis or complete hemiplegia, to imperfections or even loss of speech, to apoplexy, to melancholy, to partial or complete, or to intermittent or continued insanity, and to mania and idiotcy.

16. Notwithstanding that epilepsy seldom passes into the apoplectic state, until after repeated fits, yet both maladies may be associated in the very first seizure. (See § 40.) Insanity and mania, although not generally appearing until after several or many attacks, are by far the most frequent consequences of epilepsy; but I believe much more so on the Continent than in this country; whilst apoplexy and paralysis oftener supervene here than there. Van Swieten states, that persons who have become insane at an early age, have been generally first epileptic. Esquirol has come to a similar conclusion; and my experience confirms it; the seizures, however, having been sometimes of an irregular convulsive kind, rather than those of true epilepsy. In

this frequent class of cases, the mental faculties are gradually impaired; sensation and memory are weakened, the former being often acute; perception and imagination perverted; various hallucinations generated; and the patient lapses into a state of incurable insanity or imbecility, or passes from the former into the latter. The more severe the fits, the more is this result to be dreaded. Sometimes violent attacks of mania follow the paroxysms, Of 289 epileptics in the *Salpêtrière*, in 1813, 80 were maniacal, and 56 in various states of mental alienation and imbecility. In 1822, out of 339 cases in the same hospital, there were 2 monomaniacs, 30 maniacs, 34 furious maniacs, 129 insane for some time after the paroxysms, 16 constantly insane, 8 idiotic; 50 upon the whole reasonable, but with impaired memories, and liable to occasional slight delirium, and tendency to insanity; and 60 without aberration of intellect, but susceptible, irascible, capricious, obstinate, and presenting something singular in their characters. As this institution receives chiefly old and severe cases of epilepsy, it furnishes sufficient illustrations of the consequences of this disease. Occasionally the epileptic mania alternates with melancholia and a desire to commit suicide; the mania often preceding the paroxysm. Dr. Cheyne states that he has known epileptics preserve their intellects to a very old age; but this is only the exception to the general rule, for they seldom live to a great age, or retain their faculties when they reach it.

17. The *duration* of the disease is most uncertain and various, and depends upon numerous circumstances connected with the regimen, habits, and treatment of the patient. Epileptics are most injuriously addicted to the indulgence of the appetites for food, and for the sex, — practices which should as much as possible be guarded against, as tending not merely to counteract the good effects of treatment, but also to induce the unfavourable consequences of the seizures enumerated above. A *favourable* termination is indicated by the fits being slighter, shorter, and more distant. Sometimes a marked crisis occurs — as the return of a suppressed evacuation, particularly the menstrual and hæmorrhoidal fluxes, epistaxis, &c., the reappearance of a repelled eruption, &c. An attack of continued fever has removed the disease, — but very rarely when it has become confirmed. M. Esquirol states, that in 1814, when typhus fever raged in the Salpêtrière, although upwards of fifty epileptics were attacked by it, and but few died, little or no amelioration was observed in any.

18. A person subject to epileptic fits may *die* of other diseases, or of a malady proceeding from an increased grade of the same changes, which, in a less degree, occasioned the fits; or of the direct or indirect effects of the repeated seizures; death taking place sometimes in the intervals, but more frequently during the paroxysm or soon afterwards. When it takes place in the interval, it is occasioned by the remote effects of the fits, in connection with the pathological states inducing them — by some one of the diseases consequent upon them (§ 38. *et seq.*). If it occur during or soon after the paroxysms, it is generally owing to an augmented degree of the same changes usually producing them, or to some further alteration directly proceeding from these changes; either *apoplexy* caused by excessive congestion within the head, or by extravasation of blood in some situation, or by effusion of serum in the ventricles or between the membranes of the brain; or *asphyxy* occasioned by similar lesions affecting the medulla oblongata and upper part of the spinal chord, being the immediate cause of dissolution. It has been supposed, that suffocation often occurs in the paroxysm, owing to the position of the patient, or of the clothes around him when in bed. But this, I believe, rarely takes place; and when suffocation, or rather asphyxy, is met with, it is caused chiefly, if not altogether, by some one of the changes just stated.

19. III. Causes. — i. *Predisponent.* — *Hereditary disposition* is a remarkable predisposing cause of epilepsy, notwithstanding this kind of influence has been disputed in respect of it. But although the father or mother of the patient may never have had an attack, either of the grand-parents, or uncles, or aunts, may have been subject to it. Zacutus Lusitanus (*Prax. ad Mir.* l. i. obs. 36.) mentions the case of an epileptic man who had eight children and three grandchildren afflicted by the disease. Stahl (*De Hæred. Dispos. ad var. Affect.* Halæ, 1706, p. 48.) and Reininger adduce instances of the whole of the members of a family being attacked by it at the period of puberty. Boerhaave (*Aphorisms*, 1075.) remarks that, like several other hereditary maladies, it often passes over alternate generations; and he adduces an instance (*Prax. Med.* t. v. p. 30.) in which all the children of an epileptic father died of it. I had, in 1820, a brother and sister some time under my care, who inherited the disease from their father, and they had two other brothers and one sister also subject to it — in all five. The fits appeared in all of them about the period of puberty; and one of the brothers died about the age of forty, from apoplexy, complicated with the seizure. MM. Boucher and Casauvieilh state that, in 110 patients, respecting whom they had made the enquiry, 31 were hereditary cases; and M. Esquirol found, that in 321 cases of epileptic insanity, 105 were descended from either epileptic or insane parents. Predisposition is often connected with *congenital formation*. I have seen the disease in several children, whose heads were of an oblique or diamond shape, or otherwise ill-formed; one side being more elevated than the other, and either side advancing or receding. Peculiarity of constitution, or *idiosyncrasy*, seems to predispose to it, as well as the epochs of *childhood* and *puberty*, at which periods the nervous and muscular systems are endowed with their greatest sum of sensibility and irritability, and the whole frame with great susceptibity. Cases, however, often occur in which these properties are rather diminished than increased. After puberty is fully attained, the disposition to the disease is greatly lessened.

20. The influence of *sex* is not remarkable; and is not manifested until after the second dentition. According to Esquirol and Foville, females are more subject to the disease after this epoch than males. At the end of 1813, 162 male epileptics were in the *Bicêtre*, and 289 female cases in the *Salpêtrière*. J. Frank found, that of 75 patients, 40 were females; but he agrees

with Celsus, Heberden, and Soemmerring, in believing, that if a strict diagnosis were established between this and other convulsive diseases to which females are very liable, particularly several of those seizures described in the article Convulsions, the predominance would be found on the side of the males; and Drs. Cooke, Elliotson, and Cheyne are of the same opinion. MM. Bouchet and Casauvieilh ascertained, that of 66 female epileptics, 38 were seized before their first menstruation, and 28 subsequently to that epoch. I agree with M. Foville in thinking the disease more prevalent in the *lower* than the upper *classes*. M. Esquirol states, that the melancholic *temperament* is more disposed to it than any other. Dr. Prichard seems nearer the truth, in saying that it is common to all temperaments and *habits*; but it is not *equally* common to all. Dr. Cooke remarks, that almost every case he has seen has occurred in sanguine temperaments and plethoric habits. This does not agree with my experience, which leads me to infer that it is most frequent in persons who are either very plethoric or very much the reverse. Its greater prevalence in persons of a *scrofulous* and *rickety diathesis*, than in any other, has been shown by Hufeland and Portal, and is undoubted. J. Frank remarks, that more than half the cases in his practice were strumous. Dr. Cheyne would make the proportion even larger. De la Fontaine and Frank found epilepsy extremely common amongst those born of parents affected by the *Plica Polonica*. An exhausted state of frame occasioned by whatever means, a cachectic habit of body, the syphilitic and mercurial poisons, and scorbutus, also dispose to the disease. Great activity of the mental faculties, and an exalted or excited state of mind, may predispose to it; and in proof of this, the circumstance of Julius Cæsar, Mahomet, Petrarch, Columna, Francis Rhedi, Rousseau, and Napoleon, having been subject to it, has been adduced by authors. But in men of strong minds, and powerful talents, the disease has seldom or ever occurred until the nervous energy has been exhausted by exertion, or by the excitements and anxieties of life. Suetonius (l. i. cap. 45.) states, that it was only in the last part of his life that Cæsar was seized with epilepsy; and that he had two attacks while he was engaged in business. It seems more prevalent in some countries than in others. This has been referred to peculiarity of climate, especially to cold and moisture. It is more evidently dependent upon moral causes, particularly to excessive and premature venereal indulgences, which are more common in some countries than in others; the disease being very prevalent in the South of Russia and Germany, in Poland, in Italy, and France — certainly much more so than in this country and the United States. Hippocrates and Tissot think it most frequent and severe in spring, but this is not remarkably the case, and has been denied by several writers.

21. It has been asked, Whether or no this disease is more common now than formerly? The dissolute habits of the ancient Greeks and Romans lead me to infer that it was at least as prevalent among them as with us. Panaroli states, that it was very frequent among the rich and noble Romans, particularly during the acme and decline of their greatness, when the utmost luxury, dissipation, and debauchery prevailed among the higher classes under the emperors.

22. ii. The *occasional Exciting Causes* are remarkably numerous and diversified. Various circumstances may concur in exciting the first seizure; and where no marked predisposition to it exists, a concurrence of several causes is requisite to its production; but, when once produced, a single, and even a slight, cause may occasion subsequent attacks. This class of causes acts variously: — 1st, Many directly change the physical condition and circulation of the encephalon; — 2dly, Others affect the organic nervous influence and circulation of the brain, through the medium of the sensations, perceptions, and other operations of the mind; — and, 3dly, Some act upon various remote organs or parts; the brain and nervous system being only consecutively and indirectly affected. — (*a*) Injuries of the head; fractures, depressions of a portion of one of the bones of the cranium, concussions of the brain or spinal chord; tumours, and the numerous pathological changes in the brain, its vessels, and its membranes, or in the cranium, described in the articles Brain, and Cranium; partial or general inflammation of the brain, or of its membranes; diseases of parts immediately adjoining, as of the cranial bones, the scalp, the medulla oblongata, and spinal chord, the ear, eye, &c., or of the vertebræ, &c.; excessive hæmorrhage and discharges; hypocatharsis, or blood-letting carried too far; omitting accustomed and requisite evacuations; insolation; the suppression of otorrhœa, of porrigo, and other eruptions; prolonged sleep; and the metastasis of gout or rheumatism to the encephalon; are the principal causes which act in the *first* mode pointed out. — (*b*) All inordinate affections of the mind may induce a seizure in persons predisposed to it, either by exciting the nervous influence and cerebral circulation too far above the natural pitch, as joy, anger, fits of indignation, coition, &c.; or by depressing the one or retarding the other to a degree incompatible with the continuance of the vital functions — as terror, sudden alarm, grief, protracted anxiety, a sense of disgust, the impression of various odours, excessive mental application or exertion, &c., nostalgia, disappointments, unrequited or forbidden affection, longings after objects of desire, or love, &c. Prolonged want of sleep; very great or enduring pain; difficult dentition; great surprise; frightful dreams; appalling and distressing sights; seeing others in the paroxysm; nervous irritation, titillation, whirling rapidly round; excessive sexual intercourse and masturbation; ill-controlled states or flights of imagination, &c.; are also very common and powerful causes. M. Esquirol, whose experience in this disease has been unequalled, truly states that fits of passion, distress of mind, and venereal excesses hold the next rank to terror, &c. in exciting the disease. — (*c*) The causes which act in the *third* mode are extremely numerous; persons who have become subject to the disease often experiencing a seizure from very slight occurrences. The most common are, however, the indulgence in too much, or in improper food; a heavy meal taken shortly before retiring to rest; the use of spirituous and fermented liquors, or of coffee, in excess; very high temperature, impure air, and

crowded assemblies; exposure to great cold; irritation of worms or morbid matters in the prima via; various acrid, narcotic, and acro-narcotic poisons, &c. There are several causes, the operation of which is either not well known, or connected with the diathesis and peculiar predisposition of the patient; and others — as, indeed, many of those just enumerated — which manifestly act in more than one of the ways pointed out above. The most remarkable of these are disorders of other organs or parts, particularly functional or structural diseases of the heart, of the digestive canal, of the liver, and of the generative or urinary organs; the presence of a *calculus* in either the kidney, the ureter, or bladder (BARTHOLIN, DE LA MOTTE, BRENDAL, SAUVAGES, &c.), or of a *gall stone* in the ducts (JENS, BEAMES, &c.); the irritation or lesions of remote nerves; the syphilitic and mercurial poisons, &c. (LARREY).

23. Dr. HEBREARD ascertained that, of 162 male epileptics in the *Bicêtre* at Paris, 119 were unmarried, 33 married, and 7 widowers. According to LOCHER (*Observ. Pract. in Vien.* 1736, p. 36.), out of 80 cases, 60 were occasioned by frights of various kinds and degrees: but, of 69 cases, MM. BOUCHET and CASAUVIEILH found only 21 that could be referred to this cause. The excitation of the feelings or passions produced by dramatic performances has also brought on an attack. J. FRANK states that, before epileptics were separated from the other patients in the wards of the Civil Hospital in Vienna, it was not uncommon for some of the other patients to be seized with the disease from sympathy or *imitation* upon seeing the epileptic paroxysm. This has been observed by BAGLIVI (*Opera*, l. i. cap. 14.), LETTSOM (*Mem. of Med. Soc. of Lond.* vol. iii. p. 383.), DUNCAN (*Med. Cases*, Edin. 1778.), AASKOW (*Coll. Soc. Med. Haun.* vol. ii. p. 14. 22.), MEZA (*Comp. Med. Pract.* fasc. v. p. 15.), and HARDY (*Lond. Med. Gazette*, vol. xi. p. 247.). I have seen it occur in one instance; but I believe that the form of *convulsion* described in § 17, 18. of that article is more frequently produced by this circumstance than true epilepsy, unless in persons liable to this malady. Various writers, particularly GALEN (*De Diebus Criticis*, l. iii. c. 2.), ARETÆUS (*De Caus. et Sig. Morb.* l. i. c. 4.), ALEXANDER TRALLIANUS (l. i. c. 15. 21.), CAMERARIUS (*Memorab.* cent. ii. n. 38.), RIVERIUS, F. HOFFMANN (*Institut.* l. iii. c. 88.), STAHL, MEAD (*De Imp. Solis et Lunæ, &c.* Lond. 1704.), WEDEL (*Ephem. Germ.* An. ii. decur. 2. obs. 148.), RUMPELT, BURMESTER (*De Morbo Spastico, &c.* Goet. p. 21.), OTTO (*De Planet. in Corp. Hum. Influxu.* Franc. 1805.), have insisted upon the more frequent occurrrence of the paroxysm at the periods of new and full moon than at any other. Indeed, lunar influence on this disease seems to have been generally believed in by the ancients; and hence one of the names given to it by them. The supervention of epilepsy during the early stages of the exanthemata, or upon the disappearance of the eruption, is much more rare than stated by many writers; for the seizures that sometimes take place in such circumstances are more strictly symptomatic convulsions, and seldom return afterwards, unless in those much predisposed to this disease. A similar remark also applies to the violent convulsive attacks, which occur during, or about the period of, parturition; and which, although they possess most of the characters of epilepsy, particularly of the uterine variety, do not necessarily return at any other period, or even on a subsequent confinement, unless in females who are really epileptic, who are very liable to dangerous seizures at this particular time.

24. Various nervous diseases sometimes pass into epilepsy, either of a simple or complicated form, — most frequently the latter. *Hysteria*, *chorea*, *catalepsy*, *cataleptic ecstasy*, *somnambulism*, and symptomatic attacks of *convulsion*, when neglected or improperly treated, occasionally terminate in confirmed epilepsy, with various associated disorders, and not infrequently in some one of the complicated states hereafter to be noticed. Numerous affections of the digestive organs have been assigned by writers as exciting causes. But I consider them, with the exception of worms in the *prima via*, which are a frequent cause, particularly in children, as coexistent with, or contingent upon, the commencement of that state of organic nervous power and circulation in the brain producing the disease, and that the disorders of the digestive organs, as well as this early state of cerebral affection, equally depend upon deranged vital manifestation throughout the organic nervous system.

25. IV. VARIETIES OF EPILEPSY. — Various divisions have been proposed with the view of fixing with greater precision the treatment which is most appropriate to the different phases of the complaint. ARETÆUS and other ancient writers distinguished it by the terms *acute* and *chronic*. One of the most commonly adopted divisions is that into *idiopathic* or cerebral, and *sympathetic* or originating in disorder of some other organ. PISO long ago doubted the existence of the sympathetic disease, and MM. GEORGET and BOSQUILLON have adopted his opinion. These writers contend, that the sensations, or disordered feelings manifested in remote organs, may actually have their seat in the brain; and that the aura felt in a distant part may depend upon an original cerebral affection. Those who believe in the sympathetic forms admit that the seat of the paroxysm is always the encephalon; its cause, or the disorder which excites the cerebral affection, on which the seizure depends, being often in other organs. Hence they subdivide the sympathetic species into as many varieties as there is disorder manifested in other organs — into the *spinal*, the *cardiac*, the *gastric*, *hepatic*, *intestinal*, *nephritic*, *genital* or *uterine*, the *nervous*, &c. SAUVAGES and SAGAR (*Systema Morborum*, *&c.* p. 442.) make as many varieties as there are principal exciting causes. VOGEL (*De Cognosc. et Curand. Corp. Humani Affectibus*, p. 404.) notices the *cerebral*, that depending upon *disorder of the digestive organs*, and that arising from *irritation of other parts*. Dr. CULLEN admits two species, the *idiopathic* and *symptomatic* — and distinguishes the former into the *cerebral*, the *sympathetic*, or that attended by aura, and the *occasional*, or that arising from some irritation; the latter into as many varieties as there are organs occasionally originating the disease. Dr. GOOD mentions three species — the *cerebral*, the *catenating*, and *complicate*. Dr. J. FRANK views epilepsy in connection, both with the organs from

which it seems to derive its origin, and with the states of action it manifests: these states he divides as follows — the *atonic*, *traumatic*, *inflammatory*, *rheumatic*, *metastatic*, *arthritic*, *carcinomatous*, *gastric*, *scrophulous*, *syphilitic*, and *complicated*. These distinctions are too complicated and unavailable in practice — are, in truth, as respects several of them, distinctions without differences. The arrangement adopted by Dr. PRICHARD is deserving of attention, as it comprises several of the most important sympathetic associations and complications of the disease; that, followed by Dr. CHEYNE, presents nothing novel or requiring remark. The *division* which seems to me most accordant with the states it commonly presents in practice, is that into — 1st, its *Simple forms*; 2dly, its *Sympathetic varieties*; and 3dly, its *Complications*.

26. i. *Simple Epilepsy, Epilepsia Simplex — Primary Epilepsy; E. Cerebralis, Idiopathica, Essentialis, Legitima, Primaria, Encephalica*, Auct. varior. — may present itself in various forms, as respects nervous susceptibility and vascular fulness and action. — It may occur in emaciated persons, whose nervous energy has been exhausted, and whose blood is deficient in quantity and quality, or in those who are plethoric and apparently robust. It may present symptoms of imperfect or sub-action, in connection either with deficiency, or with too great fulness of blood; or of increased action, especially as respects parts about the base of the encephalon. It is very important in practice to ascertain these states of the vascular system, as upon them must necessarily be founded the chief indications of cure.

27. *A. Simple Nervous or Asthenic Epilepsy — E. Simplex nervosa*, or *Epilepsy with defective power and action* — is not so common in this, as in other countries; yet it is not infrequent in London and large manufacturing towns. — It is observed in weak constitutions; in thin habits, presenting a deficiency rather than fulness of blood; in young persons employed in factories; and in those who are endowed with great susceptibility, and who have been addicted to venereal excesses, especially to onanism. In this form, the face is pale or sallow; the veins small; the pulse weak, small, and accelerated, or readily excited; the seizures are frequently ushered in by leipothymia or fainting; and the countenance is neither full nor livid, until the convulsive stage of the fit, and often not even then. It is probable that, at the accession of the attack, the due supply of blood to the brain is withheld, or the circulation of it interrupted; although it must be admitted that there may be evident want of nervous power, and general deficiency of blood, and yet vascular action may be increased within the head, relatively to the rest of the body. It is very important in practice, to ascertain which of these states exists on the accession of the fit; and this can be done only by examining the circulation in the carotids, the temperature of the head, and the action of the heart, at this and at other periods. This state of the disease may ultimately become complicated with insanity, imbecility, or paralysis.

28. *B. Simple Sanguineous Epilepsy — E. Simplex Sanguinea; Acute Epilepsy*, LÖBENSTEIN-LÖBEL and RICHTER; *Epilepsy with Plethora; E. Plethorica*, PORTAL and others; *E. with excited or sthenic action; E. with determination of blood* — appears to be the most common form of cerebral epilepsy, especially in this country. — It is usually observed in sanguine and plethoric habits, and is consequent upon too high living, great exertion, the suppression of accustomed evacuations and discharges, the disappearance of eruptions, or the translation of morbid action from other structures to the brain, exposure to the sun, and violent fits of passion. In these, as in other cases betraying increased vital action, the disease has been supposed by several writers to possess an inflammatory character — *E. Inflammatoria*, J. FRANK, PORTAL, and others. — There is every reason to suppose that this form is caused by an impeded return of blood from the head, as well as by increased determination to it; and that it is more frequently associated with disordered action of the heart and congestion of the liver, than is generally supposed. Although simple plethora, or determination of blood to the encephalon, may alone be sufficient to the production of the fits, yet these states will ultimately be followed, if the disease be not arrested, by partial or slow forms, of inflammatory action; and, consequently, in protracted cases, the malady will often pass into, or be complicated with, mania, phrenitis, apoplexy, or paralysis. In other cases, owing to the constitution of the patient and the nature of the exciting causes, the disease is obviously connected, from the commencement, with chronic inflammation of a partial or limited kind, inducing alterations chiefly in the medullary substance of the brain. The distinction, made by SAUVAGES, SAGAR, J. FRANK, and others, between the *inflammatory*, the *rheumatic*, the *metastatic*, and *arthritic* states of the disease, are not to be discovered in practice; as they all present signs of determination of blood to the encephalon, and of excited action: but it is of importance to keep these morbid relations in recollection, as they should very materially influence the treatment. The countenance in the fit is generally red, tumid, or livid, and is, with the head, covered by perspiration; respiration is at first interrupted, and afterwards sonorous and laboured; the convulsions are not very violent, nor of long duration; and the subsequent stupor is profound and prolonged. In the intervals, the patient is subject to vertigo, or temporary loss of consciousness. The *Syphilitic, Scorbutic, Cachectic, Humoral, Febrile*, &c. of BONET, HOFFMANN, SAUVAGES, &c. are merely occasional symptomatic or complicated states of the disease, the paroxysms often closely resembling those of simple convulsions.

29. ii. *Sympathetic Epilepsy; E. Sympathica; Epilepsy with associated disorder of other organs.* — This form is much more varied than the foregoing, not only as particular organs may betray disorder antecedent to, or coexistent with, or consequent upon, the explosion of the epileptic attacks; but also as it may present more or less of the features of either of the two states just particularised; epilepsy associated with especial disorder of some important organ, being, in respect of nervous power and vascular fulness, also either *nervous* or *sanguineous*, as described above (§ 27, 28.) — being oftener further characterised by defective tone and energy, and deficient fulness of blood, or by plethora and excited action. This

very important connection of morbid states, although appearing complex to the superficial observer, will not seem so to those who are in the habit of pathological analysis. It is chiefly owing to the circumstance of this species of investigation having been neglected as respects epilepsy, and to our consequent ignorance of the actual state of the circulation within the head, and of the heart's action, about the accession of the paroxysm, that our knowledge of the nature and treatment of the disease has advanced so little since the days of Aretæus.

30. *A. Epilepsy from affection of the spinal chord* — *E. Spinalis* of J. Frank — has been elaborately described by Harles (*Opera Min. ac Med.* t. i. 1825.). It generally arises from injuries and concussions of the spine; from caries of the bodies of the vertebræ, or inflammation of the intervertebral substances; and from inflammation of the membranes of the chord, or effusion of fluid within the sheath, from the metastasis of rheumatism, or the disappearance of eruptions, &c.; and is sometimes preceded by great sensibility, formication, or irritation of the skin. The fits are generally characterised by severe convulsions, seminal emissions, and relaxation of the sphincters. The head is seldom so much affected as in cerebral epilepsy, and the seizures often approach nearly, or altogether, to simple convulsions. One or other of the limbs is frequently weak, and sensation in them occasionally diminished, or otherwise altered, during the intervals. Mr. Austin and myself lately attended a young lady, in whom the catamenia returned every fortnight in large quantity; and who afterwards had slight epileptic seizures. We found the spinous processes of the three upper lumbar vertebræ projecting, and that part of the spine painful, and tender upon firm pressure and percussion. The case terminated favourably from the treatment advised in this state. I believe that disease of the spine, associated with disorder of the uterine functions, and epilepsy or convulsions, is not rare. This form of epilepsy may be attended by great nervous susceptibility and deficiency of blood, as in the case now referred to; or by sanguineous plethora or excited action; either of the two pathological states characterising the simple malady also subsisting in this.

31. Very intimately connected with this variety is the supervention of the seizures upon pressure, irritation, laceration, or other *injury of nerves*. As in the spinal variety, so in this, the paroxysm, generally, is rather one of convulsions than of complete epilepsy. I do not believe that this and the spinal variety are more frequently preceded by an *aura* than the other forms; as this sensation may not depend upon any change in the part in which it seems to originate, but upon the condition of that portion of the brain or chord with which its situation is especially related. I have even met with cases in which the aura shifted from one limb to another in the course of treatment.

32. *B. With especial disorder of the circulating and respiratory actions.*—(*a*) I believe that the paroxysm is more commonly connected with disordered function of the *heart*, than is generally stated by writers. In many of the cases where I have had an opportunity of examining the state of the circulation, just before, or at the commencement of, the fit, the action of the heart has been either suspended for a few seconds, or remarkably slow or irregular. This connection has not been overlooked by some authors. Quercetanus (*Tetrad. de Affect. Capitis*, cap. 8.), indeed, assigns to this organ the seat of the disease; and instances have been adduced by Morgagni (*Epist.* lxiv. art. 5, 6.), Lancisi (*De Mortib. Subitaneis*, p. 113.), Gould (*Philosoph. Trans.* vol. xiv. p. 537.), Sprengel, and Brera (*Krank. d. Herzens. &c.*), in which the seizures commenced with fainting, followed by palpitations; and, after death, the cavities of the heart were found dilated, and containing fibrinous concretions. The numerous dissections of Greding also show the frequent connection of the disease with lesions of this viscus. (See § 47.) Dr. Reid has drawn attention to the subject in a more especial manner than any other writer, but in too general terms. "It will be found," he states, "that the first symptom of an attack is the suspension of the action of the heart; and, consequently, an intermission of the pulse, which may continue from a few seconds to about three minutes; which was the longest period of intermission I have yet seen." I noticed the affection of the heart in a young man, whom I attended in 1820; and in several cases since that time. But opportunities are comparatively rare in which the physician can examine the patient at or shortly before the accession of a fit. That the heart's action is interrupted at this period, in many cases, appears evident, on observing the symptoms, and tracing the connection between the exciting causes and their more immediate effects. When we consider that the most common and energetic causes, as fright, surprise, grief, anxiety, &c., are those which, although primarily affecting the cerebral functions, most remarkably disorder the actions of the heart, the importance of more frequently directing our attention to this organ, in our researches respecting the nature and treatment of epilepsy, will be evident. — (*b*) The disease can hardly be said ever to depend upon *disorders of the lungs*; although the function of respiration is very often remarkably affected, or even altogether arrested, owing to the sudden spastic contraction of the respiratory muscles in the first period of the paroxysm; and cases sometimes occur in which the frequent congestions of the lungs, from this cause, are productive of inflammation, or hepatisation, or even of effusions into the pleuræ. But such associations are merely consecutive; and are chiefly met with in prolonged and complicated cases, as shown by the researches of Greding. (§ 47.)

33. *C. With disorder of the digestive organs.* — (*a*) When the *stomach* is the organ chiefly disordered — the *Epilepsia Stomachica* of Sauvages, Cheyne, &c.; the *E. Gastrica* of Frank and others — there are generally a loaded tongue, heavy or disagreeable breath and perspiration, unpleasant taste, acrid or acid eructations, cardialgia, a sense of distension at the epigastrium and hypochondria, and morbidly increased or even ravenous appetite; digestion being at the same time very slow and imperfect, especially just before the paroxysm. In some instances, the appetite is capricious or defective; and, occasionally, nausea and even vomiting occur. Not infrequently, large quantities of undigested food, some of which was taken two or three days pre-

viously, are vomited shortly after the fit. The bowels are usually torpid. This form, particularly in the paroxysm, generally assumes the character of the sanguineous or plethoric variety (§ 28.).

34. (*b*) Where the *biliary organs* especially betray disorder — the *Epilepsia Hepatica* of BURSERIUS, PRICHARD, and several nosologists — pain, fulness, or tenderness in the right hypochondrium, or towards the epigastrium, with flatulence, occasional hiccup, or quickened respiration, and a sallow or icteric countenance, are complained of, generally some time before the explosion of the paroxysm. BURSERIUS has seen the disease follow the formation of biliary calculi. It seems, from my own experience, to be connected more frequently with jaundice than with any other form of biliary disorder; and to possess more of the plethoric, or sub-inflammatory form, than of the nervous (§ 27, 28.).

35. (*c*) Epilepsy arising from, or associated with, *disorders of the bowels* — the *E. Enterica* of PRICHARD — more especially with *worms* in the intestines — the *E. Verminosa* of nosologists — is very common, particularly in children. It may commence in the form of convulsions, and become fully developed after several seizures; or it may be complete from the first attack, especially in the scrofulous diathesis. Although it most frequently depends upon worms, it may be connected only with an accumulation of morbid secretions, or fæcal and undigested substances, in the intestinal canal. The tape and lumbricoid worms are those which oftenest induce it; and, where this cause exists, the symptoms of worms are usually observed. When it occurs about the period of second dentition, or about that of puberty, it is often a most severe and obstinate disease. It is very frequent among the poor and ill-fed. AUTENRIETH states, that more boys than girls are affected by it. It is with difficulty distinguished from convulsions, into which it almost insensibly passes; but, according to my experience, which, especially as respects children, has been very extensive, it is not so common as the different forms of CONVULSIONS. (See that article, § 24.) MONSCHEIN (*De Epilepsia*. Franc. 1700, p. 9.) and J. FRANK consider true epilepsy from worms comparatively rare. The paroxysms, in thin and weak patients, generally commence as in the cardiac variety; or with vertigo and leipothymia, the action of the heart apparently being momentarily suspended, and the countenance pale and collapsed. In some instances, where the habit is more plethoric, the face becomes tumid, livid, or injected. The attack is often preceded by pain in the abdomen, or by nausea or vomiting; and occasionally by an aura ascending from the umbilicus. The bowels are generally constipated; but sometimes the constipation alternates with diarrhœa, the evacuations being unhealthy, crude, and offensive, and often containing little or no bile. The appetite is also craving, ravenous, and unnatural; and the skin is foul, or the seat of chronic eruptions.

36. (*d*) In these varieties, the disorders of the digestive organs may be more or less concerned in producing the disease; or both the one and the other may be coexistent, or the associated consequences of impaired vital energy, manifested in the organic nervous and vascular systems, particularly of those organs which evince most disturbance (§ 47.). In some cases, as in those related by MORGAGNI (*Epist.* ix. art. 7., et *Ep.* lxiv. art. 5.), and by Sir W. BURNETT, it is difficult to determine whether the heart, the liver, the stomach, or the bowels, present greatest functional disturbance. But, besides these, other parts concerned in the functions of digestion and assimilation may also betray disorder; as the *spleen*, *pancreas*, and *mesenteric glands*. These affections, whether they be viewed as concurrent exciting causes, or as associated effects of impaired health, are deserving of attention in practice, as their increase or diminution will very materially affect the disease; treatment being of little service, unless directed with strict reference to them.

37. D. *With disorder of the generative or urinary organs.* — (*a*) Epilepsy is most frequently either excited by, or associated with, disorder of the *female organs*, especially the *uterus* — the *Epilepsia Uterina* of EICKMEYER, GRÜGER, SAUVAGES, PRICHARD, and CHEYNE — or with irritation of the adjoining parts, as of the *ovaria*, *vulva*, &c. It may be further associated with *hysteric symptoms* — the *E. Hysterica* of WEDEL, SCHULZE, &c.; and the *E. Nervosa* of Dr. CHEYNE. But these are merely phases of the same variety; and not different species, as described by some recent writers. Uterine epilepsy sometimes proceeds from delayed, or difficult, or obstructed catamenia, and generally returns about the menstrual period. Frequently, the same causes which disorder the uterine functions, also induce this disease; as sudden alarms, terror, anxiety of mind, manustupratio, disappointed love, nostalgia, great fatigue, cold applied to the lower parts of the body, &c. This variety is most common about, or soon after, the period of puberty; and in young females of a sanguine temperament, light eyes, ruddy complexion, and plethoric habit of body; and is associated not only with difficult or suppressed menstruation, but with various symptoms of irritation of the uterine organs, or with too frequent or excessive menstruation. I have remarked that the paroxysm oftener occurs after the subsidence of the menstrual evacuation than either before it or during its continuance; and that the fit commonly commences in the leipothymiac or cardiac form. Although hysterical symptoms are observed in other varieties of the disease affecting females, yet they are most common in this, especially in nervous and delicate constitutions. These symptoms are, vertigo, faintings, palpitations, the globus or clavis hystericus; pain about the sacrum, under the left breast, or in the left side, or in either mammæ; large evacuations of pale urine; borborygmi; and occasional hysteric delirium. — (*b*) The irritation of calculi in the kidneys or urinary bladder may likewise be connected with epilepsy; but I agree with FRANK in thinking that this disorder induces convulsions more frequently than genuine epilepsy. This latter is more commonly associated with great irritability of the male organs, both affections having been brought on by masturbation; inordinate excitement, whether mental or physical, occasioning a paroxysm. There are few states of the disease which oftener present extreme fulness, or deficiency of blood than this.

38. iii. *Complicated Epilepsy* — *E. Complicata*.

— Besides the association of diseases of distant parts with epilepsy, various important *complications* of other maladies of the nervous system with it, very frequently present themselves in practice. In most cases, the complications are of the kind above noticed (§ 15, 16.)—are merely consequences of an advanced grade of the same changes upon which the epileptic paroxysms seem to depend, or these heightened by the effects of the repeated seizures. But in others, different affections of the nervous system long precede the occurrence of an attack; and in some instances the complication is manifested from the commencement; and occasionally, even the first or second seizure is of a mixed kind.

39. (*a*) The most frequent complication is that with *mania* and other forms of *mental alienation*. Much attention has been paid to this state of disease by Continental writers, particularly by Esquirol, Greding, Guislain, Frank, Calmiel, Bouchet, Casauvieilh, and Bouillaud, and by Dr. Prichard. The mental disorder generally appears in the course of prolonged cases, and at first immediately after the seizures, in an intermitting form, and as stated above (§ 15, 16.); but it is occasionally the original affection, the epileptic paroxysms supervening in the most protracted and hopeless cases of insanity, imbecility, or idiotcy. When it occurs early in epilepsy, the fits usually pass into a maniacal state of delirium, remaining longer or shorter after each, until continued and confirmed insanity is the result. This complication is sometimes congenital, and is then often connected with malformation of the cranium. It very frequently seems to depend upon chronic or sub-inflammatory vascular excitement in the encephalon, affecting chiefly the cortical and medullary structures of a part, or parts only; and is often further associated with diseases of either the *heart*, the *digestive canal*, the *biliary organs*, or the *uterine* functions, as shown by the instructive researches of Greding, Prichard, Bright, Bouchet, and Casauvieilh.— This state of disease may even ultimately pass into apoplexy or paralysis, before it terminates fatally.

40. (*b*) The *apoplectic* complication may occur as stated above (§ 16. 18.), or the very first seizure may be a combination of apoplexy with epilepsy. Of this latter, I have seen two cases within six months of writing this; — one, that of a female of middle age, attended by Mr. Byam; the other, that of a corpulent man of sixty three years. The former of these recovered, the latter died. When the apoplectic and epileptic seizures are thus associated, the distinctive features of either may precede those of the other. In the two cases now alluded to, the seizure was apoplectic at its commencement, the true epileptic convulsions not appearing until after some time; but more frequently the apoplectic phenomena supervene upon the epileptic fit. Partial or general convulsions are not infrequent in the course of an apoplectic attack. But these do not constitute the complication now being considered; for in it, the stages of the epileptic fit, as described above, with the characteristic phenomena — injury of the tongue, priapism, &c. — are clearly defined. In this kind of seizure, one or more limbs, or one half the body, may be paralysed; but as often, this additional affection is not observed. The severe forms of convulsions which occur in the puerperal states sometimes very clearly approach, or are altogether identical with, this complication. But they are rarely connected with paralysis. Notwithstanding the obvious relation between epilepsy and apoplexy, and their frequent complication, the subject has been unaccountably overlooked, even by practical writers; it having been incidentally noticed only by a few, until Dr. Bright directed attention to it (*Med. Reports*, vol. ii. pp. 198. 519.). Hippocrates (Περὶ Ἀδένων, § ix. v. 103.) seems, however, to allude to it; and his commentator, Martianus (*Annot. in Lib. Hip. de Gland.* v. 103.), Morgagni (*De Sed. et Caus. Morb.* ep. iv. sect. 4. 5. et ep. ix.), and Dr. Prichard (*On Nerv. Dis.* p. 59.) mention it somewhat more explicitly.

41. Nearly allied to this complication, especially to the slighter of those seizures which commence as apoplexy, is that form of attack mentioned by Dr. Prichard (p. 86.) as *intermediate between apoplexy and epilepsy*. In these fits, the patient falls to the ground, and lies for some time in a state of insensibility; but without any rigidity or convulsion of the muscular system. They are sometimes preceded by vertigo; and seem — at least, in the cases which I have seen — to be slight forms of those attacks which I have ascribed to sudden congestion of blood on the brain (see Brain, § 139.), probably with some degree of affection of the *medulla oblongata*. They evidently are connected with epilepsy, inasmuch as they are occasioned by the same kind of causes as produce it, and are often met with in persons at other times subject to epileptic or convulsive seizures; the one species of fit frequently passing into or superseding the other. They are often consequent upon disorder of the uterine functions, and upon hysterical affections; and they then sometimes become convulsive as the attacks subside.

42. (*c*) The complication of epilepsy with *paralysis* may appear in the same manner as the foregoing; the latter occurring either during the advanced progress of protracted cases of the former, or almost contemporaneously with it, or even long previously to it; but I believe that paralysis is most frequently consequent upon the epileptic seizures. Of this I have seen several instances; the paralytic affection consisting of loss either of sensation, or of motion, or of both, in one limb, or in half the body; and occasionally of loss of sensation in one limb, and of loss of motion in another on the opposite side. Although this association is most common after repeated seizures, yet have I met with it after the first; the paralysis either disappearing some days or weeks afterwards, and recurring after each fit, or being from the first permanent, or ultimately becoming so. In some cases the paroxysm follows the paralysis, and at last passes into coma or apoplexy. Dr. Ferriar (*Med. Hist. and Reflect.* vol. ii. p. 11.); Dr. Percival (*Essays, Med. and Experim.* vol. i. p. 148.), and Dr. Prichard (*On Nerv. Dis.* p. 60.), have recorded cases of this kind. Occasionally the paralytic state entirely supersedes the epileptic seizures; this latter disappearing, but the former being permanent. But this complication may be further associated with insanity or imbecility, or with amaurosis; and the seizure may, moreover, present a mixture of

epilepsy and paralysis, or a state intermediate between both, as remarked by Piso, Mead, Ferriar, Prichard, and myself.

43. (*d*) Of the *other complications*, little beyond the mere mention is necessary. — *Hysteria*, *chorea*, *catalepsy*, and *somnambulism*, not infrequently pass into epilepsy; and the seizures are sometimes intermediate between either of these affections and this disease. In a very large proportion of these cases, the uterine functions, or the digestive organs, are more or less disordered at the same time — such disorder proving the determining cause of the aggravated or epileptic character of the attacks. — Epilepsy may be also associated with *hypochondriasis* and *melancholy*, the digestive and biliary organs being generally remarkably disordered in these cases. I have likewise seen it alternate with *delirium tremens*, or this latter affection follow a regular paroxysm of epilepsy; and the same case, which has been thus associated, may ultimately pass, after a recurrence of the fits, into permanent mania or paralysis.[*]

44. V. Appearances after Death. — It has already been stated (§ 22.), that epileptic seizures may be connected with any of the organic lesions described in the articles Brain, and Cranium; but they sometimes are independent of any change cognisable to the senses. Appearances, however, vary much according as death has taken place in the fit or in the interval, and as the disease has been simple or complicated.

45. *A.* — (*a*) In the *simple states* of the disease (§ 26.), when the patient has died of some other malady unconnected with epilepsy, and has evinced no disorder of the locomotive and intellectual powers, either immediately after the fits, or during the intervals, little or no alteration can be detected in the nervous system. Occasionally, small tubercles, increased vascularity in parts, or bony deposits, and various other very slight changes, which are frequently observed without having produced any disorder of the nervous functions, are detected; but these may be viewed as coincidences rather than as lesions connected with this disease. — (*b*) When the patient dies *during the attack of simple epilepsy*, the substance and membranes of the brain and cerebellum are generally loaded and injected with dark blood, as observed in persons who have died from hanging or asphyxy. But this change is no further connected with epilepsy than being contingent on the form and mode of death in the paroxysm.

46. *B.* — (*a*) In the *complicated states* (§ 38.), especially in that with *mental disorder*, lesions of great diversity are generally found; consisting chiefly of induration of the medullary substance of the brain, frequently with more or less injection, and of considerable dilatation of the blood-vessels. In some cases accompanying the dilatation of the vessels, the medullary structure is soft, flabby, or flaccid. These alterations are generally limited in extent; but are met with in all the white portions of the encephalon. In addition to these, the grey substance often presents inequalities of surface, alterations of colour and consistence, and vascular injections — the usual results of chronic inflammation; and, in some instances, adhesions of a portion of the cortical surface to the membranes, or accumulations of serum in the ventricles. Greding states, that of sixteen maniacal epileptics, the lateral ventricles of thirteen were filled with serum; and the brain softer than natural in nearly the same proportion of cases. In rarer instances, partial or general atrophy or hypertrophy of the brain is met with. — (*b*) In epilepsy complicated with *apoplexy*, either extreme injection of the vessels with dark blood, or the appearances presented by the different states of that disease, or great effusion of serum into the ventricles (Richter, Mills, &c.), are met with. In those accompanied by *paralysis*, tumours and various other adventitious formations, cysts, softening, extravasation of blood, abscesses, and the other lesions described in the articles Apoplexy, Brain, and Paralysis, are usually observed.

47. *C.* In the *sympathetic states*, alterations of the *medulla oblongata* and *spinal chord*, similar to those found in the encephalon, have been remarked by Morgagni, Harles, Frank, Greding, and others. Water in the *pericardium*; enlargement and dilatation of the cavities; thinning and softening of the walls of the *heart*; and diminution of its entire bulk; have been noticed by Lieutaud, Greding, and Pew. — Hepatisation and congestion of the *lungs*, and purulent collections in them, have been recorded by Bonet, Baader, and the writers just mentioned. — Enlargement and other lesions of the *liver* have been observed by Prichard, Dr. Cheyne, and myself. — In a case of abscess of the liver, lately under my care, and seen also by Mr. Copland Hutchison, an epileptic fit occurred at a time when the diaphragm was much affected. — Calculi in the *kidneys* have been met with by Bartholin, La Motte, and Brendel; and disease of its secreting structure, by Dr. Bright.

48. *D.* The Wenzels, in their numerous dissections, directed attention to the state of the *pituitary* and *pineal glands*; but the result of their researches, until the mistake was pointed out by Dr. Sims (*Lond. Med. Gaz.* vol. vii. p. 374.), was referred to the cerebellum, by nearly all subsequent writers, excepting Esquirol. These able pathologists found the *pituitary gland* and *infundibulum* variously altered in colour, consistence, size, and structure, in nearly all the cases of epilepsy they examined; and the spinous processes of the os frontis, the crista-galli of the ethmoid, and the clynoid processes of the sphenoid bone, more or less prominent, or otherwise changed in position and shape, in most of them. The *pineal gland* was also more or less altered in colour, and softer than usual, in the larger proportion of cases. — Caries, thickening, internal exostoses, spiculi, malformations, and malpositions, of the bones at the base of the skull, with various changes of the membranes, were met with in several instances. In fifteen cases out of twenty, the cerebrum and cerebellum were quite sound. Alterations in the sphenoid bone and pituitary gland have been found likewise by Greding, Neumann, Sims, and

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[*] I was, whilst writing this, called to a man reduced in circumstances, from habits of intoxication; and who had experienced two or more attacks of delirium tremens. He was seized with an epileptic fit, brought on by the fear of being run over by a carriage near his own house. He had a return of the delirium tremens upon recovery from the paroxysm. A gentleman, given to occasional intoxication, is at this moment under the care of Mr. Carter and myself. He has had regular attacks of epilepsy, followed by delirium tremens. The last paroxysm has not been followed by this affection, but by threatened paralysis.

myself. GREDING has also observed changes of the pineal gland, and fibrinous concretions adhering to the inner surface of the *sinuses*, — appearances likewise noticed by WAGNER and myself. Nearly all the lesions described in § 29. *et seq.* of the article on the BRAIN *and its Membranes* have been occasionally detected, but not so frequently as the foregoing, nor so often in this as in some other diseases of the nervous system, as insanity, paralysis, &c. Indeed, the most important maladies seated in this system, as somnambulism, chorea, hysteria, catalepsy, ecstasy, convulsions, epilepsy, mania, apoplexy, and paralysis, are merely modifications, with exaltations of grade, of nearly the same pathological conditions.

49. VI. NATURE OF EPILEPSY. — There are certain circumstances connected with the pathology of epilepsy, fully ascertained, and which should be kept in recollection in our speculations as to its nature and treatment: — 1st. That it may remotely depend upon inanition, losses of blood, or a deficient quantity or quality of this fluid. — 2d. That it may be owing to a totally opposite state as respects either the system generally, or the brain especially. — 3d. That it seldom occurs in persons whose digestive, assimilating, and circulating organs perform their functions regularly — 4th. That, in the simple and early disease, it is not dependent upon any lesion cognisable by our unassisted senses, unless such lesion be seated in the *medulla oblongata* or *pituitary* and *pineal glands*, — parts not yet sufficiently examined in this malady, and which may be dangerously affected without manifesting any material change. — 5th. That the appearances found in old or complicated cases are to be referred rather to the repeated derangements the circulation of the brain has suffered in the paroxysm, and to the nature of the associated disease, than to the lesions detected in fatal cases; such lesions, however, when induced in the course of other disorders, being occasionally exciting or concurrent causes of the epileptic attacks. — 6th. That general congestion of the encephalic vessels evidently exists in the second or convulsive stage of the fit; but it is not so manifest that this state is present from the commencement of the seizure, as cases have presented, at this period, symptoms of a very opposite condition. — 7th. This congestion is only a passing phenomenon, evidently caused by interruption to the respiratory actions, impeded circulation through the heart, and to the spasmodic action of the muscular system; and is not the cause of the seizure, the principal phenomena of the fit even ceasing at the very moment when the congestion is at its height. — 8th. The paroxysms of epilepsy cannot, therefore, be imputed to the congestion, which is evidently an advanced or consecutive phenomenon produced as now stated; but must be referred to the parts on which sensibility depends, and which actuate the respiratory and muscular organs.

50. Although these positions seem not to admit of being controverted, yet there are other points necessary to a knowledge of the nature of the disease that still require to be ascertained: — (*a*) What are the states of the heart's action, and of the circulation, particularly in the head, just before and at the time of seizure? — (*b*) Is the suspension of the heart's action sometimes observed at this time, owing to a spasmodic contraction of some continuance; or to sudden loss of power; or to an interruption of the return of blood to either side of the heart? It is obvious that, until these and other points are fully ascertained, no satisfactory conclusion can be come to respecting the nature of the disease. Numerous opinions have been offered, but very few of them require any notice. The ancients supposed that the disorder is caused by a pituitous humour in the ventricles of the brain, the symptoms arising from an effort of nature to relieve herself from it. BOERHAAVE and VAN SWIETEN imputed it to a morbid action of the brain exciting the nerves of motion, and obscuring those of sensation. Dr. CULLEN considered that it may proceed in some cases from too great excitement of the brain, and in others from collapse. Numerous modern writers have referred it to a change in the structure of parts within the cranium. But opposed to this opinion, are the facts, that in the simple disease lesions are seldom observed; and that, when observed in either the simple or complicated states, they are not uniform, or even of the same kind, and are as frequently seen in other diseases of the brain, unattended by convulsions, as in epilepsy. Dr. J. JOHNSON has remarked that the immediate cause of the attack seems to be a temporary local turgescence of the cerebral vessels, determined by a temporary super-excitement of the nervous structure of the parts thus affected. This opinion is very generally adopted in connection with the inferences, that local turgescence or plethora causes pressure; and that pressure, when general, produces apoplexy; when partial, paralysis; and when slight, epileptic convulsions, — phenomena which, doubtless, frequently arise from these conditions, but not from them alone, but likewise from others; symptoms of pressure being very often altogether wanting at the commencement of the fit. — Mr. MANSFORD, proceeding on the supposition that the nervous and electro-motive fluids are identical, has contended that the brain is constantly generating them, and that, in health, they are controlled by the will, in opposition to their natural tendencies; their formation, retention, and discharge thereby being duly regulated; but, when weakened by disease, this control is irregularly or imperfectly exercised, and their accumulation is favoured, until it reaches its maximum, when it explodes in an epileptic seizure. It is obvious that this opinion is entirely founded on a postulatum — the identity of nervous influence with the electricities — to which few will subscribe. SAUVAGES had long ago ascertained by experiment that the hemispheres of the denuded brain may be punctured without exciting sensibility; but that, as soon as the instrument reaches the origin of the nerves, or the *medulla oblongata*, epileptic convulsions are produced (*Nosol. Method.* vol. i. p. 782.), and hence concluded, that whatever especially affects those parts, may induce the disease. The opinion has been adopted by several pathologists, and probably approximates as nearly to the truth as can be expected in the present state of our knowledge. — The researches of the WENZELS have led them to imagine that the proximate cause is to be referred chiefly to the pituitary and pineal glands, especially the former; and it is not improbable that impairment or other disorder of the function I have attributed at another place to these parts (see APOPLEXY,

§ 103, 104.), may be concerned in some way or other in deranging the circulation of the encephalic organs, and in predisposing, or giving rise, to the disease. Dr. Reid, insisting on the suspension of the heart's action at the commencement of the fit, and on the tetanic rigidity of the muscles in the first stage of it, has referred these changes to "irritation or accumulation of blood in the spinal nervous mass," particularly the cervical portion. Dr. Shearman has contended, with much justice, that simple epilepsy often owes its origin to deficiency of nervous energy, or irregular distribution of it, independently of vascular excitement or any primary disorder of the circulation.

51. It is unnecessary to offer any further opinion of the foregoing views. From a survey of the predisposing and exciting causes, and of their mode of operation, as well as of the connection frequently subsisting between other diseases and this, it seems probable, that changes in the organic nervous influence of the encephalon, or alterations of structure of any part within the cranium, may so affect those parts at the base of the brain, connected with the origin of the nerves, especially the *medulla oblongata*, as to suppress sensibility, derange the functions of respiration and circulation, and occasion inordinate action of the muscles, under the influence of the cerebro-spinal axis — in short, to disorder especially the functions depending upon these parts, in the manner constituting the disease. It may be urged that, if this affection arise from irritation or any other change in the parts now named, wherefore is it paroxysmal, or of occasional occurrence and short continuance? To this I can only answer, that nervous excitement, not depending upon or kept up by inflammatory action, is usually manifested in this form; that any other than functional affection of the parts about the origin of the nerves of respiration cannot produce the disease, as any remarkable change of structure of these parts is quickly followed by death; and that, presuming the change therefore to be functional, or at most very slightly structural, the successive phenomena constituting the different stages of the paroxysm most probably remove for a longer or shorter time, according to the duration of the interval, the particular condition which excited the attack. According to this view, irritations or other alterations of function or structure in remote but related organs or structures may affect the *medulla oblongata* or adjoining parts, so as to induce a paroxysm of the disease, especially in persons predisposed to disorder of these parts, the predisposition arising from the state of organic nervous influence and of circulation within the head. In such cases, the irritation is propagated by nervous connections to the situation referred to, the chief phenomena of the seizure being one of the numerous forms of morbid action depending upon *reflex sympathy*.[*]

52. VII. Diagnosis.—The intimate relation subsisting between the diseases of the nervous system just alluded to, might lead to the inference that the diagnosis of epilepsy would be sometimes a matter of difficulty. But in the regular and uncomplicated form of the disease, no difficulty will be experienced. It is only when insensibility precedes the convulsions; or when there are no convulsions, or merely slight or partial convulsions; or when there is violent delirium in the paroxysm; or when there are convulsions with some degree of consciousness; or when one half the body is only affected — all which modifications may occasionally present themselves in both the simple and associated forms of the disease; — that the practitioner can doubt as to the exact nature of the attack. The intermediate seizures also between epilepsy and apoplexy (§ 41.), which frequently attack aged persons, and are, as respects the course of the affection, merely a variety of epilepsy, without the convulsions — the *Leipothymia* of Sauvages — may also be mistaken, especially for *apoplexy*, or for *syncope*; but, by attending to the history of the disease, in all its forms, and to the state of the pulse in the fit, its nature will become apparent. When the paroxysms exhibit the regular course described above, as they usually do, there can be no difficulty in the diagnosis.

53. (*a*) If the fit be complicated with *apoplexy*, it may be mistaken for the simple form of that malady; but convulsions will sufficiently show the mixed nature of the attack. In the *intermediate states* (§ 41.), or the paroxysms without convulsions, greater difficulty will be experienced. The nature of the seizure will, however, be evinced upon tickling the soles; for, if it be epileptic, no sensibility will be evinced, particularly in the first and second stages of the fit; whereas, in apoplexy, the patient draws away his feet, unless there be paralysis, but still one foot will retain its sensibility. Besides, this form of fit is seldom above half an hour, or an hour in duration, unless it be aggravated by improper treatment.—(*b*) *Hysteria* may be mistaken for epilepsy, particularly when the paroxysms of the former are severe; but the borborygmi and globus hystericus, the discharge of limpid urine, followed by laughing, crying, sobbing, &c. will indicate their nature. Moreover sensibility is only obscured, but never altogether lost, in hysteria, until it has assumed the epileptic character; and the convulsions come on first, even when the insensibility is greatest; the restoration of sensibility being often followed by a renewal of the convulsions, the patient at last recovering without any sopor, and with little or no fatigue.—(*c*) The *convulsions of children* are often confounded with epilepsy, although both affections are very distinct. The former are more

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[*] The *aura epileptica* is also, in many cases, nothing else than a manifestation of this kind of sympathy — the irritation of some internal part affecting some portion of the encephalic organs, the affection being reflected in the course of some nerve belonging to the cerebro-spinal system. In cases where this sensation may depend upon some change in the part where it originates, the paroxysm is still more evidently an expression of reflex sympathy. The reader may refer to my remarks on the *Sympathies*, in the first and second editions of my notes to M. Richerand's *Physiology* (pub. 1824 and 1829), where he will find them divided into the direct and reflex — "*direct sympathy*," sympathy depending upon the organic nervous functions; "*reflex sympathy*," upon the cerebro-spinal. See, also, a paper, in the *Philosophical Transactions* for 1833, on the latter class of sympathies — the reflex, which the author has dignified by the name of "*reflex function.*" The reader will then see in what this *new* "*reflex function*," of the nervous system differs from the *old* "*reflex sympathy*" of the nervous system; or whether it differs at all; also whether or not the phenomena usually designated by the term sympathetic are more correctly named by substituting for it the word function: function, in physiology, being the office any part especially performs, and not such phenomena as only accidentally or occasionally depend upon it.

continued or recurrent; are more irregular in their course; and are accompanied with more or less fever, loss of appetite, and often with thirst: whilst the latter is less frequent, more periodic, and attended by much less disorder of the digestive, circulating, and assimilating functions; the one being an *acute*, the other a *chronic*, malady.— (*d*) In fine, epileptic seizures may be readily distinguished from all others by — 1st, their commencing with a scream, and sudden and complete loss of sensibility; 2d, the spastic rigidity of the affected muscles in the first stage; 3d, the convulsions being more tetanic than clonic, unless in severe cases complicated with apoplexy; 4th, the foaming at the mouth, distorsion of the features, and lividity of the countenance; 5th, the priapism and unconscious discharges; 6th, the injury sustained by the tongue; and 7th, the consequent sopor, or mental aberration. The diagnosis of real from *feigned* epilepsy is considered in the article on Feigning Disease.

54. VIII. Prognosis.—An opinion of the disease should have reference — 1st, to the recurrence of the paroxysms; 2d, to their severity, duration, and the danger to be apprehended; and, 3d, to the nature of the disorder complicated with them. Of epilepsy generally it may said, even when the simple form, and not very frequent recurrence, of the fits indicate no immediate danger, that few disorders are more intractable, or more liable to contingent complications of a very serious kind. The danger varies materially in the different *varieties* and *states* of the disease, and increases as the fits return more frequently, as they become more severe or of longer duration, and as additional disorder of the nervous system associates itself with them.—(*a*) In the *simple* forms, the cerebral symptoms, preceding and following the fits, are the chief guides in forming a prognosis; but what is known of the causes must also be taken into account. The presence of intense pain, vigilance, delirium, mania, amaurosis, paralytic symptoms, &c., either before or after the seizure, indicate organic lesions of the brain, and an unfavourable form of the disease, usually passing into some one of the complications described above. In cases of this kind, considerable danger is to be apprehended from the paroxysm, especially when there is evident plethora. Hereditary predisposition, severe injuries of the head, and the scrofulous diathesis, although not necessarily indicating immediate danger, are also very unfavourable circumstances.

55. (*b*) The *sympathetic states*, or those associated with or arising from disease in related organs, are generally less dangerous than the cerebral varieties. Of these forms, the most serious are the *spinal* and *cardiac;* and the least so, the *uterine*, *enteric*, and *stomachic* or *dyspeptic*, but much will depend upon the amount of disorder in the respective organs, and the habits of the patient, particularly as to indulgence of the appetites. When these are under due control, the latter three varieties often terminate favourably. The *uterine* variety sometimes disappears after marriage; but if an attack occurs in the puerperal states, it is attended by much danger.

56. (*c*) The *complicated varieties* present few chances of complete recovery, especially the *paralytic* and the *insane*. When, however, the paralytic symptoms are slight, or pass away soon after the fit, recovery should not be despaired of; and the same may be said of the form attended by temporary delirium, or by *delirium tremens*, or by temporary *mania*, or intermitting insanity. M. Esquirol states, that epilepsy complicated with continued insanity is never cured. I have seen complete recovery from the *apoplectic* variety; but this is a complication also of great, and often immediate, danger. The *intermediate* form is much less dangerous.

57. (*d*) The fits usually *recur* most frequently in the cerebral and complicated forms; and next in the spinal and cardiac. They are most rare in the uterine, and the nephritic, and in the gastric and hepatic. Dr. Cheyne thinks that the disease is most inveterate, when it is accompanied with chronic cutaneous affections. Addiction to masturbation aggravates and prolongs it, and often causes it to pass into the paralytic and maniacal or insane complications; but, when it has arisen from this most baneful and disgusting practice, and the patient has had resolution enough entirely to relinquish it, a complete cure will often be accomplished. Epileptic seizures from the metastasis of gout or rheumatism, or in persons of the gouty or rheumatic diathesis, may not return, if these diseases fix themselves in the extremities. When the fits arise from the syphilitic infection, a mercurial course will generally remove them permanently. M. Cullerier has recorded several instances of this.

58. IX. Treatment.—i. *Of the Paroxysm.*— The *intention* is to shorten the fit, or render it less severe: but this is not easily accomplished; and the means usually recommended for the purpose, if inappropriately used, may have a very opposite effect; and either render the next seizure more severe, and the interval shorter; or convert what would have been a simple, and by no means serious, paroxysm into a recurring and prolonged seizure, followed by various unfavourable symptoms. — *Bleeding* has been advised in the paroxysm; but, unless in the epilectic convulsions of the puerperal states, or when the fits are attended by very marked plethora, or cerebral congestion, or in a first attack, especially when consequent upon the suppression of some sanguineous evacuation, it should be deferred. Besides, it cannot easily be performed in the convulsive stage of the paroxysm, at which time it is most appropriate. In the just mentioned excepted circumstances, however, I have directed it with great advantage. But in the soporose period of the fit, it should not be resorted to, unless apoplectic symptoms be present. I have seen it, at this stage, cause a return of the paroxysm as soon as sensibility had been partially restored.[*]

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[*] A gentleman, residing near Portman Square, had been under my care, in the spring of 1833, for articular rheumatism. He soon recovered, and went out of town. Towards the close of the year, whilst in Scotland, he had an epileptic attack; and was blooded in the arm, and cupped soon afterwards. This was the second seizure, the first having occurred two or three years before. He returned to town immediately after this second attack; and, when I saw him, there appeared no occasion for further vascular depletion: a course of alteratives and stomachic purgatives was therefore directed. Three or four days afterwards, he had a third seizure, and was brought home in the soporose stage of the fit. I did not see him until about two hours afterwards; and then a physician, who had been called in whilst I was sent for, had had him cupped largely! But, soon after the depletion, and as sensibility was returning, the paroxysm

— The *cold affusion* on the head and occiput is sometimes useful, particularly where there is much heat of the head, and when the disease has been consequent upon or connected with hysteria, or associated with uterine disorder; but in other circumstances I have not seen so much advantage from it as I had anticipated. **Brera** (*Giorn. di Med. Prat.* t. iii. c. 3.), however, speaks of it very favourably. It requires, however, discrimination as to the time and manner of employing it; for it may be even injurious, if resorted to in the soporose stage, or continued too long, especially when the head is cool, and the pulsation of the carotids is weak: in these, the *tepid* or *warm affusion* is much more appropriate. — *Antispasmodic and purgative enemata* are, upon the whole, as safe and efficacious means as can be employed in the fit. When there is but little determination to the head, the assafœtida injection, with or without a small quantity of camphor, and some castor oil, may be preferred. But when this symptom is present, the terebinthinated enema (F. 150.) is more efficient. In some cases it will be advisable to combine these substances, or to add others.

59. Under every circumstance, all ligatures and cinctures should be instantly removed; and the patient placed in bed, in a large and very airy apartment, with the head and shoulders much elevated. A cork or wedge-shaped piece of soft wood ought to be introduced between the teeth, and the struggles gently but not forcibly restrained, so as to prevent the patient from injuring himself by their violence. Certain popular remedies have been noticed by writers. Dr. F. **Hawkins** thinks that filling the patient's mouth with common salt is not without use; and J. **Frank** entertains a similar opinion of placing a piece of cold metal in the hands. I have seen apparent benefit from a similar application to the nape of the neck and occiput; and probably ice, or the cold affusion, in this situation, would be equally useful. Upon the whole, excepting the precautions recommended above, it will be as well to adopt the advice of **Celsus**, and to do but little in the paroxysm, unless under the circumstances now stated. Where the fits are moderate and uncomplicated, and especially when the practitioner is either in doubt, or insufficiently informed as to the state or variety of the disease, this is certainly the safest plan; for in the simple forms of epilepsy, I have seen more harm than advantage from the "*nimia diligentia medici*" during the paroxysm.

60. ii. *Treatment in the Intervals.* — Upon visiting an epileptic patient, the physician should enquire into his general health, disposition, avocations, habits, modes of living, and former attacks of this or of other diseases; and ascertain the causes of the first seizure. The information thus obtained, viewed in connection with his present state, will generally enable the physician to ascertain the following things, which are of the utmost practical importance: — (*a*) The existence of plethora, of asthenia, or of inanition, and the probable extent of either, in the *simple*, the *sympathetic*, and *complicated forms* of the malady; — (*b*) The states of the digestive, assimilating, circulating, depurative, and generative functions, and of the organs chiefly concerned in them — or the *sympathetic* forms of the disease; — (*c*) The existence of other disorders of the nervous system, and especially with reference to chronic inflammation, or its effects in parts within the cranium — or the *complicated* states; — (*d*) The evidence of impending or of more remote danger. Having thus analysed the case, the particular *variety* to which it should be referred will be determined with greater ease. Proceeding thus, in order to the due appropriation of the means of cure, the physician should direct them calmly and decidedly, with reference to the disposition, the feelings, the weaknesses, and the irresolution of the patient; and in a manner calculated to gain his confidence, and to inspire hope. In this, as well as in all nervous diseases, the communications of the physician should be brief, clear, and forcible, without descending to any explanation whatever, either as to the cause or intimate nature of the disease, and the operation of the remedies he recommends, or as to his reasons for adopting them in preference to others; for these are matters respecting which no one but a well-educated medical man can think aright, or should even attempt to think. All endeavours to explain abstract matters connected with disease, and the means of removing it, to unprofessional persons, however well informed they may be, is to place ourselves at the mercy of the pragmatical objector or self-sufficient volunteer in the professed cause of humanity. That ignorant empirics are sometimes apparently more successful in the cure of nervous diseases, than scientific practitioners, chiefly arises from the circumstance of the former being incapable of stating their views, or assigning reasons for their procedures; whilst the latter, as justly remarked by Dr. **Cheyne**, are generally very much too ready, as respects both their own reputation, and the confidence of their patients, to explain every thing. The empiric is fully convinced of the justice of the apothegm — "*Omne ignotum pro magnifico,*" — and acts conformably with it:

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recurred. The obvious course in this case was, to have caused the patient to be removed to bed, and to have stated that nothing further was requisite in that stage of the fit until the patient had partly slept off the exhaustion; when the physician in attendance would pursue that course which his knowledge of the antecedent disorders and state of the patient would warrant.

Whilst this was passing through the press, a man of middle size, apparently about forty, consulted me; and stated that he had been seized with the first paroxysm of the disease immediately post coïtum quinquies repetitum duabus cum puellis inter horas perpaucas; that he had been blooded to about a pint soon afterwards, and experienced a still more severe fit about a month after the first; that the third seizure occurred about a fortnight after the second, during which he fell down and cut his head, the cut part having bled a pint at least; that his usual medical attendant, upon arriving soon after the termination of this fit, bled him largely from the arm; but that, as soon as the vein was closed, the fit recurred; and that, during the struggles, the vein broke out, and the blood was allowed to flow until two or three pints were taken in addition to the quantities lost just before. The person who accompanied him to my house, on account of his weak state, and who witnessed the paroxysms, stated that this last was most severe; and that the fit which recurred during the depletion, and which was attempted to be put a stop to by continuing the abstraction of blood until a very unusual quantity was lost (about five pints in all), was remarkably prolonged and violent. The patient is now pale and weak, with a waxy appearance of the surface; completely exhausted, physically and mentally; and constantly dreading a recurrence of the paroxysms. This case furnishes a very remarkable instance, not only of the failure of large blood-letting in arresting or shortening the fits, but also of its influence in rendering them more frequent and violent, when injudiciously prescribed.

the man of science is candid, and ready to impart to others the views he entertains. The silence of the one, although generally the cloak of ignorance, imposes more on the public than the open deductions of the other, however confirmed by science and enlightened experience.

61. iii. *Treatment of Simple Cerebral Epilepsy.* — *A.* This form of the disease, depending upon *deficient power*, and *inanition* (§ 27.), being occasioned chiefly by exhausting discharges, vicious habits, or imperfect nutrition, obviously requires the removal of these causes, and means to invigorate the nervous system, and equalise the circulation, which, even when the blood is most deficient in quantity, is generally inordinately determined to particular organs, and especially to the brain, during the convulsive stage of the fit. In this and the other form (§ 63.) of the cerebral disease, the moral means just hinted at are especially required, with the regimen hereafter to be described; and, whilst the mind is confirmed thereby, these intentions may be simultaneously fulfilled. With this view, a light and nutritious diet, in very moderate quantity, and chiefly farinaceous, may be allowed; and the preparations of *iron* exhibited in conjunction with bitter tonics, or stomachic laxatives. The feet should be kept warm, and the head cool, whilst the circulation on the surface is promoted by daily shampooing, or by frictions with coarse flannels or the flesh-brush. If there be occasional flushes, or increased heat of the scalp, the hair should be cut close, and the head sponged night and morning, or even oftener, with a cold acetous lotion. Moxas or blisters may be applied behind the ears, and repeated from time to time, or a seton inserted in the nape of the neck. In some cases, the latter may be found too irritating or exhausting; but, even in these, it may be of service, if the rest of the treatment and regimen be sufficiently invigorating; and the digestive and assimilative functions be judiciously promoted. As amendment proceeds, the cold sponging of the scalp may be replaced by the daily use, in the morning, of the shower bath.

62. Where we have reason to suspect that the disease has been induced by venereal excesses, the subcarbonate of soda may be given with tonics, and soda water taken as a common beverage: but neither of these ought to be continued too long. In the scrofulous diathesis, and where we suspect organic change, Brandish's alkaline solution may be prescribed, in any of the bitter infusions; or a solution of the ioduret of iron, or of the hydriodate of potash. In a case very recently under my care, three grains of blue pill, with seven of the aloes and myrrh pill, were given on alternate nights, and one of the above preparations of iodine during the day, with very remarkable advantage. When the functions of the liver are impaired, as occasionally happens, small but frequent doses of the preparations of mercury, with taraxacum, taking care not to affect the mouth, will be of service. I have found them, however, often fail of improving the excretions, until tonics were also exhibited. In a case of this kind, I prescribed very small doses of the oxymuriate with the compound tincture of bark, and the preparations of sarsaparilla, with great benefit. Equal proportions of the nitric and muriatic acids, thrice daily, or oftener, or the addition of them to the warm foot-bath, may also be useful. — When the disease proceeds from excessive sexual indulgences, late hours, and addiction to intoxicating liquors — a combination of causes by no means infrequently inducing it — the alkaline carbonates, or the liquor potassæ with the infusion of valerian, or bitter tonics; or very small doses of camphor with the oxide of zinc, and cinchona, or the tincture of the muriate of iron in the infusion of quassia, may be employed. In this, as well as in the other varieties of the disease, when depletions and depressing agents have been carried too far, the preparations of iodine, or the extract of nux vomica, or strychnine, or other tonic and antispasmodic remedies hereafter to be noticed, may be prescribed, in forms of combinations which the peculiarities of the case will suggest..

63. *B. Simple cerebral epilepsy, connected with plethora or excited action* in the head, is the most common form of this variety, in this country; and requires, according to the apparent degree of either of these pathological states, *bloodletting*, general or local, or both; and, subsequently, the affusion of cold water on, or cold sponging, the head, or the shower bath; derivatives, particularly setons, moxas, or issues, or blisters behind both ears, kept open some time, or often repeated; and purgatives every second or third night, with low diet, and total abstinence from all spirituous and fermented liquors. Unless plethora or vascular action be very considerable, local bloodletting once a month, in moderate or small quantity, is preferable to large depletions; and, if the fits recur monthly, the patient may be cupped just before the new or full moon, according to the period at which the fits recur. Dry cupping over the nucha and between the shoulders may likewise be practised once or twice, or even oftener, between the bleedings, as judiciously advised by Dr. Cheyne. An issue or seton near the nape of the neck, or an open blister, is more serviceable in this than in the preceding form of cerebral epilepsy. Where there is manifest determination to, or increased vascular action in, the brain, antimonials, and especially James's powders, are often beneficial. Dr. Cheyne (*Dub. Hosp. Rep.* vol. i. p. 315.) recommends this powder to be taken at bedtime, commencing with two or three grains, and increasing the dose by half a grain each night, until a sensible effect is produced on the skin, stomach, or bowels. If it occasion sickness, the dose should be diminished one grain on the following night. He states that, by adding a few grains of rhubarb to it, a larger quantity of the James's powder will be borne by the stomach than could otherwise be taken. If it produce diaphoresis, the same dose may be continued for three weeks, and then it should be reduced half a grain each night; the course of this medicine thus usually extending to six weeks. In this manner the dose may be increased to fifteen or twenty grains, and continued for some weeks, without offending the stomach. When we suspect the existence of a state of chronic inflammatory action, the *antimonial liniment* (F. 301.) or *ointment* (F. 749.), may be rubbed along the spine, or over the nape of the neck and occiput; the latter application being continued until a copious eruption of pustules is procured, which should be kept out for some time.

64. Although *cerebral* or simple epilepsy frequently appears connected with one or other of the states of vascular fulness and action above specified, yet cases will also often occur in which the practitioner will be at a loss to determine the presence of either; the disease being dependent upon deficient nervous power, with irregular circulation or distribution of blood, rather than upon any deficiency or excess of this fluid. In these cases, the vital nervous system is primarily and chiefly in fault; congestion or irritation possibly also existing in the medulla oblongata or adjoining parts of the encephalon. But little advantage can be expected in such from depletions only, especially when pushed far, as they will increase these morbid states, and even favour determination of blood to the head. I believe that most advantage will accrue *from such remedies as will promote an equable and free action of all the excreting organs, and impart tone to the nervous system.* Light diet and very moderate use of animal food; total abstinence from fermented and spirituous liquors; careful avoidance of the predisposing and exciting causes, and particularly of those in which the case originated; regular exercise in the open air, taken often, and short of fatigue; travelling, or frequent change of air; a due regulation or moderation of all the passions and appetites; the daily use of the shower bath; external irritation or derivation; and anti-epileptic tonics and antispasmodics; or moderate local depletions, or dry cupping, or both, as circumstances may indicate; are the most rational resources. When the case evinces an inclination to one or other of the states above considered, the treatment pointed out with reference to it should be enforced to an extent co-ordinate with the amount of such disorder. If there be any tendency to plethora or excited action, animal food should be altogether relinquished, — a measure advised also by Fothergill, Heberden, Frank, Abercrombie, and Cheyne.

65. iv. *Treatment of the Sympathetic Varieties.* — *A. From Disease of the Spinal Chord or Nerves* (§ 30, 31.). — This variety will necessarily require either vascular depletions, or tonics, or even both, according to the degree in which plethora, increased action, or deficient power, is inferred to be present. — (*a*) Where increased fulness or action exists, cupping, the application of leeches, and dry-cupping in the course of the spine, the insertion of setons or issues a little below the seat of pain, frictions with the mercurial and compound camphor liniments, or the repeated application of moxas, are the most efficient means, aided by purgatives, the usual antiphlogistic remedies, and by rest. — (*b*) Increased vascular action in the spinal chord, or its surrounding parts, is, however, often associated with deficient power, and sometimes even with inanition. In such cases, whilst moderate local depletion, dry cupping, external derivation, &c. are resorted to, the more antispasmodic tonics, as valerian, myrrh, castor, &c., and even the preparations of iron, cinchona, camphor, ammonia, &c., should be prescribed. — (*c*) This state of disease is not infrequently induced by masturbation. In this case, cold aspersion of the genitals, night and morning; sponging the spine with cold salt water, or with vinegar and water; or the effusion or aspersion of these along the back; and the internal use of the muriated tincture of iron, or of the carbonate of iron with soda, or of Brandish's alkaline solution in tonic infusions; will prove of the greatest benefit. Due regulation of all the secretions and excretions; early rising; and, as the strength increases, a shower bath every morning; will also be powerful adjuvants. When cold sponging, &c. are not resorted to, tonic plasters (F. 111. 117, 118.) may be applied along the spine. — (*d*) If pressure from the effusion of lymph, or serum, or from the thickening of some portion of the sheath of the cord, be inferred after a careful examination, the preparations of iodine may be tried both internally and externally, particularly the hydriodate of potash, or the iodurет of mercury; or the linimentum hydrargyri and the linimentum terebinthinæ may be rubbed along the spine night and morning. — (*e*) If the fits be preceded by an *aura*, a ligature should be instantly applied above the place at which it commences, if this be practicable; or a seton or issue inserted in the part, and kept freely discharging; or a blister applied before the expected return of the paroxysm, and either preserved open, or often repeated. — (*f*) Sometimes this variety is connected with uterine irritation or disorder; it being almost impossible to determine whether the spinal or the uterine affection is primary, or which of them is most instrumental in causing the epileptic seizures. Cases of this kind are met with chiefly in large or manufacturing towns, and in females who have become addicted to sexual excitement; and appear to me to be most benefited by counter-irritation in the course of the spine; by the application of an antispasmodic liniment (F. 297. 311.) in this situation; and by the alkaline carbonates, or Brandish's solution with hyoscyamus, in tonic infusions or decoctions. Subsequently, the remedies enumerated above (*c*) may be prescribed.

66. *B. With especial Disorder of the Heart or Lungs* (§ 32.). — It is by no means easy to determine what is the most appropriate and successful treatment in these states of the disease. Local depletions, antispasmodic tonics, or chalybeates, according as the case may present excess or deficiency of blood, aided by purgatives or laxatives, and regulated diet, are generally required. External derivation, chiefly by means of one or two setons or issues, should not be omitted. It has been supposed that the circumstances especially indicating the propriety of resorting to setons or issues, contra-indicate the exhibition of tonics. But such is certainly not generally, nor even frequently, the case in this disease. I believe that, in many instances in which these external means fail of affording relief, the failure has been partly owing to their having been employed, either at a time when the system has been too far reduced by depletions; or in conjunction with those and other depressing agents, in cases wherein such treatment was inappropriate, or carried too far. Where the function, or even the organisation, of the heart is affected in epilepsy, it will be found that greater benefit will accrue from a judicious exhibition of tonics and antispasmodics, aided by external derivation, than from other remedies. In many cases, the disorder near the centre of the circulation depends either upon deficient or irregularly distributed nervous power, or upon some affection of the medulla oblongata,

and is merely a varied manifestation of the primary form of the disease. In these, the treatment already advised for that form, according to the states of vascular fulness and action, will be appropriate. Where signs of pulmonary congestion or inflammation appear after repeated seizures, vascular depletions, external derivation, and low diet, must be chiefly depended upon. When the fits are preceded by a feeling or any other symptom of cardiac disturbance, an antispasmodic medicine should be in readiness for the patient to resort to. The following have been recommended; and either of them, or F. 423. or 424. may be taken, in any of the forms of the disease, when premonition of the fit is felt.

No. 210. ℞ Aquæ Ammon. Sub-carbon. ʒj.; Tinct. Succini ʒiij.; Tinct. Castorei, Tinct. Assæfœtidæ, āā ʒvjss. Capiat æger cochleare unum minimum, vel duo, in aquæ cyatho. (De Haen.)

No. 211. ℞ Fol. Recent. Lauri-Cerasi ʒvij.; tere cum Sacchari Albi ʒxiv.; Pulv. Fol. Aurantii ℥j.; Syrup. Rosarum et Syrup. Violar. āā ʒij. Fiat Electuarium, cujus capiat cochleare unum medium ante paroxysmi accessionem. (Van Mons.)

No. 212. ℞ Spirit. Ammoniæ Succinati ʒiij.; Tinct. Castorei, Tinct. Valerianæ, āā ʒijss.; Mist. Camphoræ ℥vij. M. Capiat coch. ij. vel iij. magna, adveniente paroxysmo.

67. C. *With Disorder of the Digestive Organs.* — (*a*) In the *gastric* association, it may often be requisite to commence with an emetic, consisting chiefly of the sulphate of zinc. But the frequent repetition of it is very rarely of the least advantage. Although the appetite is often ravenous, yet digestion is slow and imperfect, and needs the aid of tonics associated with laxatives. The compound galbanum pill may be given through the day, conjoined with equal quantities of inspissated ox-gall and Castile soap, or with the extract of gentian and quinine; and, when the bowels are sluggish, three or four grains of the gall may be taken on alternate nights with an equal quantity of aloes. If the biliary secretion be deficient, a full dose of calomel once a week, followed by a purgative draught (F. 181, 182.), will be requisite. If there be deficient action, or fulness, of the vascular system, or general asthenia, the mistura ferri composita, or the mistura ferri aromatica (*Dublin Pharmacop.*), may be exhibited; or the sulphate of iron, or of zinc, or of copper, or of quinine, may be prescribed with some tonic or antispasmodic extract, or with the compound galbanum pill. In cases evincing great depression of nervous power, with deficient tone of the vascular and muscular systems, these latter remedies, or the ammoniaret of copper, the extract of nux vomica, or strychnine, or the nitrate of silver, may also be tried, and in similar forms of prescription. It is in this variety that travelling, and change of air, of domicile, or of habits, as advised by De Haen, is most likely to be of service, as Dr. Cheyne remarks. In many cases, it will be necessary to assist the digestive organs, either shortly before, at the time of, or soon after, a full meal. With this view, the aloes and myrrh pill, or aloes with mastich, or with the addition of capsicum, has been generally recommended. Either of the digestive pills in the Appendix (F. 558. *et seq.*) may be directed in this manner. The ox-gall with extract of gentian, or of hop, and a grain or two of aloes, is the most beneficial; a small portion of the aloes acting fully on the bowels, when combined with these bitter tonics, or with the sulphate of quinine. These will seldom or never fail of preserving the bowels very freely open; but if irritation in the rectum be excited by them, they may be relinquished for a time, and injections substituted; or they may be prescribed, in a more purgative form, every second or third night.

68. (*b*) Cases manifesting *hepatic* disorder (§ 34.) should be treated with reference to the nature of that disorder. If symptoms of excited action be present, general or local depletions, antimonials and cooling diaphoretics, and a seton or issue near the region of the liver, will be necessary. If there be enlargement, chronic obstruction, torpor, or accumulation of bile in the ducts, deobstruent purgatives, especially the preparations of mercury, the taraxacum in large doses, and subsequently a course of alteratives (see especially F. 503—511.); the repeated application of blisters over the hypochondrium; and the dilute nitro-muriatic acid, internally or externally, or both; will be productive of more or less benefit. As, in these cases, the functions of both the stomach and intestines are also impaired, these means should be conjoined with so much of the treatment directed with reference to disorder of these organs (§ 67. 69.) as the peculiarities of the case may warrant.

69. (*c*) *Epilepsy from worms or other disorders of the intestines* (§ 35.) should at once be treated by the purgative anthelmintics; for, even where no worms may exist, these medicines frequently remove morbid matters which have accumulated in the prima via in this variety. Having expelled these sources of irritation, antispasmodic tonics — especially valerian, assafœtida, camphor, galbanum, the preparations of iron, &c. — will generally be of great service, in preventing both a recurrence of the paroxysms and the regeneration of worms. It is in this variety that an occasional full dose of the oil of turpentine, either with castor oil, or followed, in two or three hours, by this or some other purgative, is most beneficial. A full dose of calomel should also sometimes precede the exhibition of the turpentine; and their action may be further assisted by enemata with equal quantities of these oils. When the symptoms described towards the conclusion of paragraph 35. are present, purgatives and purgative enemata every second and third day; and tonics or chalybeates, with warm cardiacs and antispasmodics, should be prescribed for a considerable period. Frictions of the surface, particularly of the abdomen, loins, and thighs, ought also to be employed daily, occasionally aided by warm embrocations or liniments. Subsequently, the shower bath may be directed, and steadily persevered in, with such other of the remedies already recommended as the circumstances of the case may require. Where associated disorder of the *spleen*, *pancreas*, or *mesenteric glands* is present (§ 36.), purgatives, deobstruents, and tonics, variously combined, and the preparations of iodine, with external derivation, are chiefly to be relied upon. In this variety, the following stomachic purgatives, taken alternately, at bedtime, will frequently be very serviceable: —

No. 213. ℞ Pilul. Hydrarg. (vel Hydrarg. cum Cretâ), Pil. Galban. Comp., Extr. Colocynth. Comp., āā gr. iv.; Fellis Bovini inspissati gr. ij. M. Fiant Pilulæ iij. pro dosi.

No. 214. ℞ Sodæ Sub-carbon. ℈j.; Sodæ Sulph. ʒss.—ʒj.; Infus. Sennæ, Infus. Calumbæ, Aquæ Pimentæ, āā ʒv.; Tinct. Cardamom. Comp. ʒj. M. Fiat Haustus.

70. *D. From Disorder of the Generative and Urinary Organs.*—The *causes* (§ 37.) of this variety should be ascertained and removed, otherwise medicine will be of little service. The treatment should depend chiefly upon the degree of vascular fulness and action, in connection with the state of nervous power. When it has arisen from suppressed catamenia, or from amenorrhœa, without any chlorotic appearance, bloodletting may be safely prescribed and repeated; and the usual means of restoring this evacuation resorted to. But when the fits appear before the catamenia are established, the period of puberty having arrived, blood-letting must be more cautiously employed, unless there be evident plethora, when it may be prescribed much more freely; and it should be aided by such emmenagogues and purgatives as the habit of body, diathesis, and strength of the patient will warrant. If the disease be attended by signs of irritation of the uterus or ovaria, or by hysterical symptoms (§ 37.), heating and stimulating emmenagogues and antispasmodics should be laid aside, and those of a cooling and sedative kind prescribed, such as nitre with the subcarbonate of soda or of potash, with hyoscyamus or the preparations of hop. When the fits follow the subsidence of regular and free uterine evacuations, vascular depletion is very seldom beneficial; the antispasmodic tonics, as valerian, the ammoniated tincture of valerian, assafœtida, the metallic sulphates, &c., occasional purgatives, and strict attention to the digestive functions, being much more appropriate. If the fits be connected with dysmenorrhœa, or scanty menstruation, vascular depletions, especially from the feet immersed in warm water, are generally of service, when the habit is full or the strength unimpaired. After the necessary evacuations, large doses of camphor combined with opium or hyoscyamus, also in large quantities, will generally relieve the more urgent symptoms. This practice has been pursued by me for several years, and has very recently been recommended by Dr. Cheyne. Semicupium, or the hip-bath, the internal use of the sub-borate of soda, and frictions of the lumbar region, abdomen, hips, and thighs, night and morning and after coming out of the bath, by a hard flesh-brush, or by flannel, will also be useful adjuvants. If the attacks occur about the commencement of the menstrual period, the application of a number of leeches near the groins, or on the insides of the thighs, shortly before the expected time, will often render the attacks more and more slight, and increase the discharge. Setons or issues in the latter situation will sometimes have a similar effect. If the catamenia be too abundant, or too frequent, or if symptoms of inanition or asthenia be manifest, the invigorating measures already advised ought not to be neglected. The connection of this form of the disease with manustupratio, or with great irritability of the sexual organs, should be kept in recollection; and where either the one or the other is detected, or even suspected, a strict mental and moral discipline, with the means recommended above (§ 62.), ought to be instituted. An occasional full dose of turpentine, either conjoined with some other purgative, or preceded by a dose of calomel, or followed by a brisk cathartic, and turpentine enemata, are sometimes of great service, particularly when the fits proceed from suppressed, obstructed, or difficult menstruation. Dr. Prichard advises the turpentine, in this state of the disease, to be given in an emulsion, in doses of from half a drachm to two drachms three times a day, or two drachms every night; but in this mode of exhibition it is generally nauseated, and is often productive of disagreeable effects, unless it be conjoined with some other purgative. If the fits be connected with disease of the *urinary organs* (§ 37. *b.*), the alkaline carbonates, with hyoscyamus; and oily purgatives, or other remedies suited to the disorder of these organs; will often prevent or relieve them.

71. v. *Treatment of Complicated Epilepsy.*—The complicated states, being evidently, in a large majority of cases, caused by advanced grades of the same pathological conditions as produced at first the simple epileptic paroxysms (§ 28. 51.), generally demand similar measures to those directed in the cerebral forms, but in a more energetic and persevering manner, especially when occurring early in the disease, and in young or robust persons.—*A.* The *complication with mania* or *insanity* will require, according to the history, the stage, and the existing circumstances, of the case, either copious depletions and evacuations, or an invigorating treatment, conformably with the principles already stated. Chronic inflammation of the brain or of its membranes should always be dreaded in this unfavourable form of the disease; and wherever the state of the circulation, and the symptoms referrible to the head and organs of sense, especially the pulse in the carotid, and the temperature of the scalp, evince its existence, general or local bleeding; the cold affusion on, and sponging, the head; purgatives; mercurials with antimonials, particularly calomel and James's powder; external derivation; irritating liniments, setons, or issues, &c.; should be employed, according to the habit of body and degree of vascular action and vital power. When the complication is of a *maniacal* kind, and vital power is not much impaired, these means may generally be energetically prescribed; repeated local depletions, the spirits of turpentine in purgative doses, and calomel with antimony pushed so far as to affect the mouth, being often of great service, especially if it occur in young robust persons, or from the suppression or disappearance of some other disorder, or of accustomed evacuations. But when the mental disturbance has slowly supervened, or attended an asthenic state of the disease (§ 27.); or has arisen from causes productive of exhaustion or inanition, consisting more or less of the low forms of *insanity*, or of mental weakness; the treatment advised with reference to the nervous or asthenic form of cerebral epilepsy (§ 61, 62.) must be pursued; external derivatives, and free alvine evacuations, being also directed. In this complication, the functions of the heart, digestive canal, liver, and uterine organs, should be duly regulated, as already recommended in the sympathetic varieties, whenever they present any manifest disorder.

72. *B.* The *apoplectic complication* (§ 40.) must be treated conformably with the principles explained in the article Apoplexy. But my experience enables me to state that bloodletting can seldom be safely carried so far in it as in true apoplexy; and that cupping on the nape of the

neck, leeches behind the ears and to the temples, purgatives frequently repeated, brisk cathartic enemata, and external derivatives, are chiefly to be confided in. After recovery from the seizure, the measures appropriate to the habit of body and other circumstances of the case, as described with reference to the sanguineous form of cerebral epilepsy (§ 63.), should be resorted to. The *intermediate states* between apoplexy and epilepsy (§ 41.) will require local depletion, alvine evacuations, and restorative medicines, according to the evidence furnished of vascular fulness, or of vital and nervous depression. In the intervals, stomachic purgatives, and antispasmodic tonics, with regulated diet, change of air, &c., will generally be necessary. When these states are connected with disorder of the uterine functions, the measures directed in the uterine form of epilepsy should be prescribed.

73. *C.* The *complication with paralysis* (§ 42.) will seldom be treated with any success, unless the palsy be partial, and pass off soon after the fit; when we may infer that it has been owing to the congestion attending the convulsion. When the patient is young, of a full habit, or of unimpaired powers, *bloodletting*, general or *local*, or repetitions of the latter, will be requisite; aided by purgatives, setons, and the other means advised in the apoplectic complication. But in persons presenting evidence of asthenia or inanition, the preparations of *iodine*, especially the hydriodate of potash, and ioduret of iron; the extract of *nux vomica* with aloes, or the aloes and myrrh pill, or *strychnine*, in any of the forms given in the Appendix (F. 542. 665. 907.); and the metallic sulphates, with the antispasmodic tonics, especially valerian, serpentaria, assafœtida, camphor, ammonia, &c.; will be most beneficial. But, even in these cases, purgatives should not be neglected; such as are of a warm stomachic kind being selected, and exhibited regularly every second or third day, so as fully to evacuate the bowels. In the more sthenic states of this variety, complete recovery from the paralytic symptoms is sometimes witnessed after free evacuations; but the patient is not secure from a return of the paroxysm in some one of its most dangerous states of complication, although his health may appear quite re-established. In a case to which I was lately called, these symptoms disappeared after full bleeding from the arm, copious purging, &c.; and the patient was able to pursue his occupation, and expressed himself quite well: but in a few days he was seized with another fit, of which he died in a few minutes. The bloodletting which I directed in this case was large; but the habit of the patient, the state of the pulse and of the blood drawn, and the effect produced by it, indicated the propriety of having recourse to it in a decided manner.

74. *D.* Of the *other complications* (§ 43.) of this malady, little further need be adduced. They require more especially a persevering use of stomachic and deobstruent purgatives, with antispasmodics, external derivatives, and due attention to diet and regimen, varied and associated with other means according to the particular nature of the complication, or sympathetic disorder, and the habit of body and other circumstances of the case.

75. vi. *Remarks on the Remedies and Means of Cure recommended by Authors, with reference to the Varieties and Circumstances in which they are most appropriate.* — *A. Bloodletting*, general and local, has been recommended by most writers; but the extent to which it may be carried has rarely been understood, and never attempted to be assigned. At the present day, it is more frequently carried too far than neglected when it ought to be directed. Of modern writers, Dr. CULLEN and Dr. BRIGHT have estimated it in a manner which approaches the nearest to the results of my own experience. If carried too far, or performed in such a manner as to induce full syncope, it is apt to bring on a paroxysm; and if it be not followed by purgatives, restricted diet, and regular exercise, it will only increase the tendency to plethora. The circumstances in which it should be prescribed, as well as those in which it ought not to be resorted to, have been explicitly stated; but the extent to which it should be carried, the particular situation and manner of performing it, and the repetitions of it, can be regulated only by the existing circumstances of the case, — by the habit of body, the state of the pulse, the modes of living, the strength of the patient, and the causes producing and tending to perpetuate the malady. Dr. HEBERDEN expresses himself strongly against bloodletting: but the class of persons amongst whom he practiced, and the inhabitants of large towns, subject to this disease, certainly are not so much benefited by this evacuation as those otherwise circumstanced; and yet, even in them, very small and often-repeated local depletion is frequently of great service.

76. *B. Purgatives*, and purgative enemata, have nearly all writers in their favour; and I believe that there is no class of medicines which is less capable of abuse in this disease than they. But the success of the practitioner will depend chiefly upon the selection and combination of them appropriately to the peculiarities of the case; and upon his firmness in persisting in them, when they are clearly indicated, although little apparent benefit at first results from them. The more drastic purgatives, as *elaterium*, *croton oil*, and the *hellebores*, have been prescribed; and are most suitable in the plethoric states, and apoplectic, paralytic, and maniacal complications of the disease. The fœtid, black, and even the white *hellebores* have been recommended from HIPPOCRATES to the present day; and are often very serviceable in the verminous and uterine varieties, and in the maniacal complication, in which they have been prescribed by CELSUS, ARETÆUS, ALEXANDER TRALLIANUS, SCHULZ, STARKE, SMYTH, GREDING, and PRICHARD. PLINY states that the tribune DRUSUS was cured of epilepsy by the black hellebore. The powder of the root, or the extract, may be given in doses of ten grains increased to thirty; or the decoction of the leaves or root may be employed. In the apoplectic and paralytic complications, the extract or decoction are advantageously given in enemata. The *oil of turpentine*, especially conjoined with *castor oil*, in order to insure its cathartic operation, is a very efficacious medicine, exhibited either by the mouth, or in clysters. It is, in the latter mode of administration, the safest and most active of antispasmodics that can be given during the paroxysm; and, when prescribed in energetic doses, and suitably combined, it produces a very

derivative action from the head, whilst it fully evacuates the intestinal canal, and stimulates the abdominal organs. Hence it is especially serviceable in the enteric, verminous, uterine, apoplectic, maniacal, and paralytic states of the disease. It has been employed successfully by Latham, Young (*Trans. of Coll. of Phys.* vol. v. p. 52.), Percival (*Edin. Med. and Surg. Journ.* vol. ix. p. 271.), Lithgow (*Ibid.* vol. xi. p. 301.), Prichard, and by myself (see *Med. and Phys. Journ.* for May and July, 1821.) The ancients, as well as the moderns, have depended also upon *scammony*, *colocynth*, and *aloes*; but of these, as well as of *calomel*, it is unnecessary to make further mention. Dr. Heberden was averse from the use of purgatives, excepting in the enteric variety, owing probably to the reason assigned above (§ 75.); and certainly, in the more asthenic states of the disease, and when the circulating fluids are deficient in quantity and quality, if trusted to mainly, they will be productive of mischief rather than benefit. In such cases, they should be given only on alternate days, or every third day, — should be of a warm and stomachic kind, or combined with tonics, and associated with the means recommended above (§ 67.). Thom, J. Frank, Kinneir, Mangold, &c., prefer *rhubarb*, the *neutral salts*, and the *supertartrate of potash*. This last, given in large doses, is most serviceable, when persisted in, if the vascular system be plethoric, and the biliary secretion in a morbid state. Galen and many recent writers have preferred *aloes*. In some one or other of its preparations and combinations, it is the most generally appropriate purgative that can be prescribed. With stomachic, chalybeate, and cardiac medicines, it is suitable in the asthenic cases; and combined with ox-gall, or with sulphate of quinine, or with bitter extracts, &c., it will act with very remarkable energy, and without depressing vital power, — a circumstance of peculiar importance in the treatment of epilepsy.

77. *C. Emetics* have been recommended by Aretæus, Alexander of Tralles, Zacutus Lusitanus, Ettmuller, Roncalli, Werlhoff, Lettsom, J. Clarke, and others. Van Swieten and J. Frank assign, with much propriety, the circumstances in which they should be given, in prescribing them only when the fits appear to proceed from disorder of, or the irritation of morbid or noxious matters in, the stomach. De Haen directs them when the paroxysm is preceded by nausea; Tissot, when a sense of weight, or a ravenous appetite, is felt; and Richter, shortly before the expected return of the fit. Mayer is favourable to the use of them, particularly of *ipecacuanha*, exhibited in doses short of producing full vomiting; and Marryat prefers those containing the *sulphate of copper*. Heberden considers them injurious; and Frank remarks, that he has never known an instance of a cure having been effected by them, although he believes that they have cleared the way for the action of other medicines. I agree with Meibom, in restricting them to the stomachic form of the disease, and in considering that they may be injurious in most other states, especially when there is much vascular fulness, or cerebral congestion.

78. *D. Diaphoretics* are much praised by Tissot and Lentin, who consider it of much importance to promote a free and equable perspiration, which is seldom observed in epileptics. *James's powder*, as prescribed above, or the other preparations of *antimony*, may be selected, particularly in plethoric persons; or the *vinum ipecacuanhæ* may be given with *liquor ammoniæ acetatis*, and the *spiritus etheris nitrici*. These are, however, most serviceable after other evacuations have been employed; and when the skin is dry; and then their operation may be aided by the tepid bath, as advised by Tissot and Marcard. Dr. Abercrombie, according to Dr. Cooke, has seen benefit from the *tartrite of antimony* given four times a day, in such doses as the stomach could bear. I had recently a patient under my care, who experienced a very severe attack whilst he was under the influence of this medicine.

79. *E. Emmenagogues* are required in those states of the uterine form of the disease that are connected with delayed, suppressed, or difficult menstruation. The *oil of turpentine* is one of the most efficient of this class of medicines that can be given in such cases, as fully shown by Dr. Prichard, more especially after *bloodletting* from the feet, or leeches to the groins and tops of the thighs, and the hip-bath, or semicupium, have been prescribed. The *sub-borate of soda* is also sometimes of service, either given alone, in doses of ten or fifteen grains; or in conjunction with other emmenagogues and antispasmodics, — more especially with camphor, or valerian, castor, ammonia, galbanum, assafœtida, aloes, &c. (F. 268. 368.) But, as M. Maisonneuve justly remarks, the restoration of the uterine functions to their healthy state is not always followed by a cure or even alleviation of the disease. When this is the case, the treatment must proceed according to the principles already explained. Marriage has occasionally removed the seizures, especially in the female, as remarked by Stahl (*De Dispos. Hered. ad Var. Morb.* p. 48.), Hoffmann (*De Epilep.* Opp. vol. iii. obs. 9. p. 20.), Krünitz (*De Matrimonio Multor. Morb. Remedio.* Franc. 1749.), Moreau (*Mém. de la Soc. Méd. d'Emulation*, t. ii. p. 189. — *in the male.*), and Prichard (*Op. cit.*). A young lady, whom I long attended on account of slight epileptic seizures, connected with irregularity of the uterine functions, and of the bowels, experienced, after marriage, a gradual amendment for some time; but had a very severe attack of puerperal mania after her first child. She is now in good health.

80. *F. Tonics and Antispasmodics.* — In the asthenic states of the disease, and in the other varieties, after bloodletting and the foregoing evacuations have been actively prescribed, remedies possessing a tonic and antispasmodic action are chiefly to be depended upon. But these should be selected with reference to the results of experience as to their operation, to the form of the disease, and to the particular features of the case, especially the states of sensibility and irritability, and of vascular fulness and action, generally and locally. But even when such remedies are most necessary, purgatives should be so conjoined, or so alternated, with them as to preserve a regular action of the bowels, or to occasion a brisker operation once or twice a week, according to the strength of the patient. In many cases, also, it will be requisite to administer tonics, and, still more frequently, antispasmodics, even contemporaneously with

local depletions, more especially when general or local plethora is associated with defective power and increased susceptibility.

81. *a*. Of *mineral tonics and antispasmodics*, the most active are the metallic sulphates and nitrates. — *α*. The preparations of *copper*, particularly the *cuprum ammoniatum*, or the simple *sulphas cupri*, have been recommended by Aretæus, Boerhaave, Van Swieten, Weizenbreyer, Duncan, Baumes, Thilenius, Theussink, Michaëlis, Cullen, Stone, Greding, Bland, Vogel, Willan, Battie, and Reil; and employed by them successfully in many cases. Drs. Home, Hook, and Magennis, however, state that they have found it to fail in most instances. Dr. F. Hawkins expresses himself much in favour of the *sulphate*, in doses of a fourth of a grain, conjoined with sulphate of quinine, or cinchona. In the asthenic states, and in the more plethoric forms, after depletions and evacuations have been prescribed, this combination, and the ammoniated preparation, frequently produce very great benefit, and sometimes entirely cure the disease. Dr. Urban (Hufeland, *Journ. d. Pr. Heilk.* 1827.) prefers the ammoniacal sulphate in the simpler states of the affection; and prescribes eight grains of it in forty-eight pills, of which three are to be taken night and morning, increasing the dose by one pill each second day.

82. *β*. The *sulphate* and *oxide of zinc* have been prescribed by Hart, Martini, Hartmann, Crell, Aasheim, Bell, Percival, Guthrie, Haygarth, Rush, Arnaud, Richter, and Ranoë. Osiander directs the zinc with valerian and orange leaves. The *oxide* has been preferred by most of these writers; and Dr. F. Hawkins advises it to be given with extract of conium. I have combined it advantageously with the ammoniated copper (F. 459. 598.), with camphor (F. 615.), and with valerian (F. 582. 665.); but I believe that the *sulphate* is more efficacious, especially when conjoined with camphor, musk, or other antispasmodics. (F. 584—587.). Upon the whole, zinc appears to be less useful than copper in this disease, although I do not rank it so low as Dr. Cullen and Dr. Cooke have done, who employed chiefly the oxide, which is frequently inert, unless it be exhibited in large doses.

83. *γ*. The *nitrate of silver* seems, from a passage in Stahl (*Theoria Med. Vera*, p. 1019.), to have been given in this disease as the principal ingredient of a secret medicine much employed in some parts of Austria at the time when he wrote; having been probably adopted from the preparation described by Angelus Sala, which consisted of a solution of the salt in wine; and which he directed in so large doses as to act as a cathartic. Schroeder, however, had already recommended it in epilepsy and other diseases of the head. Both Sala and Geoffroy prescribed it as a purgative in dropsies; but, although Schroeder and Boerhaave had mentioned it as a cure for epilepsy, it was scarcely used until Dr. Wilson noticed (Duncan's *Annals of Med.* vol. ii. p. 405.) its good effects. It was afterwards adopted by Dr. Sims, Dr. Cappe, Dr. Powell, and many others, who published proofs of its efficacy. Subsequently, Dr. Baillie, Dr. Roget, Dr. R. Harrison, Dr. J. Johnson, Dr. Cook, Dr. Sementini, M. Valentin, Dr. Heim, and others, have prescribed this medicine with advantage; and the more numerous observations of M. Lombard have also proved its success in a very large proportion of cases. The discoloration of the skin by it, noticed by Albers, Roget, J. Johnson, Vetch, and others, is so frequent, and so permanent when it does occur, as to be a serious objection to it. In some of the cases in which this effect was produced, the disease was not removed; but in others the recovery was complete. It does not seem to depend so much upon the largeness of the dose, as upon the long continuance of its use. Sementini (*Giornale di Fisica*, t. xi. p. 355.) recommends this salt to be triturated with some vegetable extract, and given in the form of pill; in this state the dose may be gradually increased to six or eight grains, or even more, in the day. I have prescribed it thus in several cases of epilepsy, and other diseases; and frequently with great benefit. It should not be continued very long, without intermitting it for a while. An eruption of minute pustules over the surface of the body, sometimes is produced by it, as first remarked by Sementini, and observed by myself; but this should be viewed as a favourable circumstance. The nitrate of silver appears to me most beneficial in the asthenic states of the disease; or after evacuations have been practised, in the other forms; also in the stomachic and enteric varieties, and in the complication with paralysis. I have generally combined it with hyoscyamus, or camphor (F. 473.), extract of belladonna (F. 472.), musk, opium (F. 475.), or gentian (F. 474.). The following is the mode of administering it adopted by Heim, an eminent physician in Berlin: —

No. 215. ℞ Argenti Nitratis in Pulv. gr. xij.; Opii Puri gr. vj.; Extr. Conii Maculati ʒij.; Extr. Glycyrrh. ʒj. Tere bene, et divide in Pilulas ponderis granorum duorum. Mane et vespere iij.—v. pil. capiat.

84. *δ*. The preparations of *iron*, especially the *sulphate*, and the *muriated tincture*, are often beneficial in the asthenic forms of the disease; or when depletions have been carried too far, and morbid matters have been evacuated. They have been much praised by Tissot, and by Quarin, who combined them with hellebore. I have directed them with valerian (F. 40.); with extract of hop; or with ox-gall, aloes, and myrrh. — *ε*. *Arsenic*, particularly Fowler's solution, has been employed by Pearson, Brugnatelli, Prichard, and A. T. Thomson. It requires much caution; as too large doses, or a too protracted use of it, may produce injurious effects, especially on the heart and arterial system. — *ζ*. The subnitrate of *bismuth* has been tried by me in two or three cases, both alone, and with other tonics and antispasmodics, the bowels having been kept freely open; and has appeared quite as beneficial as the preparations of zinc. — *η*. The *muriate of baryta* has been recommended by Hufeland and Gebel (Hufeland, *Journ. d. Pr. Heilk.* b. vii. st. 3. p. 177.), especially when the disease is connected with the scrofulous diathesis; the *aqua calcis*, by Tissot; and the *sulphuric acid*, by Ruland (*Curat. Empir.* cent. vi. obs. 96.), Rosenberg (*Rosa Jatrica*, cap. 30.), Hirschel, Feuerstein, and Hildebrand. The *nitro-muriatic* acids, in equal proportion, have been prescribed by me in tonic and astringent infusions, in only one instance, connected with

torpid function of the liver, and with some benefit; but the ultimate result is unknown to me.

85. *b*. Numerous *vegetable tonics* have been employed, in circumstances similar to those in which the foregoing are prescribed. — *α*. *Cinchona* and its preparations have been preferred, especially when the paroxysms were periodic, by Bano (*Acta Reg. Soc. Med. Hann.* vol. i. p. 106.), Buchhave (*Act. Med. Soc. Hafn.* vol. i. p. 224.), Frank, Chavalier, Comparetti (*Occursus Medici, &c.* p. 303.), De Haen, Cullen, Home (*Clinical Experiments, &c.* p. 194.), Pinel, &c.; and by Tode (*Med. Chirurg. Biblioth.* b. ii. p. 160.), with the ammoniacal salts. — *β*. *Orange leaves*, and the *bark* of the tree, have been praised by Thilenius (*Med. Chir. Bemerk.* p. 129.), Hannes, Fischer, Gesner (*Beobacht.* b. i. No. 19.), De Haen, Henning, Tissot, Locher (*Observ. Pract.* p. 44. 47.), Oberteuffer, Hufeland, &c. Quarin (*Animadvers. &c.* p. 23.), however, and Home, consider them inert. — *γ*. The *misletoe*, or *viscus quercinus*, was formerly much employed against this disease; and is evidently a medicine of great power. But the misletoe of the oak is procured with difficulty. It has been prescribed in epilepsy, probably from the time of the Druids. Gerarde (*Herball.* p. 1351.) mentions it as a popular remedy. Parkinson[*] (*The Theater of Plants*, p. 1394.) is much more copious respecting it; and Colbatch, in his treatise on its virtues, thinks it almost specific. The evidence of Borelli, Cole, Boerhaave, Van Swieten, Buchwald, Andree, Haller, De Haen, Quarin, and others, is also very much in favour of it. Dr. Frazer states, that out of eleven cases which he treated with it in the years 1802, 1803, and 1804, nine were completely cured. He prescribed it in powder, in the dose of from two scruples to two drachms, twice a day, in camphorated emulsion. Dr. Fothergill, Dr. G. Thompson, Mr. Haynes, and Dr. Willan, have also employed it successfully. On the other hand, Tissot, Cullen, Home, Good, and Cooke place no confidence in it; and, at the present day, it is almost wholly, and, perhaps, undeservedly, neglected, unless by empirics, whose success in this, as in other diseases, often depends upon the adoption of a once popular and efficacious remedy which had fallen into undeserved disuse. — *δ*. *Valerian* is mentioned by Dioscorides and Aretæus as a remedy in epilepsy. Fabius Calumna cured himself and others by it (*Phytobasanos.* Nap. 1592. 4to. p. 97.). Willis (*De Morb. Convul.* c. 24.), Panarolli (*Jatralogism. Pentecost.* i. obs. 33.), Cannengiesser, Marcard, Brisbane, Linnæus, Quarin, Haller, Fothergill, Sprengel, Unzer, and many others, have insisted on its efficacy when exhibited in sufficiently large doses. Thilenius (*Med. Chir. Bemerk.* p. 113—131.) and other German authors prefer its *essential oil*; and M. Guibert (*Rév. Médicale*, Dec. 1827, p. 376.) gives the *extract* in large doses. A powder, consisting of valerian and puff-balls, the *Lycoperdon Bovista*, is a popular remedy for the disease in Germany; and several writers contend that this latter substance is almost a specific for those fits which proceed from terror (Cooke). — M. Tissot placed great confidence in the efficacy of valerian, not only in epilepsy, but in all nervous affections requiring a gentle tonic and antispasmodic. Cullen, Home, Frazer, Woodville, Heberden, Tode, and Cooke, however, consider it a medicine of very little power — an inference much at variance with my experience of its effects, when appropriately exhibited; and depletions and evacuations have been premised, in plethoric cases. The powder of the root soon loses it activity by keeping; and, even when recent, often requires to be given in large doses. The ammoniated or camphorated tinctures, the extract, and essential oil, are useful preparations of it. The formulæ in the *Appendix*, particularly F. 81. 101. 269. 368. 582. 665. and 863., illustrate the mode of prescribing it; but in most cases of this disease, its quantity should be much increased. It may also be exhibited in enemata. — *ε*. The root of the *Artemisia vulgaris*, or mugwort, has been recommended by Burdach, Hufeland, and Loewenhard, in the dose of from 50 to 80 grains, on alternate days, or a few hours before the expected return of the fit, the patient being kept warm in bed. Hufeland prescribed it in ten cases, of which three were completely cured, three much relieved, and four received no benefit (*Rév. Méd.* 1824. t. iv. p. 447). Its operation, in the above dose, is tonic, diaphoretic, and diuretic. In plethoric cases, it should be preceded by depletions and cathartics (see F. 224.).

86. *ζ*. *Assafœtida* has been much employed, but seldom in sufficiently large doses, and not always in appropriate circumstances. It is advantageously combined with purgatives, and other tonics and antispasmodics (F. 367. 423. 480.). Lange (*Miscel. Verit.* p. 59.), Berger (*De Remed. Specif. in Epilep.* p. 13.), and Tissot, give it with valerian. With either castor, camphor, galbanum, myrrh, aloes, ox-gall, &c. (F. 368. 481, 462.), or any two of these, it is serviceable in the asthenic, dyspeptic, and enteric forms, and in the uterine variety after evacuations have been prescribed. It is one of the best medicines that can be given in enemata during either the fit or interval (F. 135, 136.). — *η*. *Galbanum* and *myrrh* are useful chiefly as adjuncts in these varieties; but they are less efficacious, singly, than assafœtida and the other substances just named. — *θ*. *Camphor* may be employed in every form of the disease, but in very different doses and combinations: in the plethoric states, in small quantity with diaphoretics and refrigerants (F. 24.); in the asthenic, enteric, and uterine varieties, in full doses with tonics and other antispasmodics (F. 35. 615.). Locher (*Observ. Pract.* No. 40.) prescribed it with bark; and Tissot, Pinel, and most modern writers have employed it, either as the chief agent, or as an adjuvant of other substances. When an immediate effect is required, it should be given in the form of draught or mixture, with the preparations of *ammonia* or of the

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[*] He states: — "The Missellto it selfe of the Oke is the best (or of the Chesnut tree, as Matthiolus saith to be as good), made into pouther, and given in drinke unto those that have the falling sicknesse: but it is fit to use it forty days together: and with this caution, that the wood, after it is broken from the tree, doe not touch the ground; which is in my minde too superstitious." — "Gentilis Fulginas, and others, have so highly esteemed of the vertues hereof, that they have called it *Lignum sanctæ Crucis*; beleeving it to helpe the falling sicknesse, apoplexy, and palsie very speedily." — "Divers doe esteeme of the Missellto that groweth on Hassell nuts, or Pearcs, as effectual as that on the Oke, so it touch not the ground, for the falling sicknesse, to be taken in wine."

æthers (F. 186. 212. 423. 845.). It often shortens the fit, or prevents it altogether when exhibited in enemata shortly before the usual period of accession, as in Formulæ 130. 135—138. 151.

87. *c.* Of *animal substances, castor, musk*, and *ox-gall* are most deserving of notice. — α. *Castor* is recommended by ARETÆUS, CELSUS, PLINY, SERAPION (apud *Cæl. Aurel.* p. 352.), K. DIGBY (*Experim. Med.* p. 332.), MOOR (*Pathol. Cerebri*, p. 211.), THOUVENEL (*Sur les Vertus des Subst. Anim. Medicam.* p. 357.), TISSOT, and FOTHERGILL. When unadulterated, and given in full or large doses, it is often of much service; especially in the asthenic, dyspeptic, and uterine varieties; and in the combinations advised in respect of assafœtida and camphor, with which (as well as valerian and musk) it may be conjoined (F. 480. 497. 905.). — β. *Musk* is also beneficial in these varieties, or in the other forms after evacuations have been prescribed, and in similar combinations to those mentioned with reference to the preceding substance. It is favourably mentioned by FEUERSTEIN, VAN SWIETEN, QUARIN, CULLEN, ACKERMANN, and others. HANNES made a full and successful trial of its efficacy on his own son (See *Nova Acta Nat. Curios.* vol. v. p. 244.). It should, unless intended merely as an adjuvant of other means, be given in much larger doses than usually directed. It may be conjoined with camphor, sulphate of zinc, &c. — γ. The *bile* of various animals, particularly of the ox, bear, and dog, has been noticed by BARTHOLIN, UNZER, QUARIN, and others. Of inspissated *ox-gall* I have had some experience in this complaint; but have usually directed it in combination chiefly with assafœtida, galbanum, myrrh, aloes, &c. (F. 558. *et seq.*). It is of much service in the states just particularised, and after depletions have been carried far, or to an injurious extent. In a case of this latter description, I am now employing it with very marked advantage.

88. *d. Cold* or *salt water bathing* has been advised by CELSUS, CÆLIUS AURELIANUS, FLOYER, LENTIN, TISSOT, and HUFELAND; but it requires caution, and attention to its effects. In young persons and delicate females, who have not been accustomed to a plunge bath, the fear, or shock of immersion, may bring on the seizure: indeed, WIEKARD (*Observ. Med.* Franc. 1775.) and TODE (*Med. Chir. Bibl.* b. i. p. 117.) adduce instances of such an occurrence. The *shower bath*, used daily, commencing with tepid water, and gradually reducing the temperature, in cases where the shock may be dreaded, is of much less equivocal benefit; and is, in all the varieties, but in the simple or cerebral forms especially, a very excellent remedy. When it cannot be employed, the patient should daily affuse water from a large sponge over the whole head and occiput.

89. *G.* Numerous substances evincing more of *stimulating*, than of tonic and antispasmodic, properties have been prescribed, with occasional success; but, in general, in combination with one another, or with medicines producing an astringent or tonic effect.— *a.* — α. The oil of *hartshorn*, or DIPPEL's animal oil, was very generally used, both internally and externally, especially during the last century, owing to the recommendations chiefly of DIPPEL (*Disquisit. de Vitæ Animalis Morbo et Med.* &c. p. 89.), ALBERTI (*De Med. in Motibus Nat. Exacerbatis.* Halæ, 1718.), VATER (*De Specificor. Epilep. Sigillatim Olei Animal. Virtutibus.* Vitel. 1725.), MAUCHART (*De Oleo Animal. Dippellii.* Frib. 1745.), JUCH, KORTUM, BANG, THOUVENEL, CULLEN, MORAND, and PORTAL. FEUERSTEIN believes that, when it is pure, and not altered by the action of the air, it is often beneficial. ACKERMANN considers it possessed of no small efficacy in the asthenic forms of the disease, particularly those connected with anæmia, and languor; but hurtful in the irritable and plethoric states. QUARIN advises it in the uterine variety. TISSOT, however, thinks it possesses but little power. — β. *Cajeput oil* was prescribed with benefit by GOETZ (in *Commerc. Lit. Noric.* 1731, p. 5.), in doses of from two to ten drops on sugar; and by WERLHOF (*Oper. Med.* p. 711.), with cinchona. — γ. The *oil* and other preparations of *amber* have been found sometimes useful by RIVERIUS (*Prax. Med.* p. 32.), BEATTIE (*De Cognoscend. et Cur. Morb.* &c. Halæ, 1780.), CULLEN (*Mat. Medica*, vol. ii. p. 361.), and others. The oils of hartshorn, cajeput, valerian, and amber, are serviceable chiefly in the simply nervous and asthenic states of the disease; and are useful adjuvants of other medicines, and are often beneficially conjoined with narcotics (§ 97.). Besides these, other oils, both simple and medicated, have been prescribed; but they hardly deserve enumeration.

90. *b. Phosphorus* was, I believe, used for epilepsy first by KRAMER (in *Commerc. Lit. Noric.* 1733, p. 137.); and more recently by FEUERSTEIN, QUARIN, and others. WEIKARD, AUTENRIETH, and HUFELAND justly view it as a doubtful and dangerous remedy. HAARTMANN (*De Noxio Phosph. in Med. Usu*, &c. Aboæ, 1773.) gave it in four cases without benefit. — β. *Cantharides* has been tried internally, by MERCURIALIS (*De Morb. Pueror.* l. i. c. 3.), ZACUTUS LUSITANUS (*Prax. Admirab.* l. i. obs. 35.), STOCKAR (*De Usu Canth. Interno.* Goet. 1784. p. 34.), and Dr. J. JOHNSON (*On Derangements of the Liver*, &c. p. 105.), with occasional advantage. Its external use, is, however, more common, if not more beneficial, in this complaint.

91. *c. Guaiacum*, either in decoction or substance, has been employed by VESALIUS (HALLER's *Bibl. Med. Pract.* vol. ii. p. 32.), WILLIS (*De Morb. Convuls.* p. 460.), SENNERT (*Prax. Med.* l. i. c. 31.), MERCURIALIS (*Respons. et Consult.* l. ii. c. 3.), FORESTUS (*Observ. Med.* l. x. obs. 58. 63.), F. HOFFMANN (*Med. Rat. Syst.* t. iv. p. iii. c. i. p. 21.), and others, who considered it possessed of much efficacy in this complaint, especially if connected with a syphilitic taint; but it has been neglected by more modern writers. — γ. The flowers of the *Cardamine pratensis* were found beneficial by BERGER and NAGEL (*De Usu Med. Card. Prat.* &c. Franc. 1793. p. 13.); but BAKER (*Trans. of Coll. of Phys.* vol. i. p. 443.), LYSONS (*Pract. Essays*, &c. p. 173.), and GREDING, state it to be inefficacious. The saturated infusion of the flowers and leaves produced a copious and fœtid perspiration in the experiments made with it by BERGER (*De Remed. Spec. in Ep.* &c. Franc. 1795. p. 11.) — δ. The *Arnica montana* has likewise been noticed by STOERCK; and the *Serpentaria*, by GRUELMANN, when the attack has been occasioned by fright.

92. *d.* The *extract of nux vomica* was praised

by Sidren (in *Acta Med. Suec.* t. i. Upsalæ, 1783. p. 367.), Rese (*De Nuce Vomica.* Jenæ, 1788. p. 20.), Hufeland (*Journ. d. Pr. Arzneyk.* b. i. p. 109.), and Vieweo (in *Annal. der Heilkunst*, Mai, 1811. p. 426.); and its active principle, *strychnine*, was prescribed by Dr. Brofferio (*Révue Méd.* t. iv. 1825, p. 488.), in this disease. I have tried the former preparation in two or three cases, and conjoined it with aloes (F. 541, 542. 907.). It is a powerful remedy in the asthenic forms of the disease, and in the paralytic complication, connected with inanition, or consequent upon excessive evacuations. When the fits follow the disappearance of the menstrual discharge, it is of especial service. Löbenstein-Löbel recommends the *tincture of nux vomica*, beginning with sixteen drops every three hours, and gradually increasing the dose to thirty or even to forty. This medicine is most injurious in the plethoric, inflammatory, and irritable states; and, if carried too far, is liable to excite inflammation of the membranes of the brain and spinal cord. These remarks apply equally to *strychnine*, which should be given in very small doses, and with strict attention to its effects (F. 565.). The *Strychnos Sancti Ignatii*, or the *Ignatia amara*, has been prescribed by Stein and Valentin. It operates similarly to the foregoing, and requires equal caution in its use. The secret remedy for epilepsy employed by Witz, father and son, is said by Dr. Haase to have consisted chiefly of the powder of this bean. It was found most useful against the fits following excessive fear; and was given in doses of two or three grains twice or thrice daily. (*Bullet. des Sc. Méd. de* Férussac, t. xi. p. 74.)

93. *e.* The *pæony* (*Pæonia officinalis*) entered, in conjunction with various vegetable antispasmodics and tonics, into many of the empirical remedies so much employed in epilepsy. The dried root, seeds, and flowers, and the recent expressed juice of the root, were chiefly used; and, with other writers, old Parkinson (*Theater of Plants*, p. 1382.) directs the male plant to be selected. The root was formerly hung around the neck as a charm against a return of the fits. Although praised by Berger, Forestus, Willis, Riverius, Appel (*De Epilepsia.* Alt. 1713. p. 39.), Schacht (*Instit. Med. Pract.* p. 64.), Murray (*Appar. Medicam.* t. iii. p. 40.), De Haen (*Rat. Med.* par. vi. p. 317.), and Vogel (*Hist. Mat. Med.* p. 206.), no confidence is placed in it by Sylvius (*Op. Med.* p. 427.), Herrmann (*Cynos. Mat. Med.* Argen. 1726. p. 176.), Moor (*Path. Cereb.* &c.), Haller, and Tissot. The imperfect trials made of it by Home (*Clin. Experim.* 2d ed. p. 209.) showed it was not without effect. This contradictory evidence is easily explained by the empirical mode of prescribing it; like the other medicines classed under the present head, it being appropriate only in the asthenic cases, and in the uterine variety after evacuations have been practised. — The *Sedum acre*, or wall-pepper, was used in Germany, as a popular anti-epileptic, before it was noticed as such by medical writers. Laubender, of Saxony, first prescribed it, and gave from ten to fifteen grains of the dried plant for a dose. Ischorn (Hufeland, *Journ. d. Pr. Heilk.* b. xiii. p. 167.) afterwards resorted to it with success. Peters (*Biblioth. Med.* t. vii. p. 116.) tried it with five patients, one of whom was cured, and the others relieved. M. Fauverge (*Journ. Génér. de Méd.* t. xcvii. p. 152.) employed it in four cases, three of which were cured. In these, bleeding was premised and vegetable diet directed: and very recently, M. Godier (*Ibid.* t. cviii. p. 141.) has given it in three cases, but with benefit in two only.

94. *f.* *Rue* (*Ruta graveolens*), and its distilled water, decoction, infusion, expressed juice and oil, were formerly much employed in epilepsy, especially by Forestus (*De Capitis et Ventris Morbis.* 1590. 8vo.), Mayerne (*Prax. Med.* p. 20.), Moor, Riedlin (*Lin. Med. Ann.* iv. 1698. obs. 25.), and Stenzel (*De Ruta Medicam. et Venen.* Viteb. 1735.). Pliny (l. xx. cap. 13.) mentions the use of the decoction before the expected return of the paroxysm; and Boerhaave (*Consult. Med.* Goet. 1752. p. 28.) frequently confided in the distilled water and infusion. It, as well as the sedum acre, should be prescribed only in those cases, to which I have restricted the pæony.—The extract, infusion, and powder of the flowers of the *Narcissus pseudo-narcissus* have been recommended by Laurembero (*Appar. Plant.* l. i. cap. 18.), and Du Fresnoy (*Des Propriet. du Narcisse de Près.* Paris, 1788.), in such doses as will not irritate the stomach. The *Viola odorata*, and *V. tricolor*, also, have been noticed by Dioscorides, Pliny, Matthioli, and Haase, as anti-epileptic medicines.

95. *g.* The frequent dependence of epilepsy on the scrofulous taint, or upon morbid structure, induced me several years since to employ *iodine* in the treatment of it; but the utmost discrimination and caution are required in the use of this substance; for it may be injurious in the inflammatory and plethoric states of the complaint, or if given in too large doses, or even for too long a period. It is indicated chiefly in the asthenic conditions, and in the paralytic complication if independent of inflammatory action. The *hydriodate*, or the *ioduretted solution* of it, or the *ioduret of iron*, may be preferred. But the iodurets are often uncertain as to the relative proportion of the metal and iodine. The *ioduret of mercury*, although a promising combination in this disorder, was prescribed by Dr. Roots, until the gums were affected, but without permanent relief.— I have found the ioduretted solution of the hydriodate most serviceable, given in very small doses three or four times a day: blue pill, and the aloes and myrrh pill, or any other gentle stomachic aperient, having been taken at bedtime. A patient at present under my care is pursuing this treatment with great benefit.

96. *h.* *Petroleum, mineral oils, and naphtha*, especially the former, have been recommended by Dioscorides (l. i. cap. 85.), Wedel (*De Epilepsia.* Jenæ, 1676.), and Gmelin (*Appar. Medicam.* vol. i. p. 185.). Ramazzini (*Opera*, p. 320.) has published a curious tract, written about the middle of the fifteenth century by Francis Ariosto, in which petroleum is said to have been employed successfully against this disease.—The ætherial preparation from *caouchouc* seems deserving of a trial in the simple or nervous states of the disease.—Of the preparations of *ammonia* and of *æther*, little further need be stated. They are useful adjuncts —(especially the

spir. ammon. fœtid., the spir. ammon. succin., and the tinct. valerianæ ammoniata)—to tonic or other agents, in the nervous or asthenic conditions of the complaint; and are sometimes serviceable when the accession of the paroxysm is indicated by failure or irregularity of the heart's action, or by other symptoms depending upon deficient nervous power. In such cases, the patient should be provided with a medicine, into the composition of which these preparations very largely enter (F. 210. 423, 424.), and have immediate recourse to it upon the recurrence of these symptoms.

97. *H.* The propriety of giving *Narcotics* and *Anodynes* in epilepsy is sometimes questionable. Yet cases frequently occur in which they may be prescribed, not only with safety, but with advantage, in judicious combinations, and after plethora, general or local, has been removed, and morbid secretions evacuated. — *a. Opiates* were employed by Aëtius (*Tetrab.* iv. ser. i. c. 96.), Avicenna, Millars, Morgagni, De Haen, Tralles (*De Usu Opii*, sect. iii. p. 16.), Tissot, Murray (*Appar. Med.* t. ii. p. 272.), Cullen (*Mat. Med.* vol. ii. p. 247.), Fothergill (*Med. Observ. and Inquir.* vol. vi. p. 80.), Rehfield (Doering's *Tracts*, vol. i. p. 160.), and Cooke. They should not be exhibited in the plethoric or inflammatory states, until evacuations have been carried to the utmost extent; nor in any form of the disease, until the bowels have been fully and frequently purged, and the secretions have assumed a natural character. In these circumstances, and in the asthenic conditions of the complaint, they are often valuable remedies; more especially if the attacks have proceeded from fright, or other affections of the mind, or are connected with an irritable or susceptible state of the nervous system. Aëtius and Avicenna gave *opium*, with various stimulating antispasmodics; Sennert (*Medicinæ Pract.* vol. i. p. 370.), with camphor: Duchesne, with aromatics: Aäskow, with assafœtida; Huxby, with musk; and Ferriar (*Med. Hist. and Reflect.* vol. i. p. 34.), with musk and camphor. De Haen and Darwin prescribed it alone, at bedtime, successfully, in cases in which the fits came on during sleep. Ward and Portal applied it with benefit, externally to the part which appeared to be the seat of irritation. Panzani (*Giornale di Med.* t. xiii. Ven. 1776.) exhibited as much as four grains with advantage in a case complicated with maniacal delirium. It is seldom of any use in the hereditary disease, or in that occasioned by the suppression of accustomed evacuations,— indeed, it may be injurious in the latter; and, as Quarin (*Animad. Practica*, p. 20.) justly remarks, it may induce a state of apoplectic torpor, when given during the paroxysm. The preparations of *morphine*, especially the *acetate*, in the liquor ammoniæ acetatis and camphor julap, or with an aromatic spirit, are frequently preferable to the pure opium, and less likely to affect the head injuriously. I have found the following draught to agree even with those who could not take opium in any of the more usual forms: —

No. 216. ℞ Morphinæ Acetatis gr. ¼; solve in Liq. Ammoniæ Acetatis ʒ jss., et adde Mist. Camphoræ (vel Aq. Destillatæ) ʒ j.; Spirit. Caryoph. ʒ j.; Olei Anisi ♏ iij. M. Fiat Haustus.

98. *b. Stramonium*, principally its *extract*, has been much employed in epilepsy, by Continental writers. Stoerck (*Libellus, quo demonstratur Stramonium, &c.* Vindob. 1762.), who first prescribed it in this complaint, gave from half a grain to a grain of the extract, three, four, or six times a day, for several weeks or months. It afterwards was approved of by Wählin, Spalowsky, Durande (Gardane's *Gazette de Santé*, 1773 et 1774, p. 143.), Sidren (*De Usu Stramonii in Convuls.* Ups. 1772.), Razouz (*De Cicuta, Stramonio, &c.* Nem. 1780. 8vo.), and others. Odhelius (*Comm. Acad. Suec. Stock.* vol. xxvii. p. 277.) prescribed it in fourteen cases of epilepsy and convulsions, eight of which, he says, were cured, and five relieved. Greding (*Sammtl. Schrift.* th. i. p. 102.), however, states, that of twenty-eight epileptics, it cured only two, permanently relieved four, and temporarily relieved eleven. He remarks, that aperients, tonics, and antispasmodics should also be exhibited. Arnemann (*Pract. Arzneimittellehre*, th. i. p. 279.) advises it to be given in the form of pill with camphor and bitter extracts.

99. *c. Hyoscyamus*, as well as stramonium, is indicated only in the circumstances and states of the disease pointed out when remarking on the use of opium and morphine (§ 97.), and in similar combinations to them. Mayerne (*Synt. Prax. Med.* Lond. 1690. p. 23.) prescribed the *seeds*, commencing with six or eight grains, gradually increasing, in the course of forty days, the dose to twenty-four grains; and directed them to be taken in the expressed juice of the *sempervivum*. Stoerck employed the *extract*, the preparation adopted also by Sauvages, Lentin, Bano, Greding, and Oberteuffer, who derived from it only slight or temporary advantage. —*Conium* has likewise been employed by Stoerck and some other writers, chiefly with liquor potassæ, when the disease is connected with the scrofulous taint.

100. *d.* The powdered *root and leaves of belladonna*, and the *extract*, are recommended by Münch, father and son, Stoll, and Bottcher. Richter, Löbenstein-Löbel, and Hufeland (*Journ. d. Pr. Arzn.* b. ix. p. 100.) prescribe either of these, with tonics, antispasmodics and aperients, according to the nature of the case. Greding (Ludwig's *Adversaria*, b. i. par. 4.) considers this plant to possess but little efficacy. Kaufer and Münch, the son (*De Usu Belladonnæ in Melanchol. et Epileps.* Goet. 1783.), however, contend, that it is especially beneficial when the fits are followed by maniacal alienation or tremors. It is most suited to the atonic states, conjoined either with ammoniated copper, or with nitrate of silver (F. 472.), or with musk, castor, camphor, &c. —*Tobacco* is stated, by Sennert, Zacutus Lusitanus, and Dupau (in *Journ. de Méd.* Sept. 1789.), to have been used successfully, in the form of clyster, in the stomachic and verminous associations of the complaint. Currie directed epithems of the infusion over the epigastrium before the accession of the fit, with benefit.

101. *I.* There are many other substances which have been employed internally in this disease.—*a. Digitalis* is one of the most important of these. Parkinson (*Theater of Plants*, p. 654.) remarks, respecting it, that "divers have been cured of the falling sicknesse thereby; for after taking of the decoction of two handfulls thereof, with four ounces of the *Pollipody* of the oake

bruised, in ale, they that have been troubled with that disease twenty-six years, and have fallen once a week, or two or three times a moneth, have not fallen once in fourteen or fifteen moneths." SALMON and WITHERING also praise it; but CURRIE (*Mem. of the Med. Society of Lond.* vol. iv. p. 18.) gave it in three cases with only temporary benefit. Dr. PERCIVAL (*Edin. Med. and Surg. Journ.* vol. ix. p. 271.) also tried it unsuccessfully, but in an unsatisfactory manner; for it is not by the empirical exhibition of one or two large doses of this medicine, that good effects can be obtained from it in a chronic complaint. Its efficacy in small doses has been shown in two cases (*Amer. Med. Recorder*, No. 2.); and in one that came under my own observation. It has been favourably noticed also by Dr. BRIGGS and Mr. SCOTT (*Edin. Med. Journ.* Jan. 1827.); and by KNIGHT, who has found much benefit from it in epileptic insanity. Dr. SHARKEY recommends an infusion of it in porter to be given until vomiting supervenes. It is advantageously exhibited also in conjunction with tonics, antispasmodics, and anodynes (F. 456. 469. 514. 537.); and is most serviceable when the disease has been caused by fright, or is connected with disorder of the heart.

102. *b.* The *preparations of mercury* have been used in epilepsy for their alterative effect, and in combination with various antispasmodics, or with antimonials. Of the propriety of these in the venereal and hepatic associations of the complaint, no doubt can be entertained. But in other circumstances they require discrimination. In the inflammatory or congestive states, and either alone, or with *James's powder*, they are often beneficial, although they be carried so far as to affect the mouth. PISO and ROLFINCK, SCARDONA, WALTHER, M. HOFFMANN (*Eph. Ac. N. C.* cent. 1. et 2. p. 272., *et Ibid.* cent. 3. et 4. p. 231.), and RAHN, have adduced proofs of the good effects of salivation in some instances. When we reflect on the frequency of serous effusion in the cavities, and of alterations of the coverings of the brain, in fatal cases, a judiciously conducted course of mercury, independently of the evidence of WILLIS, RIEDLIN, ETTMULLER, LOCHER, TISSOT, BURSERI, LYSONS, FRANK, SPÖRRY (*Ueb. die Würk. des Quicksilbers in der Epil.*, in *Mus. der Heilk.* b. i. No. 35.), and others, in its favour, promises some benefit. It is chiefly, however, in the more *active conditions*, or when the malady presents the apoplectic, inflammatory, maniacal, or paralytic complications; or follows some acute cerebral disease, and the pulse retains considerable firmness; that mercury, given so as to affect the mouth, is most likely to be serviceable. In these, calomel or blue pill with antimonials, or mercurial inunction, may be employed; but in the *more asthenic* and *chronic cases*, either these preparations should be conjoined with antispasmodics, as camphor, castor, or musk, as directed by BANG; or the sublimate should be given dissolved in sulphuric æther (J. FRANK), or in tincture of bark; or hydrarg. cum cretâ, or PLUMMER'S pill, with James's powder, Castile soap, or any other substance that the peculiarities of the case will suggest.

103. *c.* The elutriated *oxide of tin* has been recommended by Dr. SHEARMAN, in the dose of two scruples to a drachm to an adult, night and morning, continued for four or five days, an active cathartic being exhibited on the fifth day, and the tin again resumed, according to its effect.— The *superacetate of lead* has been prescribed by MAYERNE, SAXTORTH (*Acta Reg. Soc. Med. Haun.* vol. iii. p. 90.), RUSH (*Philad. Med. Mus.* vol. i. p. 60.), and EBERLE (*Lond. Med. Repos.* vol. viii. p. 178.); and the *hydrochloric acid*, by LARREY, chiefly in the syphilitic and cachectic states.

104. *d.* The *Agaricus muscarius* has been found serviceable in doses of from ten to twenty grains, by WHISTLING (*De Virtut. Agar. Mus. &c.* Jenæ, 1773. p. 13.); the *Boletus suaveolens*, in doses of a scruple four times a day, by ENSLIN (*De Bol. Suav. &c.* Erling. 1784. p. 77.); the *Aconitum napellus*, by DURANDE; the root of the *Dictamnus albus*, by STOERCK; the seeds and root of the *Heraclium spondylium*, in doses of two or three drachms of the latter, by PLINY (*Hist. Nat.* l. xxiv. cap. 6.) and ORNE; the root of the *Tussilago petasites*, by CRANZ (*Nat. Med.* par. ii. p. 162.); the *colchicum*, by ALDERSON (*Lond. Med. and Phys. Journ.* vol. xxxvii. p. 17.); the *Hyssopus officinalis*, by FORESTUS, RULAND, and SENNERT; the flowers of *pimpernel* (*Anagallis arvensis*), in doses of twenty grains three or four times a day, by DIOSCORIDES and GASSER; the expressed juice of the *Galium luteum*, in doses of two or three ounces in the morning, by CHOMEL (*Plant. Usuelles, &c.* t. ii. p. 24.), GARDANE (*Gaz. de Santé*, 1773, p. 19.), and WENDT (*Klin. Annal.* p. 146.); the seed of the *Lycopodium clavatum*, by SCHROEDER and KUHN; the *Lunaria rediviva*, by J. FRANK; the watery extract of the leaves of *yew* (*Taxus baccatus*), in from one to ten grains in the day, by LODER (*De Taxo Baccato.* Jenæ, 1794. p. 17.) and HUFELAND, in uterine epilepsy; the *Cocos nucifera*, by THUNBERG; the flowers of the *Anchusa officinalis*, by BRUTZ and BALDINGER; the *Bryonia alba*, by REUSNER; the essential oil of the *Buxus sempervivens*, by SCHROEDER and VOGEL; the flowers of the *Lilium convallium*, by SENKENBERG, BALDINGER, and LANGHAN, in doses of a scruple to a drachm, in the periodic type of the complaint; the powdered leaves, the decoction, and the essential oil of the *Origanum majorana*, by DIOSCORIDES, SCHROEDER, and FONSECA; the berries of the *Sambucus niger*, by DUFOUR; the decoction of the *Solanum dulcamara*, by BOERHAAVE, in epilepsy from metastasis; the flowers and root of the *Tilia Europea*, by HOFFMANN, RULAND, and TILEMANN (*De Mat. Med.* p. 308.); the *Verbena officinalis*, by SEBITZ and ROSENSTEIN; and the distilled water of the *Prunus laurocerasus*, by J. FRANK. Neither of these require any remark, excepting this last, which, from the quantity of prussic acid it contains, is sometimes not without efficacy. Its active constituent, *prussic acid*, is occasionally beneficial in the simple states of the complaint, after plethora has been removed, and the bowels fully evacuated, or when the disease is connected with great susceptibility and irritability, or is dependent on pain, local irritation, or gastric disorder.—Of internal treatment, generally, it may be added, that every medicine will fail, or afford merely temporary advantage, as long as plethora exists, or active determination to the head is unrestrained, and the appetites are indulged. And I must subscribe to the justice

of HEBERDEN's remark :—" Etenim nulla sunt remedia, quæ non toties spes nostras fefellerunt, ut incertum sit quantum illis debeatur, ubi visa sunt profuisse." (*Comment. &c.* p. 143.) It is chiefly by a judicious sequence, and combination of remedies; and by a well-devised plan, having strict reference to the circumstances of the case; that we can hope to treat this malady with success.*

105. *K. Electricity* was formerly much employed, but is now seldom tried, in epilepsy. DESHAIS, MANGIN (*Hist. de l'Electr.* par. iii. Paris, 1752.), MORRIS (*Gent. Mag.* 1753. p. 379.), LINNÆUS (*Consect. Electrico-Medica.* Ups. 1754.), FRANKLIN, and LOVET (*Elect. rendered useful in Med. Intentions.* Lond. 1760.), furnished the earliest notices of its use; but these were unsatisfactory, and almost contradictory. The more extensive experience, however, of FELLER (*De Therapia per Electrum.* Leips. 1785.), FEUERSTEIN, DEIMANN, and KÜHN (*Geschichte der Med. u. Phys. Elect. &c.* Leips. 1785. 8vo.), demonstrated — what indeed might have been inferred *à priori* — that it is occasionally successful in cases characterised by debility, inanition, or torpor of the vital functions, and in those occasioned by frights; but that it is seldom beneficial, and may even be injurious, in the acute, plethoric, inflammatory, and hereditary states of the complaint. In cases caused by suppressed discharge, it is not always a safe remedy: for, although the experiments of SPENGLER and KÜHN have furnished instances of its success in such; yet those of LINNÆUS, FELLER, and QUARIN, show that it was either inefficacious or hurtful, unless evacuations had been premised. Of the effects of *galvanic electricity*, the evidence is but little different from the foregoing. Mr. WHITLAM (*Lond. Med. Phys. Journ.* vol. xiv. p. 527.), Dr. DUNCAN (*Ann. of Med.* vol. viii. p. 339.), and Mr. MANSFORD, have detailed cases where this agent proved of service; but the last-named writer admits, notwithstanding his views as to the nature of the disease (§ 50.), that galvanism can often rank only as an auxiliary means. His plan of employing this agent is peculiar; and, although it may be the most rational and efficacious, it is seldom possible to have recourse to it; for, granting that the physician may manage, in the way Mr. MANSFORD directs, constantly to inclose the body of his patient within the circle of a galvanic battery; yet it may not prove successful, or the benefit derived may cease with the discontinuance of its use. Of electricity and galvanism, it may be said generally, that they have occasionally been found successful: that, when resorted to shortly before the seizure, they have sometimes suppressed it, or rendered it more mild; that, when applied during the paroxysm, they have often mitigated its violence and duration; and that the safest mode of employing electricity, is to place the patient on the insulating stool, and subject him to the *electric bath*; and to draw sparks from different parts, when thus insulated and placed in connection with the prime conductor.

106. *L. Of external means*, the most deserving notice are setons, issues, moxas, open blisters, and artificial pustulation. — *a.* The *actual cautery*, applied to the nape of the neck, the occiput, and even to the vertex, is recommended by ARETÆUS, CELSUS, CÆLIUS AURELIANUS, AVICENNA, and several writers of the sixteenth and seventeenth centuries. At the present time, *moxas* have nearly superseded the cautery, and have received the sanction of the most experienced writers, especially ESQUIROL and LARREY; the former of whom directs them along the cervix and spine, he having observed disease of the medulla oblongata and spinal cord in several instances.

107. *b. Setons* and *issues* have been directed by nearly every writer on the disease. In the cerebral variety with determination to the head, they are often serviceable; but in the asthenic forms, or when evacuations have been carried too far, and when susceptibility and irritability are augmented, they often either fail, or increase the disorder, unless tonics and antispasmodics be administered. The nucha is the place usually selected for their insertion, but the insides of the arm, or thigh, are often preferable situations. ZACUTUS LUSITANUS (*Prax. Admir.* l. i. obs. 22.), AB-HEERS, ROCHARD, and LOCHER, direct either them, or the *actual* or *potential cautery*, to the seat of the aura. M. ANDRAL prefers the latter means, and advises their application to a limb in preference to the nucha or occiput. An accidental burn of the limb, followed by ulceration, has not infrequently effected a cure, as in the case detailed by Dr. BONA (HUFELAND's *Journ.* 1827.).

108. *c. Artificial pustulation* by tartarised antimonial ointment, applied to the nucha, occiput, or vertex, has been found serviceable by Dr. CARTER (*Lond. Med. Repos.* vol. xix. p. 382., and vol. xxi. p. 369.), Mr. CREIGHTON, and Dr. MILLS, but it has, like all other agents, also failed. HORN (*Archiv.* 1812, May, p. 573.) directs this ointment to be rubbed on the part where the aura commences. — *d.* The propriety of exciting irritation in the scalp itself is questionable in the inflammatory, plethoric, and acute cases; although ARETÆUS recommends it, and ALEXANDER TRALLIANUS advises *mezereon bark* to be applied to this part. Where the disease has followed the suppression of an eruption in this situation, the antimonial ointment, or the mezereon bark, or blisters, are very appropriate applications. In the more obstinate and chronic cases, and after free evacuations in the more acute, *blisters* kept freely open, on the occiput, behind the ears, or on other parts of the

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* M. BORIE's plan of treating epilepsy, which is in great repute in Paris, is as follows: — Having premised a small bloodletting from the feet, exhibited an emetic, and acted on the bowels by means of four grains of calomel and an ounce of castor oil, he directs, every morning fasting, twenty drops of the distilled laurel water, in a glassful of sugared water; increasing the dose one drop daily until it reaches sixty, when that quantity is continued; and, every night, two drachms of the leaves of the *artemisia*, in powder, in the infusion of the *tilia Europea*. He applies, every fortnight, moxas — not exceeding six — along the spine, from the occiput downwards; causes the lower extremities to be well rubbed, with some ætherial preparation, twice daily; and leaves a bracelet on the left arm, which is to be drawn very tight upon the approach of the fit. He allows the patient only water for his drink, and restricts him to vegetable diet. He further directs sea-bathing — the head being first immersed — or the shower bath, and exercise in the open air, avoiding exposure to the sun: and lastly, he enjoins him — " Eviter les émotions vives, les emportemens de colère, les occupations sérieuses, les tensions de l'esprit, les lectures obscènes, la frequentation des spectacles, les contrariétés, les habitudes extenuantes, l'onanisme, les plaisirs vénériens," &c. (*Journ. des Progrès des Scien. Méd.* t. ii. D. S. p. 226.)

scalp, are prescribed by Riverius, Piso, Hoffmann, Mead, Percival, and others. — *e. Scarifications of the scalp*, particularly on the occiput, are directed by Celsus and Cælius Aurelianus, and are deserving of adoption in modern practice. — *f. Dry cupping* on the neck and between the shoulders shortly before the expected return of the fit, has been prescribed by me, with slight benefit, in some cases in which depletion had been carried as far as was judged prudent.

109. *M.* — *a. Ointments* containing the active principles of various medicines, as *strychnine*, *veratria*, *acetate of morphia*, &c., have very recently been tried in epilepsy, and are calculated to prove serviceable in some of its states; but, as yet, the results have not been such as to admit of further remarks. — *b.* Variously *medicated epithems* have likewise been resorted to, applied chiefly on the epigastrium, or along the spine. I have directed them in a few instances with advantage, particularly in children, and have genenerally employed modifications of F. 311. 313. and 770. in this manner. — *c.* The *endermic method*, or the application of various active substances to the skin denuded of its cuticle, has recently been tried on the Continent, in this disease. It possesses this advantage, — that it combines the operation of medicinal agents on the nerves of the part, and on the circulation, with external irritation; and it therefore deserves a cautious adoption, and more extended trials than have hitherto been made of it.

110. *N.* Immediate *ligature* of a limb or part, above the situation in which the aura commences, has been favourably noticed by Galen, Alexander Trallianus, Rhazes, Avicenna, Schenck, Greding, Lysons, Pew, Cullen, &c., and is generally recommended when the fit is preceded by an aura. It sometimes wards off the seizure; but it fails of doing so, as often as it succeeds, although it may have been sufficiently early employed.

111. *O.* — *a.* Aretæus is the earliest author who has noticed *trephining* the cranium in epilepsy, and the circumstances in which it may be performed. Cælius Aurelianus was opposed to the practice, although he states Themison to have been in favour of it. Instances have, however, been recorded by Abernethé (*Quæst. Medicæ Monspel. &c.* Monps. 1617.), Rhodius (*Observ.* cent. i. obs. 66.), Van der Wiel (*Observ. Med.* cent. i. obs. 8.), Marchettis (*Observ. Chirurg.* Patav. 1664.), La Motte (*Chirurgie*, t. ii. p. 409.), Lysons (*Essays, &c.* p. 111.), Kite, Tissot, and others, where external injury, and circumscribed disease of the bone or scalp, have furnished indications to warrant the performance of this operation; and where it was resorted to with success. It has also been practised recently with benefit. Dr. Elliotson refers to a case in St. Thomas's Hospital, where the trephine removed a piece of bone with a spicula from its inner surface, and cured the disease. Other successful instances are recorded by Dr. Guild (*Med. and Chirurg. Review*, vol. xii. p. 504.), and Dr. Blake (*Lond. Med. and Phys. Journ.* Jan. 1826.). — *b.* The much less feasible experiment of *tying the common carotid*, in order to cure the disease, has been suggested by Mr. Earle, and actually practised by Mr. Preston (*Trans. of the Med. and Phys. Soc. of Calcutta*, vol. v.); but its ultimate success is not apparent. — *c. Pressure on the carotids* has been advised by Mr. Earle; but it is probable, that the obstruction it must occasion to the return of blood from the head, will be as injurious as the diminution of the supply may be beneficial.

112. *P. Travelling, and change of air and of residence*, are sometimes serviceable; and are recommended by Hippocrates and Hoffmann. In the cases of children, change to a dry situation, or to the sea-side, is especially beneficial. Van Swieten (*Comment.* vol. iii. p. 436.) states, that several epileptics were cured by emigrating from Holland to the East Indies, and that, upon their returning to Europe, some experienced a relapse, but that others had recovered permanently. It is chiefly, however, in the asthenic and sympathetic forms of the disease, that change of air and travelling prove serviceable.

113. *Q. Regimen.* — In addition to what has been already advanced on this subject, the practitioner should bear in mind, that as much may be done by a regimen suited to the peculiarities of the case, as by medicinal agents. — *a.* The *meals* should be light, very moderate in quantity, at regular and not too long intervals between each. In the plethoric and more acute states, animal food should be altogether or nearly relinquished; but in the asthenic conditions, or when there appears to be a deficiency of blood, the more digestible kinds of animal food may be allowed once, and occasionally twice, a day. Even in these latter cases, a spare, but nutritious and digestible, diet ought to be adopted, as a liberal allowance will seldom be duly assimilated, and will only embarrass the digestive organs. The principal meal should be taken early, and a light supper, consisting of a biscuit and half a pint of milk, about an hour before retiring to rest. The only *drink*, in plethoric habits, should be water, or toast-water, or imperial; but in the opposite states, and in asthenic cases, Seltzer water, or even Pyrmont or Spa waters, with milk, may be allowed. Chocolate and cocoa are unsuited to the former class of cases; and coffee and green tea should be avoided, especially where active determination to the head is observed. Black tea once a day, and milk and water, are the best suited to the ordinary states of the disease. Not more than half a pint of any liquid should be taken at one time.

114. *b.* Epileptics should not *sleep* longer than seven hours. They ought to lie in an airy chamber, without curtains to the bed, and without night-caps; upon a hair mattress, with the head and shoulders somewhat raised. The hair ought to be worn closely cut, and in the severe sthenic cases should be shaved entirely off. The tepid or cold affusion on the head, or shower bath, should be used every morning, the scalp being afterwards well rubbed. In all cases, *early rising*, and *regular exercise* in the open air, should be enjoined. But the exercise should not be at one time, but twice or thrice daily, with intervals of repose. It should be taken on foot, and not sooner than two hours after a full meal. The patient should be as much as possible in the open air; but should not venture on horseback. Flannel ought to be worn next the skin, and the lower extremities constantly kept warm. During warm weather, a light-coloured hat should be worn; and ex-

posure to the sun's rays always avoided. When the attacks are at all frequent, the patient ought never to be without an attendant, and he should be guarded from the fire, from precipices and water. He ought not to frequent crowded assemblies, nor even the bustling and crowded streets of great cities, nor should he look down from precipitous places.—There is no disease that requires a more strict dominance of the passions and desires than this. The concluding injunctions of M. Borie's judicious treatment (see note to § 104.) especially require observance, as the habits there referred to have a powerful influence both in inducing and perpetuating the malady, and in destroying the constitutional and intellectual powers.

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EPISTAXIS. See Hæmorrhages.

ERECTILE TISSUE.

— Syn. *Vasa Erigentia*; *Tela Erectilis.* *Tissue Erectile*, Fr. *Erectiles Gewebe*, Ger.

Classif. — Pathology — *Morbid Structures.*

1. This structure, which is eminently vascular, and copiously supplied with organic or ganglial nerves, possesses, beyond all others, that vital property which is obscurely evinced by several other textures, and which was denominated the *turgor vitalis*, or vital turgescence, by Hebenstriet, Schlosser, Reil, and Ackermann. This property, whether denominated as above, or called vital expansion, or any other name, is more generally diffused, and presents more important relations, both in health and in disease, than has usually been acknowledged. The reader will find it more fully discussed under the article Turgescence. I have merely to notice in this place, very briefly, the morbid states, which the parts allowedly erectile present. These parts are — the cavernous and spongy body of the penis, as well as its bulb and gland; the clitoris and nymphæ; and the nipple of the female. There are other parts more obscurely (owing to their situation), but undoubtedly, endowed with this property: these are — the uterus, especially its neck; the Fallopian tubes, particularly the fimbriated extremities; the spleen; and the lips of both sexes: but these are not comprised in the following observations. The morbid structure called *Nævus maternus*, *Aneurism by Anastomosis* (Bell and Freer), *Angiectasia*, or *vasorum dilatatio* (Meckel), *Telangiectasis*, or *vasorum ultimorum distensio*, by some German authors, appears to be merely an accessory or morbid form of the erectile tissue; and I agree with Dr. Craigie, in considering that such is the case, and that the throbbing vascular tumour first noticed by Pearson, and subsequently minutely described by Scarpa, is an adventitious formation of the same kind.

2. The *erectile* tissue may evince its characteristic property in a very marked manner, and to an extent that is truly morbid, without any appreciable change in its organisation. This is shown in *priapism*, in which the vascular turgescence is the result merely of nervous excitement or irritation. *Chordee* is a modification of this state, caused chiefly by inflammation of an adjoining structure; the erectile tissue of the penis being excited, whilst the submucous tissue of the urethra is inflamed, and unyielding, owing to its morbid state, and to spasm of the *ischiocavernosus* muscle.

3. *Hæmorrhage* rarely takes place spontaneously in erectile tissues. I have, however, met with it in the *corpus cavernosum* of the penis, occasioning a state nearly resembling that of priapism, but unattended by nervous or mental excitement. In this case, the morbid state was removed by a small incision made into the cavernous structure, when grumous dark blood escaped. An interesting instance of this kind is recorded by Mr. Callaway. Similar changes are not so infrequent, from external violence, particularly in the erectile tissue of the female organs, owing to difficult or instrumental labours. This tissue may be the seat of excrescences, of scirrhus, and, like others, be involved in specific inflammation, malignant ulcerations, and adventitious formations; but such of these, which belong to the province of the physician, are noticed in the articles on the Spleen and Uterus.

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ERETHISM, and MERCURIAL ERETHISM.

Erethismus (ἐρεθισμὸς, from ἐρεθίζω, I excite or irritate.).

1. I. Erethism, in *Pathology*, has been generally understood, since the time of Hippocrates, as implying a state of irritation, or excitement of a part, different from, or short of, the inflammatory condition; although often passing into it. Hippocrates and Aretæus viewed it as irritation, accompanied with some degree of debility. Galen applied the term to irritation of the stomach and intestines by acrimonious fluids; and most of the ancients believed that, where it existed, it prevented the accession of salutary critical evacuations. Many modern pathologists employ it as synonymous with orgasm, or simply an exalted state of the vital actions of a part; and others attribute to it more of a morbid import, viewing it as an early stage, and lesser grade, of many acute diseases, especially those that are febrile or inflammatory. The most familiar illustration of this state, according to the

former class, is the act of blushing. According to the latter class, the ravenous appetite attendant sometimes upon debility and various affections of the digestive organs, proceeds from erethism of these parts, or, in other words, from an excited state of the nerves of the organ, with increased circulation and secretion or exhalation from the villous surface. It is very probable, that this state, either prolonged, or frequently excited, will give rise to acute or chronic inflammation, and even to changes of structure, and to effusion from mucous or serous surfaces. That it prevents the accession of critical changes, is also probable.

2. This condition should be viewed as morbid, and *treated* according to its seat and grade. It requires, generally, refrigerants, light or low diet, soothing and mucilaginous drinks, tepid or warm bathing, cooling diaphoretics and diuretics, and mild laxatives and enemata. When neglected, it is apt to extend the sphere of its morbid influence, more especially when seated in the digestive mucous surfaces; the functions of digestion, sanguifaction, and assimilation becoming disordered, and irritation supervening in the cutaneous surface, in the liver, and even in various remote parts. (See art. Disease, § 72. *et seq*. and 78. *et seq*.)

3. II. Erethism, Mercurial — *Erethismus Mercurialis* —was the name given by Mr. Pearson to that extreme state of irritability and exhaustion which sometimes is occasioned by mercury. Before this state was described by this surgeon, its nature and cause had been entirely overlooked, although it must have often occurred, and even proved fatal. It evidently arises from the poisonous action of the preparations of mercury upon the organic nervous system and heart. The preparations which most commonly produce it, are, the blue pill and the ointment, particularly the latter; and it is not improbable that some change may take place in these from the action of the air, when they have been long kept, that will give rise to this affection, if they be prescribed in the quantities safely administered in the more recent state. A mercurial atmosphere, as in confined syphilitic wards, has also, very probably, a considerable share in its causation. The erethismal symptoms usually come on early in a mercurial course, but they may occur at any period. When once produced, they very readily return upon resuming the mercury, in the same form that first occasioned them. Pre-existing debility, the action of malaria, the scrofulous diathesis, constitutional susceptibility and irritability, and previous mental excitement and anxiety, seem to be, as far as is yet known, the chief predisposing causes.

4. i. This affection usually *commences* with slight trembling of the limbs and tongue, sense of fluttering in the chest, irregularity of the heart's action, and palpitations on the least exertion. The pulse is feeble, small, quick, compressible, irregular, or intermitting. The strength is extremely depressed, the countenance is pale and contracted; and great anxiety at the præcordia, with frequent sighing and a feeling of sinking, is complained of. If the mercury be still continued, the tremblings, the frequency, irregularity, and intermissions of the pulse, increase rapidly, and are attended by a sense of coldness, and sometimes by vomitings. At this period, sudden or great exertion may extinguish life.

5. ii. *The Treatment*, early in the affection, is generally easy and effectual. Upon the first indication of it, the patient should be removed to, and remain as much as possible in, the open air; and mercury, in every form, relinquished; even a mercurial atmosphere should be avoided. The preparations of ammonia and camphor ought to be given in full doses, and the surface of the body cleansed from all impurities, especially from the remains of mercurial ointment. Having thereby restored the state of the circulation, a course of nitric acid with sarsaparilla should be entered upon, and the bowels kept gently open by a sufficient dose of the precipitated sulphur taken at bedtime on alternate nights. If it should be still necessary to resume the use of mercury, as sometimes proves to be the case, the utmost circumspection is requisite. The oxymuriate, in the tincture of cinchona, or in the form of pill with the pulvis glycyrrhizæ and camphor, and taken with the meals, will often produce a sufficient salivation. After a most severe case of this affection which came under my care, where it was determined, in consultation, to have recourse to mercurial salivation as a last resource, for the cure of most dangerous secondary syphilis, the preparation prescribed in the manner now mentioned had the desired effect.

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ERGOTISM.—(Classif. Pathology, *Ætiology*.) Diseased, unripe, or damaged grain of any kind, is injurious to the animal economy, according to the quantity consumed. The species of grain, the nature of its alteration from the wholesome state, and the proportion of it entering into the food of man and the lower animals, are the chief circumstances modifying the morbid results. *Rye* is most frequently productive of injurious effects in the northern countries of Europe, the disease in it giving rise to the *ergot*, or spur, being the chief cause. But wheat, rice, or any other grain, either similarly diseased, or prematurely cut down, or damaged by the mode of keeping, or by age, or mixed with the seeds of poisonous plants, as those of the *Raphania raphanistrum* and the *Lolium temulentum*, will occasion dangerous diseases. The noxious effects of spurred rye (*Secale cornutum*) have been most frequently observed, and are especially noticed in connection with the affections of which it is one of the chief causes. (See arts. Gangrene, and Spasm — *Cachectic*.) But the disorders produced by other kinds of diseased or unwholesome grain, are in many respects similar to those consequent upon the use of spurred rye. Sufficient allusion has been made, in the article Epidemics, to the influence of unripe, blighted, deficient, or damaged crops, upon the health of the community; the epidemics thereby occasioned, varying in character with the particular state on which the unwholesomeness of the grain depended, and the concomitance of other causes. The particular unwholesome condition of grain has not, however, been hitherto viewed sufficiently in connection with its specific effects upon the economy, in any one instance; and it is only in respect of spurred rye, that we have any kind of data that will admit of the special consideration of the subject. From some circumstances that have come before me, I should infer that unripe grain is productive chiefly of diarrhœa and dysentery; that diseased, impure, or blighted grain, most frequently occasions affections of the nervous and vascular systems, with disorder of the digestive organs, and contamination of the circulating fluids; and that damaged and old grain gives rise principally to fevers of a malignant or adynamic kind, with predominance of some one or more of the preceding affections, according to concurrent causes and circumstances. (See Disease — *Causation of*; Gangrene, and Spasm.)

ERYSIPELAS. Syn. — Ἐπιφλόγισμα, Hippocrates; ἐρυσίπελας, Gr. (from παρὰ τὸ ἐρύεσθαι ἐπὶ τὸ πέλας, that it extends to adjoining parts; or, rather, from ἐρύω, I draw, and πέλας, adjoining; or from ἐρυθρός, red, and πελὸς, brown, livid) *Ignis Sacer*, Lat. *Febris Erysipelatosa*, Sydenham, Schroeder, &c. *Febris Erysipelacea*, Hoffmann, Vogel, &c. *Rosa*, Sennert. *Ignis Sancti Antonii*, Auct. Var. *Emphlysis Erysipelas*, Good. *Erysipèle*, Fr. *Die Rose, der Rothlauf*, Germ. *Erisipela, Risipola*, Ital. *The Rose, St. Anthony's Fire.*

Classif. — 1. *Class*, Febrile Diseases; 3. *Order*, Eruptive Diseases (*Cullen*). 3. *Class*, Sanguineous Diseases; 3. *Order*, Eruptive Fevers (*Good*). 4. *Order*, Vesicular Eruptions (*Willan*). III. Class, III. Order (*Author*, in *Preface*).

1. Defin. — *Asthenic inflammation of the integuments, affecting them more or less deeply and extensively, with diffused tumefaction, and a disposition to spread, depending upon constitutional disorder.*

2. I. General Description. — *A. Erysipelas*[*] usually *commences* with either the local or the constitutional symptoms more prominently marked; but I believe that the local symptoms never manifest themselves before some disorder referrible to the vital sources and centres has been present, although frequently in too slight a degree to alarm the patient or come before the physician. Previous to, or accompanying, a sense of tension, itching, heat, weight, and uneasiness, with diffused redness and swelling of the skin, the patient experiences chills, rigors, disturbance of the functions of the stomach and bowels, and a quickened circulation. On the second and third days, the swelling, which was either slight, or scarcely noticed, increases rapidly, extends superficially, and is warm, shining, of a yellowish red colour, disappearing momentarily during pressure, with a tensive burning pain, exacerbation of fever towards evening, and remissions in the morning. In addition to these, the patient complains of frontal headach, drowsiness, anxiety at the præcordia, general lassitude, and pain or aching of the limbs; anorexia, nausea, or vomiting; thirst, and heat or dryness of skin. The tongue is generally loaded, and subsequently dry; the bowels are constipated, and the motions offensive; the urine is turbid or saffron-coloured; and the pulse full, soft, frequent, sometimes broad and compressible, and often oppressed or irregular. The disease generally runs its course, in its more acute forms, between the seventh and fifteenth day. It is sometimes extended to the twenty-first, but seldom beyond, unless in cases of relapse or metastasis, or when it assumes certain anomalous forms, or occasions organic changes of subjacent or internal parts, which prolong the fever and increase the danger.

3. *B.* Erysipelas presents phenomena which are peculiar to it, and distinguish it from phlegmonous inflammation, on the one hand, and from the inflammatory action attendant on rheumatism and catarrh, on the other. — *a.* The characters of erysipelatous inflammation are as follow: — *α.* The *pain* is peculiar — is tensive, burning, or stinging; is not severe, but is diffused throughout the inflamed surface, and is occasionally remitting. — *β.* The *redness* is not intense, as in phlegmon; but is either pale, rose-coloured, or of a pale yellowish hue — arising, seemingly, from a more copious and diffuse deposition of serum, slightly tinged with a little blood. The redness always disappears on pressure, but quickly returns when pressure is removed: it is of a deeper red when the attendant febrile action is of a sthenic kind; and of a more livid hue when the vital powers are much reduced. — *γ. Tumefaction* is always present, and is sometimes very remarkable, owing to the effusion of serum into the subcutaneous cellular tissue. It is, however, diffused, never acuminated or convex; but sometimes hard or brawny, as in the sthenic or phlogistic variety; and occasionally soft and boggy, as in the œdematous or asthenic variety, or when the adjacent cellular tissue is affected or suppurating.

4. *b.* Erysipelas is *seated* chiefly in the integuments; but it presents various modifications, according as the more superficial or more internal tissues of the skin are especially diseased. Where the *cutis vera* is the principal seat, the cellular tissue underneath is also materially affected; it being usually infiltrated with serum, tumefied, and sometimes inflamed to a very considerable depth in some instances; whilst the more superficial capillaries likewise partake in the disturbance. Where, on the other hand, the *rete mucosum* and papillary tissue are the chief seat, the disease is commonly accompanied with vesication. When this occurs, or when a discharge from the surface, or free exfoliation of the cuticle, takes place, the severe affection of the subjacent cellular tissue very rarely is observed.

5. *c.* Erysipelatous inflammation has always a tendency to *spread to adjoining*, and occasionally even to *attack remote, parts*. As long as the metastasis, or vicarious affection of distant parts, is confined to the integuments, the primitive form and nature of erysipelas is retained; but, as soon as it has apparently attacked internal organs, which is sometimes the case, owing to their pre-existing disposition and morbid conditions, and to the operation of superadded causes, then the affection of the skin disappears, and the super-

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[*] Some confusion has arisen from the manner in which this disease and *erythema* have been viewed in relation to each other, and in which both have been classed. For, while I admit, with Dr. Good, that the term erysipelas has been loosely employed in medical writings, yet I conceive that it will not add to the precision of our knowledge to remove certain of the varieties of erysipelas to the genus erythema, where their local characters are chiefly considered, and their more important constitutional and vital relations are overlooked.

induced internal disease occasions the symptoms of an idiopathic malady, with more or less of the constitutional disturbance characterising the erysipelatous eruption, particularly those which relate to the vital energies and powers of resistance. Thus, inflammations of internal parts, as of the serous or mucous surfaces, may displace, or be vicarious of, the erysipelatous disease of the skin; but such inflammations will still retain peculiar features, and differ from idiopathic or true phlogosis of those parts; the depression of the powers of life, the morbid condition of the circulating fluids and of the excretions, characterising erysipelas, attending also upon them, often in increased grades.

6. *d.* Like other inflammations of membranous parts, erysipelas generally assumes an *acute form*; and, in this respect, resembles phlegmon: but differs from it very materially as regards the nature of the constitutional disorder, especially the morbid state of the circulating fluids and of the excretions, and the manner of termination — particularly the slow convalescence; the persistence of congestion — especially of the venous capillaries; the desquamation of the cuticle, and the tendency to relapse.

7. *e.* The characteristics of erysipelas arising from the *texture* in which it is seated, are — the dryness, the stinging heat, the peculiar shining appearance of the surface, the burning and itching, and the frequent elevation of the cuticle into vesicles, or its successive desquamation. All these indicate — 1st, suppression of transpiration, with increased circulation; 2d, morbid sensibility of the cutaneous nerves; 3d, a preternatural secretion of serum beneath the cuticle; and, 4th, an altered state of the reproductive or plastic function of the *rete mucosum*.

8. *f.* When erysipelas has once attacked the frame, there remains a certain morbid *diathesis*, disposing to renewed attacks at distant intervals. The same property is also evinced by several non-contagious affections of the skin; and is most probably owing to acquired constitutional disposition, or rather, to a weakened state of the digestive and excreting or alimentary organs — to a latent state of disorder arising out of the remote causes of the disease, and heightened or rendered more persistent by its attack.

9. *g.* The *causes* of this malady are frequently the same as those of low forms of fever, catarrh, and rheumatism; for, like them, it generally proceeds from peculiar states and vicissitudes of weather and of the atmosphere; especially cold, moist, miasmatous, and foul conditions of the air, acting upon a system already disposed to their influence by depression of vital power, or by the accumulation of morbid or effete matters in the circulation, owing to defective action of the excreting organs, to unwholesome diet and regimen, or to prolonged disorder of the prima via.

10. *h.* Erysipelas is generally preceded and accompanied by more or less *fever*, according to the situation of the part affected, the sensibility and irritability of the system, and the character of the prevailing epidemic constitution. It should never be considered apart from the attendant state of constitutional disturbance, — from the manifestations of vital power, and the conditions of the circulating fluids, and secretions, — of all which the local affection is merely an extensive and important effect; but one which reacts upon these states and conditions, whence it chiefly derived its origin, or at least its peculiar characters. The modifications of the attendant fever depend chiefly upon the constitution and pre-existing state of the assimilating and excreting organs, upon the prevailing epidemic influence, and upon the weather and season. Thus, the fever more commonly approaches the inflammatory type during cold and dry seasons, or in winter and spring; whilst the more adynamic forms, with predominance either of the gastric, bilious, or nervous states, are most frequent in summer and autumn.

11. II. PARTICULAR DESCRIPTION.—Erysipelas presents various modifications, according — 1st, to the part affected; 2d, to the nature and form of the local changes; 3d, to the states of constitutional disturbance with which these changes are associated, and on which they are dependent; and, 4th, to the causes which have produced it.

12. *A. Modifications as to the part affected.*— The sensibility of the part in health, and its vital relations, especially modify the consentaneous disturbances of the sensiferous and vital functions generally characterising this malady. If it attack the *face*, commencing in one cheek, it generally soon extends to the other; and in a short time to the forehead and scalp, producing more tumefaction than almost in any other situation, owing to the effusion of serum in the subcutaneous cellular tissue. The eyes are closed or prominent; the nose is distended; the ears are red, shining, and burning. On the second or third day, the whole head and face are often enormously distended, presenting a yellowish or sub-livid redness.— Also, when the disease commences in the *scalp*, owing to punctures, bruises, or contused wounds, the affection of the subcutaneous cellular tissue is very great, frequently followed by diffused suppuration, and disease of the fibrous tissues adjoining. But, whether originating in the face or in the scalp, the greater the extent and intensity of the affection of these parts, the more are the functions of the brain, of the circulation, and of secretion disturbed. Hence the violent headach, tinnitus aurium, delirium, sopor, convulsions, coma, &c.; the parched and dark tongue; the morbid state of the evacuations; and the disturbance of respiration.

13. When erysipelas attacks the face, it sometimes affects the *mouth and fauces*, extending in some instances to the *pharynx* and *larynx*, internally, and down the neck to the chest externally. An interesting case of this kind was attended lately by Mr. BYAM and myself, where the enormous tumefaction of the neck and throat, with the affection of the larynx and trachea, increased by the constriction produced by the integuments surrounding the neck and throat, caused suffocation in a few hours. This extension of the disease to the fauces and throat, not infrequently occasions a species of consecutive *croup*, as stated in that article (§ 18. *d.*): it may also occur, when the scalp is affected; but, in this case, the disease generally extends down the neck and back, even to the loins. The disposition to spread thus extensively, and to affect subjacent parts, is most remarkable when the pulse is frequent, and vascular action greatly excited, at the same time that vital power is much depressed, the functions of excretion impeded, and the blood morbid

14. In other parts of the body, the symptoms are generally not so severe. The pain, however, is very great when the disease attacks the *mammæ* during lactation, or when it extends to the *organs of generation*. In these situations, it frequently implicates the subcutaneous cellular tissue and adjoining glands, and thus closely approximates in seat and nature to the primary form of spreading inflammation of the cellular tissue. When it occurs in the latter situation, in children between one and six years of age, it often proves fatal, either from this circumstance, or from sloughing ulceration. Where the extremities only are affected, there are generally less pain and constitutional disturbance than in other cases.

15. *B. Modifications of the local affection.*— The changes which take place in the external seat of disease, may be classed under four varieties: the glabrous, vesicular, crustaceous, and deep-seated.—*a*. The *glabrous* local affection consists in a diffused or plane and smooth tumefaction of the skin, of a rose or yellowish redness, sometimes verging to a sub-livid hue.—*b*. The *vesicular* form is attended with bullæ, or blisters, in parts of the inflamed surface, resembling the vesicles raised by cantharides. Sometimes they are numerous, small, and discrete *phlyctenæ;* at other times confluent, and forming very large *bullæ*, containing a yellowish, sometimes dark, sanguineous, acrid serum, effused between the rete mucosum and cuticle, which it elevates. These vesicles continue to appear during the course of the disease; are accompanied by an unpleasant tension, itching, burning, or pain; and, instead of diminishing, often increase, the inflammation and fever.—*c*. The *crustaceous* form arises from an early rupture of the cuticle, and escape of the lymphatic serum effused beneath it, which exposure to the air forms into crusts, and under which an acrid fluid collects, and irritates, or even ulcerates, the skin.—*d*. In the *deep-seated* and *tumefied*, the cellular and other subcutaneous tissues are affected, either by œdema, or by phlegmonous or diffusive inflammation, tending to disorganisation. Whilst the superficial parts of the integuments are the chief seat of the affection, in the preceding varieties, the tissues underneath are principally diseased in this, particularly the cellular and adipose; and they present every shade of morbid action, from simple passive œdema, to inordinate vascular excitement—from the lowest state of asthenia, to the highest degree of vital action—either passing rapidly into suppuration, or into disorganisation, or spreading extensively in the course of the cellular tissue, and involving other adjoining parts, as shown in the article on *Diffusive Inflammation of this Tissue*. It is generally observed in this associated or deep-seated malady, that the skin is but slightly altered, or that the morbid action in it diminishes, as that in the subjacent parts increase, especially if the latter be of a diffusive or septic kind.

16. *C. Modifications connected with the constitutional disturbance.*—The forms which the disease assumes, chiefly result from the states of the nervous system, of the assimilating and excreting organs, and of the circulating fluids, and from the temperament and habit of body. These modify the febrile action as well as the local affection, aided by the existing grades of constitutional power and vital resistance. Erysipelas consequently presents every intermediate shade between high vascular action with simply diminished vital power, and low vascular action with great depression of the vital energies, as respects both the part chiefly diseased, and the system in general.—*a*. As soon as the morbid action in the skin passes a certain height, it generally extends to the subjacent cellular tissue; and if it occur in young, robust, or plethoric subjects, or if the constitutional powers be not much reduced, or the nervous system not materially exhausted or oppressed; or if the functions of the digestive and excreting organs be not altogether overpowered; then the disease assumes more or less of the *sthenic* or *phlegmonous* character, both as to its local appearance and the attendant fever, and has a marked tendency to pass into suppuration, occasionally with destruction of the subcutaneous cellular and adipose tissues.—*b*. When the disease is attended by signs of accumulated sordes in the prima via, with nausea and vomiting, and a morbid state of the secretions, particularly of the biliary secretion,—characters which it often presents,—it has received, from Continental pathologists, the appellation of *gastric* or *bilious erysipelas*.—*c*. If it present great depression or disturbance, especially of the cerebro-spinal nervous functions, with a pale, evanescent, and changeable state of the part affected, and imperfect secretion and excretion; and if delirium coma, subsultus, &c. supervene; or if the local affection spreads rapidly, or if it entirely disappears, and is followed by internal disease; it has been called *nervous erysipelas*, or it may be said to be complicated with febrile disturbance of the nervous kind.—*d*. If, owing either to excessive morbid action over vital power, or to a faulty state of the system at the time of attack, or when it supervenes upon remittent or continued fevers, or upon any cachectic malady, or in aged or broken-down constitutions, it extends to the subcutaneous structures, and gives rise to œdema, or terminate in softening or disorganisation of these parts, it has received the name of *œdematous*, *septic*, or *gangrenous erysipelas*. This state of the malady is generally connected with defective assimilation and excretion, with an impure state of the circulating fluid, and with deficient vital power.

17. *D. The causes which dispose to, or excite, the disease*, have also great influence in modifying its characters, both local and general. When propagated by infection, it is prone to assume a complicated state, or to be associated with inflammation of the throat and pharynx of a most dangerous character, owing to its disposition to spread to the larynx and trachea; and with diffuse and gangrenous inflammation of the subcutaneous cellular tissue. A similar complication is also observed during certain epidemic constitutions, or when the disease has been occasioned by the contact of animal matters in a state of decomposition, or by other septic agents. In these cases, the tumefaction is often great; and, although vascular excitement may be very remarkable, vital power is much depressed, and speedily overwhelmed; owing chiefly to the morbid state of the circulating fluids, or to the contaminating and septic operation of these causes.

18. III. DIVISION OF ERYSIPELAS. — This disease has been divided by authors, according to its various states, into *febrile* and *non-febrile;*

the *stationary* and the *erratic*; the *benign* and *malignant*; the *acute* and *chronic*; the *periodic* or *habitual*, and the *accidental*; the *sporadic* and *epidemic*; the *idiopathic* and *symptomatic*; and the *primary* and *secondary*: to which may be added, the *internal* and *external*. As to all these general divisions, it is only necessary to remark that, by *Idiopathic* erysipelas is understood that condition of the disease which arises from the direct impression of the causes on the skin, as from vicissitudes and epidemic states of the air, chemical stimuli, morbid effluvia, poisonous matters, &c.; and by *Symptomatic*, is meant the external manifestation of internal disorder, as of impeded secretion and excretion, the accumulation of morbid excretions in the *primæ via*, and an impure state of the circulating fluid, either from interrupted elimination of effete matters, or from the absorption of morbid matters. As to the existence of *Internal erysipelas*, I may observe, that it cannot be allowed otherwise, than that inflammatory metastasis to internal organs, particularly the mucous and serous membranes, occasionally occur; the internal disease taking place either in consequence of the suppression or disappearance of the external affection; or the latter ceasing to exist, owing to the commencement or progress of the former. But, although the internal disease may retain the constitutional peculiarities attendant on the primary affection, yet its distinctive characters can no longer exist when it attacks a differently organised structure, from that to which they are chiefly owing. It is in such circumstances, and when internal inflammations supervene in broken-down constitutions, or from interrupted excretion and a morbid condition of the circulating fluids, as in the course of fevers, and in the puerperal state, that J. P. Frank and many other writers contend for internal erysipelas; similarity of morbid action, local and constitutional, although affecting different structures, being considered by them as sufficient to warrant the appellation.

19. The *Division* adopted by Willan and Bateman — viz. 1. *Phlegmonous*; 2. *Œdematous*; 3. *Gangrenous*; and 4. *Erratic* — is faulty, inasmuch as the termination in gangrene is peculiar to no one state, but may occur in either the first or second variety. — Dr. Good associates certain varieties of erysipelas, with *chilblain* and *intertrigo*, under the generic term of *erythema*. — Biett, Cazenave, and Schedel treat only of the *True* and *Phlegmonoid*. — One of the best and simplest divisions is by MM. Alibert and Rayer, into (*a*) the *Simple*, (*b*) the *Phlegmonous*, and (*c*) the *Œdematous*; but it is defective, as it excludes certain states or complications which should not be overlooked, when treating of this disease. — Mr. James adopts a nearly similar arrangement, substituting merely the term *superficial*, for that of simple, employed by Rayer.*

i. Simple Erysipelas — *E. Simplex* — *E. Exanthematicum* (Rust). — *Febris Erysipelatosa* (Sydenham, Hildenbrand). — *E. Superficiale* (James). — *E. Verum seu Legitimum* (Naumann).

20. Charact. — *Spreading inflammation of the skin, with soft and slight tumefaction, redness, stinging heat, fever, and frequently with vesication.*

21. *A.* The *mild*, benign, or superficial form, is attended by little constitutional disturbance, or only by slight inflammatory fever, or disorder of the digestive organs; the surface of the skin is of a pale or rose red; vesication very seldom, or sparingly, occurs; and occasionally, after spreading to, or affecting, adjoining parts of the surface, and disappearing from those in which it first commenced, it *terminates* in resolution in the course of a few days, especially after the disorder of the digestive and excreting organs, on which it is usually dependent, has been removed.

22. *B.* The *acute states* are attended by more severe local and constitutional symptoms (§ 2.). They are preceded by marked disorder of the secreting and excreting functions, and are accompanied by smart febrile action. The skin is generally red, hot, diffusely tumefied, and covered with small vesicles, and, in various parts, with large bullæ. These generally break soon after their appearance, or about the fifth or sixth day of the disease, the fluid drying into crusts of varying colour and thickness; the surface underneath either healing rapidly, or becoming excoriated by the acrid serum effused beneath them. In this latter case, the duration of the disease is longer, and the subsidence of the symptoms more gradual, than in the former.

23. *C.* The *termination*, which is usually by resolution, is preceded by a mitigation of the symptoms, after having continued in full force for three, four, or five days; and is attended by exfoliation of the cuticle and of the crusts; resolution generally taking place more rapidly in this, than in any other, disease of the integuments. But sometimes the sudden disappearance of the inflammation is followed by its supervention in some other part of the external surface — *Erratic Erysipelas*; and more rarely by asthenic inflammation of some internal part — *Metastatic Erysipelas*. These occurrences are most frequent when the local affection suddenly subsides, although the constitutional disturbance continues, and effete or morbid matters are still retained. The evacuation of copious offensive stools, or of urine depositing a large sediment, antecedently to, or about the time of, the disappearance of the local affection, is a sure indication of a salutary crisis.

ii. Complicated Erysipelas — *E. Complicatum*.

24. Charact. — *The inflammation of the integuments of the kind above defined* (§ 1. 15.), *associated with disease of the adjoining structures, or with prominent disorder of internal organs.*

25. This species is very varied, owing to circumstances already enumerated, but chiefly to the severity of the attack, to its situation, to the states of the internal functions and of the constitutional powers, and to the exciting causes. Indeed, these latter circumstances mainly determine the character of the former. The morbid

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* *Synopsis of the Arrangement of different States of Erysipelas adopted by the Author.*

Species I. — Simple Erysipelas; *E. Simplex.*
  Var. A. — *Benign or Superficial Erysipelas*; E. Simplex Benignum.
  Var. B. — *Acute Erysipelas*; E. Simplex Acutum.
Species II. — Complicated Erysipelas; *E. Complicatum.*
  Var. A. — With *Œdema* of the Subcutaneous Cellular Tissue.
  Var. B. — With *Inflammation* of the subjacent Parts.
  Var. C. — With *Inflammatory Disease* of the Throat, &c.
  Var. D. — With *Nervous* or *Cephalic Affection.*
  Var. E. — With *Gastric* or *Bilious Disorder.*

associations, or more complicated states and severe degrees, of erysipelas, are those in which adjoining tissues suffer, or internal organs are disordered, at the same time that the pathognomonic phenomena — the inflammation of the integuments — continue manifest. For, although metastasis to internal viscera, or the inflammation of other parts than of the skin, occurring in cachectic habits, or in those who are subject to this disease, may, with great propriety, be viewed as erysipelatous, as respects the nature of the attendant constitutional affection, yet neither of them can strictly be considered as such, as regards the part affected. The erysipelatous character, however, of the affection, under both circumstances, should not be overlooked; as thereupon ought to depend, in a great measure, the choice of remedies.

26. *A. With Œdema, or Effusion into the Subcutaneous Tissues* — *E. Œdematodes* of authors. — *a.* This state of the disease may be consecutive of the simple varieties, or it may accompany them from the commencement, when they attack the face, or the vicinity of the organs of generation; effusion, in these cases, always taking place in the loose cellular tissue. It often, also, supervenes in the progress of anasarcous swellings. Its primary form occurs chiefly in old persons, and broken-down constitutions, consecutively of chronic visceral disease, and in the leucophlegmatic and dropsical diatheses; the affection of the skin and subjacent cellular tissue being nearly coëtaneous. The external surface is of a pale or yellowish red, inclining to brown; generally smooth and glossy; and it is seldom tense. It is but slightly hot or painful; and sometimes neither the one nor the other. The swelling increases gradually, extends slowly, and pits slightly on pressure. Vesications are not common; and the vesicles, which are small, numerous, and flattened, usually appear from the third to the fifth day; they break in a day or two, and are replaced by thin crusts. In the more active states, a sero-puriform, or puriform, fluid infiltrates the cellular tissue, or is discharged from the vesicated surface. The genitals, the face and scalp, the thighs and legs, are chiefly the seat of this variety. Dropsical limbs, especially when the cuticle is cracked or abraded, or after scarifications have been made in them, are often affected by it; and, in these circumstances, there is a marked disposition to gangrene.

27. *b.* Œdematous erysipelas *terminates* — 1st, in resolution, with absorption of the effused fluid; 2d, in suppuration; and, 3d, in softening, sloughing, and gangrenous destruction of the part. — *Suppuration* occasionally takes place; but is generally of an irregular or diffusive kind, extending in the course of the vessels, and between tendons and muscles; is preceded by a boggy state of the swelling; and is often attended by disorganisation of portions of the cellular membrane. — *Gangrene* is indicated by severe pain; and a red and glossy state of the surface, passing into a livid or leaden hue.

28. *B. With Inflammation of the Subcutaneous Structures* — *Er. Phlegmonosum* vel *Phlegmonodes*, Auct. var.; *Diffuse Phlegmon*, Dupuytren; *Er. Spurium, Pseudo-Erysipelas*, Rust. — This is a most important and often dangerous disease; especially when epidemic, or propagated by infection. It is very varied in form and seat; and presents every grade of activity, from the passive or œdematous state, just described, to the most acute grades that rapidly pass into gangrene (§ 31.). — When it occurs *sporadically*, its local character is that of "diffused phlegmon;" the attendant fever being of an inflammatory kind, and preceded by rigors. In this case, vascular action is more acute; the swelling is greater and more circumscribed; the pain and burning more remarkable, and more pulsating; the redness deeper; the temperature higher; and the disposition to pass into suppuration greater, but to change its situation less, than in other circumstances. Where the symptoms are very acute, the subjacent cellular and adipose tissue frequently are profoundly affected; the fasciæ, the intermuscular substance, and even the fibrous structures, becoming inflamed. In such cases, disorganisation of the cellular and adipose tissues often rapidly supervenes; the part passes from a *brawny* and tumefied, to a flaccid and *boggy*, state; and the attendant fever changes to a low or adynamic form. When occurring *epidemically*, or from infection, the local and constitutional symptoms are more severe; vital power and resistance are diminished; and the disease is often complicated with a very dangerous affection of the throat and adjoining parts. This variety may be divided, as suggested by M. Rayer, into *three grades*.

29. *a.* In the *first*, after rigors, and in connection with the constitutional symptoms described above (§ 2.), tingling, heat, and redness, followed by hard tumefaction of the part, begin to appear. A stinging pain, tension, and burning heat are complained of in the seat of swelling; which is diffused, hard, and deep-seated. After pressing the surface with the finger, the redness returns more slowly than in the superficial and simple disease. The lymphatic glands often become inflamed or enlarged; and febrile action is fully developed. If, about the fifth or sixth day, the skin be less red and tense, or covered by furfuraceous scales, and the swelling subsides, *resolution* has commenced. *Œdema* of the cellular tissue, however, sometimes remains for two or three days. But if the pain, about this period, become pulsating, *suppuration* in one or more parts is inevitable. The abscesses thus formed generally give issue to well-digested pus, and heal in a few days.

30. *b.* In the *second grade* of this variety, inflammation is more extensive; and the redness, heat, pain, and fever are greater. If the disease be not arrested, abscesses form, very insidiously, from the sixth to the ninth day, or even earlier; or a sero-puriform fluid infiltrates the cellular tissue, extending between the muscles and under the integuments; and, upon free openings being made, disorganised portions of this tissue are discharged with the puriform or ichorous matter. Fistulous cavities frequently are formed, giving issue to a fœtid and ichorous pus. — Sometimes the skin is thinned or detached, and falls within the margin of the ulceration (Rayer). In these cases, the stomach and bowels frequently become irritable; and the patient dies, either from the exhaustion occasioned by diarrhœa, or by the extensive suppuration and disorganisation of the cellular tissue; or from the absorption of the morbid

secretion of the part, and the consequent contamination of the circulating fluids; or from those causes combined: severe nervous symptoms (§ 35.) being either superadded, or taking the place of this disorder of the prima via.

31. *c.* The *third grade* presents a still more acute series of symptoms. In two or three days, the inflammation of both skin and subjacent parts reaches its acmé. The skin is tense, smooth, and shining; and of a deep or dusky red, which is hardly a moment dissipated by the pressure of the finger. The swelling is profound, very painful, intolerant of pressure, and diffused. In this grade, and sometimes also in the preceding, the inflammation extends to, and beneath, aponeurotic expansions; and, occasionally, even to the periosteum, especially when the head is affected. The pulse is sharp and frequent; the tongue is loaded and furred; and the excretions are offensive. There are, also, great thirst, restlessness, sleeplessness, increased fever towards night, and delirium. About the fifth or sixth day, the inflamed integuments assume a violet hue, lose their sensibility, are softened, and covered by phlyctenæ filled with a reddish serum. Soon afterwards, ecchymoses and sloughs form; and, at the same time, an ichorous suppuration, with destruction of the cellular tissue, is established in the subjacent parts — *Gangrenous Erysipelas.* In favourable circumstances, the sloughs are detached, and the parts beneath assume a healthy character; but more frequently the patient sinks, from the absorption of morbid matter causing contamination of the fluids, or inflammation of veins; with affections of the brain, of the stomach, and of the bowels, as in the more severe forms of adynamic fever.

32. *d.* The *first* and *second grades* of this variety often occur in the scalp, face, and neck; and are frequently further complicated with cerebral affection, especially delirium, coma, &c.; or with gastric and bilious disorder; and with inflammation of the fauces and throat. The *third grade*, as well as the first and second, is met with chiefly in the extremities, particularly after contusions, fractures, and punctured wounds, and is seldom preceded or attended by rigors. When occurring epidemically, as from infection, the constitutional disturbance is greater and more dangerous; the pulse weaker and more frequent; the inflammation of the skin generally less, and that of the cellular tissue more remarkable, and more nearly approaching, if not altogether identical with, *diffusive inflammation* of that tissue (see this article), than in other circumstances.

33. *C. With severe inflammatory Affection of the Throat and Larynx.*—This affection may accompany any of the forms of erysipelas attacking the face; but it is most frequent in the phlegmonous variety, particularly when it appears epidemically, or from infection. Of this, the papers of Dr. Stevenson, Mr. Arnott, Dr. Gibson, and Dr. M'Dowel, furnish interesting illustrations. In some cases, the extension of the disease over the nostrils and lips, to the fauces and pharynx, may be traced. In others, the affections of the throat and face are almost coëtaneous; and, in the more severe cases, the face, throat, and integuments, down to the chest, with the cellular substance underneath, and surrounding the pharynx, trachea, and glands, are more or less inflamed, infiltrated, and tumefied. Most commonly, the inflammation commences, with or after rigors, in the fauces or pharynx; is of a dusky hue; extends along the nasal surfaces, and affects the face, scalp, &c. A sero-albuminous exudation is either partially or rarely seen; the croupy symptoms, which sometimes supervene upon this complication, being owing rather to the extension of the inflammation to the mucous surface of the larynx and trachea, and the infiltration of the subjacent and surrounding cellular substance, than to the exudation of lymph. In a few cases of the complication — one of them in the practice of my friend Mr. Byam, at the time of writing this — the cellular tissue of the throat, and of the whole neck, was so distended, that the integuments appeared girt around them with the utmost tension; and, in this instance especially, the respiration and cough were as distinctly croupal as in idiopathic croup. I have seen, in some cases of this kind, the constriction of the integuments so great, that incisions of them — as first recommended by Mr. Copland Hutchison —were required, to arrest fatal cerebral congestion or immediate strangulation. The constitutional disturbance in this state of disease is most acute; and, at the commencement, attended by high action, with deficient power. As the disease proceeds, the pulse becomes more and more frequent, unequal, irregular, soft, or small; deglutition difficult or impossible; respiration sometimes suffocative, wheezing, or sonorous and croupal, with strangulating cough; and the excretions are always foul, morbid, and offensive. Delirium, coma, or sinking, preceded by restlessness and anxiety, or disorder of the alimentary canal, are also generally observed.

34. This complication may *terminate*, in the most acute cases, in the course of three or four days — 1st, in suffocation, from the extension of the disease to the larynx and trachea, or from the inflammation, infiltration, and tumefaction of the cellular tissue surrounding these parts; — 2d, in sphacelation; — 3d, from the severity of the superinduced cerebral affection, in connection, sometimes, with congestion of the lungs; — and, 4th, the symptoms may abate under very decided treatment; and, as in the less severe cases, may pass on to resolution, or to the formation of purulent collections, either near the eyes, or about the angle of the lower jaw, or side of the neck. The formation of matter is generally insidious; this fluid being diffused throughout the cellular tissue, and frequently deep-seated. When this is the case, the result is usually fatal; owing to the partial absorption of the matter, and to the effects caused by it on important parts in the vicinity.

35. *D. With Nervous or Cephalic Affection — Erysipelas Nervosum*, of authors. — This is a common complication, where the disease affects the face or scalp, particularly the cellular substance surrounding the eyes (Piorry); occurring generally between the third and sixth days; and in the course of other varieties, attacking persons of weak constitutions and susceptible nervous systems, especially when about to pass into dangerous exhaustion, or gangrene, or prevailing epidemically. In the former circumstance, there is evidently superinduced inflammatory irritation, or excited vascular action, in the mem-

branes of the brain, analogous to the vascular excitement of the skin, often occasioning an increased exhalation of serum: hence the delirium, passing frequently into coma. In the latter circumstance, the cerebral disturbance is the result rather of depressed vital power, manifested especially in the cerebral functions, and of the morbid changes in the blood, than of inflammatory action. The pulse is frequent, but variable as to fulness and power. The tongue is at first loaded, red at the point and edges, and afterwards dry in the middle, and of a brown or dusky hue. The excretions are suppressed or impeded; and, in the worst cases, particularly towards the close, are passed unconsciously. Tremors, subsultus of the tendons, floccitation, &c. are then also observed. A fatal termination occurs generally from the seventh to the fourteenth day, or later. A bilious diarrhœa, or copious fæculent and offensive stools; a free discharge of urine depositing a copious sediment; and a general, warm, and copious perspiration; are favourable occurrences.

36. *E. With Gastric and Bilious Disorder.*— The bilious nature of erysipelas was strenuously insisted on by Stoll, Dessault, and others. Antecedent disorder of the digestive and assimilating organs is more or less evident in all the varieties, but especially in this; which is of common occurrence during summer and autumn, when the digestive mucous surface and biliary apparatus are most liable to be diseased. It is generally attended by manifest signs of accumulated sordes and morbid secretions in the prima via, and of an increased secretion of acrid bile, especially when the disease is epidemic at the seasons just mentioned.

37. *F.* Erysipelas may, moreover, be complicated with inflammatory action of the mucous surfaces, analogous to that of the skin, giving rise to a form of *bronchitis* or *gastritis*. Where it is connected with inflammatory sore throat, it sometimes extends along either the trachea, or the œsophagus, or even both, until the lungs, or the stomach and bowels, are affected; and, occasionally, along the Eustachian tube, to the ear: it thus becoming complicated with one, or even more, of these affections. This connection, first distinctly pointed out by J. P. Frank, has more recently been insisted upon by Broussais, Elliotson, and others. Frank alludes to instances in which erysipelatous inflammation extended from the pudenda, along the vagina, to the uterus, and even to the bladder. Erysipelas may be further complicated with *inflammation of the lymphatics*, particularly when caused by breach of surface; or with *phlebitis*, when consequent upon injury, or when it has proceeded to suppuration.

38. *G.* Erysipelas may occur in the course of continued and remittent fevers; and it may appear during convalescence from any of the exanthematæ. In the first of these associations, it generally presents an adynamic character, with nervous or with malignant symptoms; frequently attacks the face, throat, and scalp; or the parts pressed upon in bed, or irritated by the evacuations; and is especially disposed to gangrene. When it supervenes upon remittents, it often assumes a bilious or gastric form; and in these, as well as in exanthematous fevers, it may prove lutary crisis, if the pulse do not rise in frequency; and if the cerebral functions remain undisturbed. In crowded sick wards, and in lying-in hospitals, it often occurs in the progress of other diseases, with which it consequently becomes complicated. But it is a most dangerous circumstance; as it is, in those cases, caused by an infected or impure air, which, favoured by the depressed state of vital power, or by imperfect excretion, has contaminated the circulating and secreted fluids.

39. IV. **Lesions in Fatal Cases.**—When the cellular tissue has not been severely affected, the injection of the integuments subsides considerably after death; and hence the redness of the external surface, as well as that of the throat, has often nearly or altogether disappeared. In addition to infiltration of the subcutaneous tissues with serum, or a sero-puriform matter, and occasional disorganisation or gangrene of these and of the integuments, various internal lesions are commonly observed. The *blood* in the large vessels and cavities of the heart is frequently semifluid; and the *veins* proceeding from the part chiefly affected, are often inflamed, or contain pus; as first observed by M. Ribes, and confirmed by MM. Dance, Arnott, and by my own observations, especially when the disease has been complicated with diffuse suppuration of adjoining cellular parts. In cases that have been attended by cephalic affection, the membranes of the *brain* are sometimes injected, or inflamed, and the arachnoid opaque, with serum effused between them, and in the ventricles; but, as M. Piorry has shown, these lesions are often not observed in this complication. Where the throat has been affected, the *fauces*, *pharynx*, and *œsophagus* are of a dark or dusky red, or of a livid or brown tint; much softened, sometimes with small patches of dark lymph on their surfaces; and the subjacent tissues infiltrated with a bloody serum, or with a sero-puriform matter. These appearances occasionally extend to the *larynx* and *trachea*, the submucous tissues being œdematous, or infiltrated with similar fluids.—In cases that have been associated with bronchial or pulmonary disorder, the *lungs* are congested with a dark semifluid blood; the *bronchi* are of a dark red or brown colour, are injected, and often contain a frothy and bloody fluid; portions of the lungs being œdematous, and others partially hepatised.—The mucous surface of the *stomach* and *intestines* is generally injected, of a deep or dark colour, often softened, and, where the bowels had been much affected, abraded, or inflamed, especially in the cæcum and rectum. The *liver* and *spleen* are seldom found in a healthy state, particularly in persons advanced in age; but they present no lesions peculiar to this complaint, excepting that those usually resulting from intemperance are most frequently observed.

39. V. **Diagnosis.**—The antecedent constitutional disturbance, with excited vascular action and drowsiness;—the dull or yellowish red, or rose-colour, of the integuments, terminating in an irregular but well-defined margin, and disappearing, momentarily, on pressure;—the pricking, stinging, and burning heat and pain of the part, sometimes with irregular vesications;—the slight, plane, and diffused tumefaction, or the greater swelling and diffused affection of the cellular tissue in connection with the inflammation of the

skin; — its rapid extension, or delitescence, or change of situation; — its almost uniformly acute or subacute character, as respects both the local and constitutional symptoms; — its manifest association with disorder of internal organs, particularly of the digestive, assimilative, and excreting viscera, and of the brain and membranes; and its dependence upon a change in the circulating fluids; — its indisposition, owing to the states of vascular action and of the fluids, to confine or limit itself; and the inability of forming coagulable lymph, owing to these causes; — its infectious character under circumstances favourable to the manifestation of this property, more especially when the constitutional affection is of an adynamic kind, or when attended by sore throat; — the readiness with which it is repelled, and thrown in upon vital or important viscera; — its rapid termination in, or transition to, resolution and desquamation, or suppuration, or gangrene; — and, finally, the insidious and diffused manner in which purulent matter forms in the cellular tissue, when suppuration takes place; — are sufficient to distinguish the disease from *erythema* on the one hand, and from *phlegmon* on the other.

40. VI. PROGNOSIS. — There are various circumstances which should influence our opinion as to results, in this disease; and determine us to give a guarded prognosis on all occasions: — 1st, Its tendency to *relapse* or to recur, from slight or unappreciable causes, or from errors in diet, &c.; — 2d, Its disposition to become *associated* with severe or dangerous internal affections; to disappear suddenly, and to be succeeded by them, especially diseases of the brain and its membranes, of the air-passages and lungs, of the digestive canal and peritoneum, and of the veins; — 3d, The age, habits, and previous health of the patient; — 4th, The causes which produce it, and the character of the prevailing epidemic; — 5th, The parts which it attacks, its particular form and complication, and the state of constitutional disorder accompanying it.

41. *a.* Recollecting that erysipelas is the external expression of an internal or constitutional disease, we should consider the free manifestation of it on the external surface, with little or no affection of the subjacent or internal parts, and without any remarkable depression of vital power, as a *favourable* circumstance, and not to be impeded by external means. As long as it remains thus *simple* and superficial, and of neither a deep, fiery, nor purple colour, although it may be extensive, and attended by vesication, it is not dangerous; unless it affect the face and head, and be accompanied with cerebral disorder. If it follow the stings of insects, the application of acrid substances to the skin, or external injuries, it is seldom attended by danger, unless in cachectic or aged persons, or those addicted to the use of spirituous liquors. Stationary superficial erysipelas is less to be dreaded than the erratic; for, in the latter, there is greater risk of internal metastasis; and the erratic character is often connected with serious changes in the nervous and vascular functions, or with latent internal disorder.

42. *b.* The risk of an *unfavourable issue* is generally great in proportion to the severity of the constitutional affection, — to the adynamic or nervous character of the attendant fever, — to the depravation of the circulating and excreted fluids, — to the deepness and darkness of the colour of the affected part, — to the severity of the cephalic disturbance, — to the extent and diffusive form of the inflammation and suppuration in the subcutaneous tissues, — and to the vital importance of the parts prominently associated in the malady. Great tumefaction of the throat, scalp, or face, with prominence of the eyeballs; attendant disease of the fauces and pharynx, or of the respiratory passages and lungs, or of the stomach, intestines, &c.; tenderness at the epigastrium, or over the abdomen; the disappearance of the external inflammation, and supervention of either of these, or of some other malady; and coma, jactitation, unconscious evacuations, &c.; are dangerous occurrences. The frequent or habitual recurrence of erysipelas, particularly in persons advanced in life, indicates organic change in the liver; and its appearance about the organs of generation, in them, and in children, and around the umbilicus of infants, or in œdematous and dropsical limbs, especially after scarifications, is very unfavourable. A similar inference may be drawn when it attacks the face and scalp, particularly of delicate, aged, or broken-down subjects; or follows severe injuries or surgical operations; or appears during convalescence from dangerous maladies, and when it is not preceded nor attended by shivering. Epidemic erysipelas, particularly in the crowded wards of hospitals, and during cold and humid states of the air, is attended by greater risk than sporadic cases.

43. VII. CAUSES. — *A.* There frequently exists a peculiar *predisposition*, or an erysipelatous diathesis, the nature of which has not been fully ascertained. It seems, however, to be connected with great irritability or tenderness of the cutaneous surface, and defective power of the capillary vessels and secreting surfaces and viscera. Females are much more *predisposed* than males, particularly at the period of menstruation, and after the epoch of its termination. The irritable, bilious, and phlogistic temperaments; feeble, leucophlegmatic, and plethoric habits; the gouty diathesis; the autumnal, winter, and spring seasons; torpor or interruption of the biliary functions; an habitually acrid and fœtid perspiration; unwholesome and low diet; addiction to spirituous liquors; pre-existing visceral disease, general cachexia, and exhaustion of vital or constitutional power; are the chief predisposing causes. J. FRANK supposes that young persons and females are most subject to erysipelas of the face and head; and the aged, to that of the extremities. Certain parts are more predisposed than others; as the face, sexual organs, and lower limbs; owing to the greater sensibility and vascularity of the former, and the liability of the latter to injury and external irritation.

44. *B.* The *exciting causes* are — *a. Those which act locally*, as injuries of the head and face; contusions, wounds, and fractures; surgical operations, particularly when performed on cachectic habits; the scarification or puncture of anasarcous limbs; venæsection, and the bites of leeches; punctures of the skin, and the inoculation of morbid, putrid, acrid, or septic matters; the stings and bites of insects; abrasions of the cuticle; irritation caused by coarse articles of clothing, or by morbid secretions or excretions; the appli-

cation of stimulating or acrid substances to the surface, particularly rancid oils and unguents; and the want of personal cleanliness. — *b.* The more *general* and *internal causes* are — exposure to cold and moisture; atmospheric vicissitudes; suppression of the cutaneous excretion; a fish diet, and especially the use of shell-fish, or of dried, stale, or rancid fish; or of rich, oily, fat, or smoked meats; the suppression of accustomed secretions, excretions, and discharges — as the menses, hæmorrhoids, &c.; violent mental perturbation; an impure state of the air, particularly a stagnant and moist air, loaded with animal effluvia; the miasm from persons affected by the disease, when confined in a close atmosphere; and certain constitutions of the air, which are recognised only by their effects.

45. In persons strongly predisposed, and particularly in those who have experienced an attack, very slight errors in diet, and indigestible meats, especially such as are apt to induce a rancid, acrid, or acid change in the chyme; or spirituous or malt liquors in excess; very frequently induce a relapse or return of the disease. Indeed, whatever has the effect of altering the chyme and chyle from their healthy states, or of interrupting the functions of depurating organs, and thereby of changing the circulating fluids, either by the introduction of morbid and contaminating matters, or by the diminished elimination of hurtful or irritating elements, will excite this malady.

46. The influence of *infection* in causing erysipelas was first pointed out, and, indeed, proved, by Dr. Wells, the most original observer of disease in this country at the termination of the last and the commencement of the present century, when the state of medical science was by no means flourishing; and is fully confirmed by the observations of Pitcairn, Parr, Baillie, Dickson, Weatherhead, Stevenson, Arnott, Gibson, Bury, and Lawrence, referred to in the *Bibliography*; and by evidence that has occurred to myself on more than one occasion. — When thus caused, erysipelas is very prone to attack the face and throat, and assume dangerous or even malignant characters; more especially if it also be epidemic.

47. C. *Epidemic Erysipelas.* — Most writers on the disease, from Hippocrates to the present time, have mentioned its occasional appearance in an *epidemic form*, and the circumstance of its characters partaking of the prevailing epidemic constitution. On most of the occasions of my seeing it, from 1814 to 1824 or 1825, it possessed more or less of a sthenic or phlogistic type; and depletions early in the attack, were then better borne than more recently; it having, for the last few years (till 1834), presented chiefly adynamic forms. Its appearance in hospitals as a circumscribed epidemic is very common; and is generally owing to impure air, particularly during the cold, raw, and foggy east winds that prevail about the months of November and March; when the external air is in some measure excluded, and the air of the wards becomes loaded with miasms, or with the effluvium of one or more persons affected by it. In these circumstances, the constitutional disturbance presents, or passes speedily into, the adynamic or nervous states; the secretions, excretions, and circulating fluids being more or less morbid. Thus, according to the particular epidemic constitution, the habit of body, the age and strength, and the modes of living, of those affected; the season in which it prevails; the contingent generation of an infectious effluvium, or of an impure and confined air; and the pre-existing state of the assimilating and excreting functions; epidemic erysipelas will appear with a predominance either of inflammatory, or bilious, or adynamic, or nervous symptoms — on some occasions, with an inflammatory appearance of the blood; on others, with a loose, dissolved, and otherwise morbid state of this fluid; and always with the excreting functions more or less disordered. In some instances, the integuments are chiefly affected; in others, and those the most dangerous, the subjacent parts are principally, and often insidiously, diseased. It occasionally does not confine itself to the situation it first attacked; and frequently it seizes on the face, neck, and scalp; and is sometimes complicated with a similar form of inflammation of the fauces, pharynx, and surrounding parts, or of the digestive or respiratory mucous surface. An abrasion, or some palpable irritation, of the cuticle, or external injury, is sometimes required to originate an attack; but much more frequently it is the external expression of a morbid state of the frame, especially of the assimilating and excreting functions, and of the circulating fluids. On all occasions of its epidemic prevalence, the constitutional disturbance, ushered in either by rigors, or by irregular chills, precedes the local affection: sometimes in a very evident manner; at others, more slightly or obscurely; and, generally, the formation of matter, and effusion of fluid into the cellular tissue, are not attended by the well-marked symptoms usually indicating them in more healthy states of the body.*

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* Hippocrates (*Epid.* l. iii.) states, that erysipelas, epidemic in the spring, sometimes continues through the summer and autumn. — Bartholin and Sylvius describe an epidemic which was frequently complicated with inflammation of the stomach and bowels. — Tozzi (*Commentat. in Hippoc. Aphorism.* l. vii. § 20.) remarks, that a fatal form of the disease was prevalent, during the autumn and winter of 1700, in Naples; and affected chiefly the face; delirium, epistaxis, and malignant symptoms rapidly supervening. When erysipelas is epidemic about the autumnal equinox, it sometimes abates during the winter, as remarked by Sydenham, and becomes again more prevalent in the spring. Richter states, that such was the case in respect of the epidemic of 1720-21, in Turin. It attacked any part of the body; but most frequently the face, neck, and limbs. Epistaxis and a lax state of the bowels were favourable occurrences. Bloodletting, in the more phlogistic cases, and medicines to aid the depurative processes, were found most beneficial. — In the epidemic of 1750, described by Darluc, the disease commenced with circumscribed redness in some part of the face, which spread over the head and face, and was attended by great tumefaction, a hard and frequent pulse, great thirst, anxiety, &c. In many cases, the affection extended over the throat, was accompanied with "difficulty of deglutition, hoarseness, a feeling of suffocation, and swelling of the external parts of the throat and neck," with delirium, thick and turbid urine, subsultus tendinum, &c.; and occasionally terminated in sphacelation. Offensive sweats, and free, copious, and fœtid alvine evacuations, were salutary. Bleeding at the commencement, followed by emetics, purgatives, and diaphoretic tisanes, was generally employed. If these were neglected, the affection of the throat often proved fatal. — Bromfield mentions the epidemic prevalence of the disease for two years; the head being affected. In it, the antiphlogistic treatment was generally fatal: bark and cordials were most serviceable. — Dr. Ferro, of Vienna, and Dr. Raggi, of Pavia, described an epidemic in these cities, during the years 1780 and 1783, which was frequently either associated with, or passed into, peripneumonia, colic, and diarrhœa. And, in all these complications, bloodletting, antimonials, diluents, and laxatives were the most successful remedies.

48. *D. Nature of Erysipelas.*—Dr. **Cullen** considered erysipelas to arise from the irritation of a morbid matter generated within the body, and thrown out, by the fever, upon the cutaneous surface. This is substantially the opinion of the ancients; and, with a very few slight modifications, of the best writers among the moderns also, especially the **Franks**, **Selle**, **Richter**, &c.—Sir A. **Carlisle** says, that "it is a humoral and constitutional inflammation occasioned by alimentary crudities," and attended by an excess of acid in the fluids. That it is a humoral and constitutional inflammation, is very generally admitted; and that alimentary crudities often precede and attend it, is also evident: I conceive, however, that not only a vitiated state of the chyme and chyle, proceeding from weak digestive power, or unwholesome and indigestible food, and vitiating the circulating fluids, but also the absorption of morbid effluvia, and the retention of effete matters in the blood, owing to impeded excretion, either by the skin, the liver, the kidneys, the mucous surfaces, or the uterus,—in short, that a morbid condition of the fluids, arising either from the passage into them of contaminating materials, or the retention in them of effete elements, that are constantly being excreted by the various emunctories,—are the principal changes productive of this disease.

49. These changes most probably depend upon deficient power of the digestive, assimilative, and excreting viscera—upon depression of the organic nervous influence. But, as soon as the change in the circulating fluid reaches a certain pitch, febrile action is the consequence; and the morbid matters in the blood are determined to excreting surfaces and organs, which are thereby exerted either to eliminate them, or to assume a morbid state of vascular action. The skin, being one of the most important of these organs, thus becomes irritated and inflamed, owing to its peculiar functions and susceptibility, and to the nature of the irritating matters contained in the blood, or of the change this fluid may have experienced. If the febrile commotion be characterised, owing to the state of vital power, by much sthenic action, the local change will be thereby fully developed, and thrown chiefly upon the excreting surface; but if, from deficient power, the fever partake more of an adynamic or asthenic form, the local expression of the disease will be made less fully on the external surface, and will fall more fully upon subjacent and internal parts. Hence the frequency of internal complications, and of affection of subcutaneous tissues, in adynamic cases; and of the simple and superficial forms in the more inflammatory and sthenic, unless when the disease is attended by a great excess of vascular action above vital power; when the local affection extends to adjoining parts from this circumstance, in connection with the morbid state of the blood. The diffusive character of the inflammation, whatever tissue it may attack, is referrible entirely to defective vital power, to the changes in the circulating fluids, and to the imperfect tone of the extreme vessels,—these conditions being inadequate to the formation of coagulable lymph; the products of inflammatory action in this state of vital power, and of vascular action and impurity, being a turbid, puriform, ichorous, or sanguineous serum, which produces a septic effect, or poisons the adjoining parts, especially the cellular tissue.

50. VIII. **Erysipelas of Infants**—*Erysipelas Neonatorum*, **Hildenbrand** and **Richter**—may be either simple or complicated; and it may attack either the head, trunk, or extremities. When it appears on the trunk, it generally commences at the umbilicus; the abdomen, trunk, and lower extremities being its most frequent seat in infants. It is generally accompanied with phlyctenæ or large bullæ; and it is sometimes complicated with œdema or inflammation of the subjacent tissues, and with inflammation or congestion of internal organs. It is most common from birth to a year old; and is sometimes remarkably prevalent in lying-in and foundling hospitals. The occurrence of **Bullæ**, in nearly all the children born for many months in Queen Charlotte's Lying-in Hospital, alluded to in that article (§ 4.), was evidently referrible to a more than usually superficial, slight, and uniform kind of erysipelas, which affected the whole surface in many instances, and not any one part in preference to another.

51. When attacking infants, erysipelas presents the following conditions and morbid relations:—1st, It is sometimes referrible to imperfect ablution and removal, soon after birth, of the secretion which covered the cuticle, and which becomes acrid and irritating if left in contact with it;—2d, It frequently proceeds, especially in hospitals, from a foul air or other contaminating agents, or irritants, acting either internally, or on the uncicatrised umbilicus;—3d, The retention of excrementitious matters, as the meconium, and morbid secretions, evidently dispose to it;—4th, Want of care and of due cleanliness, especially as to the immediate removal of the excretions from the parts with which they come in contact, is also a common cause;—5th, It is probably favoured, as M. **Billard** suggests, by the great vascularity of the external tissue of the integuments at this epoch;—6th, It is not so frequently complicated, or attended by great disorder of the circulating fluids, as in aged persons, although it is generally accompanied with disorder of the excretions, and often with an inflammatory state of the digestive mucous surface, and occasionally with disease of the throat and respiratory organs;—7th, The attendant fever is more commonly of an inflammatory kind, than in adults and aged persons;—8th, It *terminates* in resolution, suppuration, and gangrene; this last occurring frequently when the disease commences about the umbilicus and genitals; and occasionally in *Induration of the* **Cellular Tissue** (see that article);—9th, The affection of the pudendum, and the complication with disease of the throat, are rarer in infants than in children from a year to five or six years of age;—10th, It is generally attended by great danger, especially when it prevails in lying-in and foundling hospitals, owing to the frequency of its complication with, or metastasis into, internal disease;—11th, Fatal cases usually present inflammatory appearances in the digestive mucous surface, and less frequently in the respiratory surfaces and membranes of the brain, in connection with destruction of the subcutaneous, cellular, and adipose tissues; a turbid, puriform, or sanguineous serum

being sometimes effused from the serous surfaces, but never coagulable or albuminous lymph.

52. IX. TREATMENT. — So numerous are the shades of difference, as to both nature and degree, between the mildest and severest forms of erysipelas, that no general plan of treatment can be proposed, without modifications according to the circumstances of particular cases. In some instances, large depletions are required; in others, moderate or local depletion only is admissible; and, in many, depletion is most injurious, the most energetic tonics being often indispensably necessary. Whilst the disease thus requires, *from the very commencement*, most varied and even opposite modes of cure, it frequently also demands an almost equal diversity *at different stages* of its progress. The following, as remarked by Mr. JAMES, is, perhaps, the most extensively applicable precept, as to treatment, that can be inculcated: — Where the skin is tense, deep-coloured, and hot, with a high pulse, full and flushed face, active delirium, and great heat of the general surface, and the constitution not materially impaired, depletion is well borne, and is required; but where there is no tension, nor much heat, nor great redness of the part; the pulse being soft, the countenance pale or sunk, the general temperature but little elevated, and the delirium quiet or comatose; depletions are injurious, and a restorative treatment is most appropriate. In the former class of cases, the reduction of the external inflammation, by local as well as by general means, is most serviceable; but, in the latter, the external affection is a small part of the disease, relief to the system often arising from encouraging it, and great injury from repelling it. — Even in the most acute and inflammatory cases, large depletions should be employed with much circumspection; for, however high, bounding, or hard the pulse, or great the heat, may be, there is always, owing to the circumstances explained above (§ 16. 49.), a disposition to asthenic vascular action, and a deficiency of vital power. Bloodletting, especially venæsection, should, therefore, be resorted to early in the attack, and should not be solely or even chiefly relied upon; the reduction of the excited action forming only one of the intentions of cure; and bloodletting being only one of the modes of fulfilling it.

53. i. *Treatment of Simple or Superficial Erysipelas.* — *A.* The *mild* or *benign form* requires only simple measures. *Purgatives* with the alkaline subcarbonates, warm *diaphoretics*, and *diuretics*, are most beneficial, if exhibited so as to promote the depurating or secreting functions. After the bowels have been fully evacuated, the *decoction of quince seed* may be given frequently, with mucilage, nitrate of potash, subcarbonate of soda, and spirit of nitric æther. If this form become erratic, a combination of *tonics*, especially bark, with these, will generally remove all disorder. I have found the following remarkably useful: —

No. 217. ℞ Sodæ Subcarbon. ʒj.; Vini Ipecacuanhæ ℈ij.; Spirit. Ammon. Arom. ʒj.; Infus. Sennæ Comp. ℥ij.; Decocti Cinchonæ ℥iij. Tinct. Cardamom. Comp. ʒiij. Misce. Capiat partem tertiam, ter in die.

54. *B.* The slighter cases of the *acute form* of superficial erysipelas are generally removed by the above means. If, however, vascular action be much excited, local *depletions*, or a small or moderate bloodletting, followed by *diaphoretics*, depurating *purgatives*, and *abstinence*, are always serviceable. When the head is unaffected, particularly if the disease occur in autumn; and after depletions, if requisite, have been practised; an *emetic*, early in the attack, generally restores the impeded functions of the liver and skin. A dose of *calomel* and *James's powder*, with two or three grains of *camphor*, should be exhibited at bedtime, and a *purgative* early the following morning; this last being repeated every morning, and diaphoretics, with diuretics, every three or four hours during the day. If the disease be caused by suppression of the perspiration, *diaphoretics*, as RICHTER very justly remarks, are especially indicated; the affected part being constantly covered by oiled silk, to prevent evaporation from it. The acetate of ammonia, antimonials, and camphor, are the most appropriate of this class of medicines. If the head or face be affected, a general bleeding — preferably from the feet, whilst immersed in warm water — is requisite; and the means just mentioned, with the exception of the emetic, ought to be freely prescribed, the action on the bowels being promoted by purgative enemata (particularly F. 150. or 151.). *Colchicum* may be tried in this and the phlegmonoid varieties. It was much recommended by Mr. HADEN, and recently by Mr. BULLOCK. It is most serviceable when given with the alkaline subcarbonates, or magnesia.

55. The choice of purgatives, and of the medicines that should be combined with them, is a matter of much greater consequence in this complaint, than is usually supposed. I have most frequently given the calomel in the above combination at first; and afterwards, the compound infusions of gentian and of senna, with a neutral salt. This last may also be prescribed in camphor mixture, with an alkaline carbonate, and taken whilst effervescing with lemon juice, the alkali being in excess. — RICHTER advises equal quantities of the supertartrate of potash and magnesia. Sir A. CARLISLE recommends the fixed alkaline carbonates to be given with the purgatives; and barley water, with the subcarbonate of soda, to be used as common drink; on the supposition of the disease arising from an acid in the blood. It is possible that the change in this fluid may partake of an acid character, but we have no proof of it; nor can it be the only, or even the chief, change. The practice, however, has been long known to be serviceable. I believe that the carbonates of potash and soda pass rapidly into the circulation, and act beneficially on the blood. Yet acids may be given not only without risk, but apparently with advantage. They have even been recommended by MARCARD, PANZANI, and others. In a case which I recently saw in consultation with Dr. RIDING, and which was complicated with menorrhagia of a most atonic kind, and with nervous symptoms, large doses of mineral acid were added to tonics, and yet the recovery was rapid. The neutral salts, which are most to be depended upon, are — the sulphates of potash, soda, and magnesia; the tartrate of potash, or of potash and soda; and the phosphate of soda. Either of these may be given in the infusion of senna, or in equal parts of it and of the infusion of gentian, or of bark. The association of purg-

atives with tonic and bitter infusions is of the greatest benefit at all periods, and particularly at an advanced stage of the complaint. F. 215. or the following may be employed: —

No. 218. ℞ Potassæ Sulphatis ʒj.; Sodæ Subcarbon. ʒjss.; Infus. Sennæ Comp., Infus. Gentianæ Comp., āā ℥iijss.; Tinct. Jalap. ʒijss.; Tinct. Cardamom. Comp. ʒiij. M. Fiat Mist., cujus capiat Coch. iij. larga, secundâ vel tertiâ quâque horâ, donec plenè dejecerit alvus.

56. After morbid secretions have been evacuated by these means, and the functions of the skin and kidneys promoted, the infusion or decoction of cinchona, or the infusion of cascarilla, may be taken with the alkaline subcarbonates, or with liquor potassæ; and if the urine be scanty, the spirit of nitric æther, or of juniper, may be added. If the skin still continue harsh or dry, the lighter infusions, or camphor mixture, may be given with the solution of acetate of ammonia, and the spirit of nitric æther, or ipecacuanha wine. When excoriating secretions from the vesications on the surface extend or increase the irritation, defective function of the excreting organs should be suspected, and deobstruent and stomachic purgatives perseveringly prescribed. The morbid action, also, of the part ought to be corrected by washes containing a solution of the chlorates of lime or of soda, or by those consisting of lime water, or of Kréosote water; or by applying the linimentum terebinthinæ. If dry incrustations form on the surface, oiled silk should be constantly applied over it. But in ordinary circumstances, especially of the constitutional disease, it is advisable to abstain from local applications, or to resort merely to bathing or sponging the part with some tepid fluid, as the decoction of *quince seed*, or of the flowers of the *lime* (*Tilia Europea*), if the heat, pricking, &c. be troublesome. Where the vesications are numerous, the practice of dusting the part with flour, or any other absorbent powder, is warranted by the results of experience. Of *incisions* and other local means, especial notice will be taken hereafter.

57. Where a disposition to terminate in œdema of the subjacent tissues becomes apparent, the measures to be adopted must depend upon the state of the constitution, and on the previous treatment. If the former be not much impaired, and if the latter have not been energetic, purgatives, as directed above, and warm diaphoretics, should be frequently exhibited, and a blister applied to the part. But if the vital powers be much impaired, the more restorative remedies, and the local means, recommended in the next section (§ 58.), should be resorted to. Where the inflammation of the integuments extends to the parts beneath, and the skin becomes tense, local depletion by leeches, scarification, or incisions, and the other measures directed in this association of the disease (§ 60.), should be adopted.

58. ii. *Treatment of Associated and Complicated Erysipelas.* — *A. In the association with œdema of the subjacent cellular tissue*, the utmost attention to the state of health, the age, and habits of the patient, is necessary. When it occurs in broken-down constitutions, and persons addicted to spirituous liquors, not only should tonics, &c., particularly cinchona, quinine, cascarilla, with soda or potash, camphor, the preparations of ammonia, &c., be exhibited, but also wine, light nourishing diet, and occasionally small quantities of the beverage to which the patient has become habituated. But these remedies should be preceded by, or alternated, or even conjoined, with, such purgatives as are most active in promoting the secretions and excretions, which are generally deficient in this state of disease. If the bile be scanty or morbid, *calomel*, blue pill, PLUMMER's pill, or the hydrargyrum cum creta, should be given with camphor; and the mixture last prescribed ought to be taken a few hours subsequently, and continued from time to time. Those who have been addicted to spirituous liquors, are most benefited by half an ounce each of the spirit of turpentine and of castor oil, taken on the surface of weak Hollands or common gin. This dose may be repeated on alternate days: it will be found remarkably beneficial when the urinary secretion is deficient; or when the affection of the skin is consequent upon anasarca. In this latter circumstance, the infusion or decoction of cinchona may be given with the *chlorate of potash*, and the tincture of cinchona, more especially if there be any tendency to gangrene, or if the temperature of the surface be low, and the colour deep or dark.* Either of the purgatives prescribed above (§ 55.), should likewise be taken occasionally. Fomentations with decoction of chamomile flowers and camphorated spirit may also be employed, early in the disease. It is in this variety, as Mr. S. COOPER remarks, that pressure by bandages, as recommended by MM. RAYER, BRÉTONNEAU, and VELPEAU, is most appropriate. After morbid secretions have been evacuated, and the use of tonics, with camphor in full doses, or with the chlorate of potash, or with both, has been commenced — the part being greatly distended, and the surface irritable or disposed to gangrene — I have seen immediate and remarkable advantage accrue from the application of a warm cloth, moistened either with the spirits of turpentine, or with F. 311., the bowels being kept regularly open by the oily draught, or by the stomachic purgatives directed above; or by enemata, particularly F. 135. 150. and 151., either of which should be repeated according to its effect. — When sphacelation has commenced, a poultice of the powdered bark, or of carrots, and this spirit; or a solution of the chlorate of lime, or applications containing the Kréosote; are the means which promise the most advantage.

59. *B. Treatment of Erysipelas associated with inflammation of the subcutaneous tissues.* — This most serious form requires, according to the grade and kind of vascular action, local and constitutional; the age, strength, and habit of the patient, and the stage of the disease, the most varied, but still the most active, treatment — in some cases general or local depletion, or both; and in others, as invigorating remedies as were prescribed for the preceding variety; — in an early stage the former means, and in a later period the latter. The treatment of this variety may be divided — 1st, into that which should be adopted before suppuration has taken place;

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* I have lately had an opportunity of trying the *Kréosote*, in doses of from one to three drops, four times a day, in a case of this variety. It increased the urinary secretion; but it was not so beneficial as the chlorate of potash, which I have been long in the habit of prescribing. I have, however, found it useful in atonic dropsy, and general cachexia.

and, 2dly, into that which is required when suppuration or disorganisation has occurred.

60. *a. Before suppuration or disorganisation takes place*, the most varied, and even opposite, measures are often necessary, according to the age, strength, and habits of the patient, the prevailing epidemic constitution, and the local and constitutional symptoms. When the surface of the inflamed part is of a deep or florid red, tense, and very hot; the pulse hard, full, or strong; the head much affected; and the papillæ of the tongue erect and excited; both general and local *bloodlettings* are requisite, especially in unbroken constitutions, in persons not addicted to intoxication, and very early in the disease. When erysipelas attacks the head, or face, and insufficient epistaxis occurs, *venæsection* should be resorted to; but when it appears in other parts, a large number of *leeches* should be applied, or *incisions* made, as recommended and practised by Mr. Copland Hutchison. This local mode of depletion will often be sufficient, excepting in the most phlogistic cases, when venæsection may also be necessary. But in large towns, and in hospitals, this latter will seldom be required, if the former have been employed with decision. Besides, in these circumstances especially, there is considerable risk of inflammation attacking the vein. When sufficient blood is not procured by leeches or incisions, *cupping* around, or even over the part if it can be borne, will frequently be preferable to venæsection. In proportion as the local and constitutional symptoms approach to those described under the head of *Diffusive Inflammation of the* Cellular Tissue, is the necessity for bleeding diminished — that which necessarily attends the incisions of the part being often sufficient, — and for the restorative and tonic treatment there recommended (§ 34. *et seq.*) increased, especially after morbid secretions and fæcal matters have been evacuated. Where the skin is but little affected; the powers of life depressed, from antecedent visceral disease or intemperance; and the affection of the subjacent parts extending rapidly; the remedies advised in that article should be prescribed energetically. When the pulse is broad, open, and expansive, or tumultuous, or easily compressed, although it be quick, sharp, or even bounding, general bloodletting is injurious; the local affection either extending, or changing its place, and vital resistance sinking from the evacuation. In the form of this complication first described by Mr. Copland Hutchison, wherein the inflammation extends to the fasciæ, to the intermuscular cellular substance, and to adjoining parts, incisions sufficiently deep to divide the fasciæ, as he directs (see *Surgical Observations, &c.* p. 110. 2d edit.), are most indispensable, whatever may be the state of general vascular action and constitutional power: for if these be of a *sthenic* kind, the incisions come in aid of the necessary depletions; and if they be *asthenic*, local congestion and effusion are thereby removed, and the operation of restorative remedies in no way impeded.

61. The observations made respecting other evacuations in simple erysipelas, very nearly apply in this complication. — *Emetics* are recommended by Reil, Retz, and Roux, and are most beneficial in the more sthenic diathesis, where those of antimony may be employed; and least so where the disease approaches the character of diffusive inflammation of the cellular tissue. If at all prescribed in the latter state, ipecacuanha, conjoined with ammonia or camphor in full doses, is preferable. The early and repeated exhibition of *purgatives* is as requisite in this as in the simple forms; and the choice and combinations of them, there directed (§ 55.), may be adopted. But, in proportion as the characters of diffusive inflammation of the subcutaneous tissues are assumed, the more warm and stomachic should the purgatives be. Where this kind of complication predominates, the treatment described in that article (§ 34. *et seq.*) should be followed. — *Diaphoretics* also, as already recommended, are usually of service; but the selection of them should depend much upon the state of the stomach, and the constitutional powers. Where the former is not disturbed, and the latter are not much depressed, small doses of antimony with other diaphoretics are beneficial; particularly if the febrile action be great, and at an early stage of the disease: but if the stomach be irritable, diaphoretics ought to be given in effervescence, generally with an excess of the alkali; and, if vital power be much depressed, those with the carbonate of ammonia and camphor are preferable. If the edges and point of the tongue be red, and the epigastrium tender, a blister, or sinapism, or the warm turpentine epithem, should be placed over this region, and small doses of the nitrate of potash, with subcarbonate of soda, prescribed in the decoction of quince seed, or of linseed, or of the flowers or bark of the lime or linden. — *Mercurials*, at the commencement, and occasionally afterwards, are generally of service. Calomel is most to be depended upon; and, when conjoined with camphor or ammonia, it may be taken in any state of the disease, if the biliary and other secretions require its exhibition. In low states of vital power, it should be followed, in three or four hours, by a stomachic purgative, the action of which may be promoted by a cathartic enema (§ 55. 58.).

62. *Opiates* or other anodynes are often necessary, particularly when there are watchfulness, general irritability, and much pain, which are often the precursors of, or even tend to induce, delirium. But they should be given with great caution. They are hazardous means, if prescribed before morbid matters are evacuated, or where there is any tendency to coma. The *acetate of morphine*, in a full dose in aromatic spirits, at bedtime, is most to be depended upon. — *Bark* and other *tonics* are necessary from the commencement, when the disease presents more of the *diffusive*, than of the *phlegmonoid*, characters. At first, the bark may be given in decoction or infusion, particularly when the propriety of exhibiting it is doubtful; and with the alkaline subcarbonates, or with the solution of the acetate of ammonia. In cases of manifest asthenia, or cachexia, and diffusive appearance, either the sulphate of quinine, or the bark in substance, with camphor and aromatics, may be prescribed; but I have generally found the decoction, with the chlorate of potash, and with either the compound tincture of bark, or the tincture of serpentaria, to act beneficially, when alvine evacuations were sufficiently promoted by suitable means.

63. In the *three grades of the phlegmonoid*

(§ 29. *et seq.*) complication, the same principles as have been now stated are applicable. Depletions and other evacuants should be prescribed with a promptitude, and to an extent, co-ordinate with each, and with a due regard to the peculiar circumstances of the case; always recollecting that, in diseases like this, which are connected more or less with imperfect excretion and a morbid state oft he circulating fluids, vascular action may be excessive, whilst nervous power and vital resistance are reduced to the lowest states; and, therefore, that vascular depletion, in order to be salutary, or even not to be injurious, should be early employed, and with strict attention to its effects both at the time and immediately afterwards. Nor should it be overlooked, that, in circumstances where the propriety of general or even local depletion appears doubtful, either one or the other, or even both, may be practised, if judicious restorative means are also resorted to, especially in conjunction with such remedies as promote the excreting functions, and purify the blood, or correct its morbid state.

64. *b. When suppuration, or disorganisation, has taken place*, or when either is inevitable, general bloodletting is no longer admissible, although the vascular excitement may be great; and the only local depletion that can be ventured upon, is that which will follow *incisions*, which should now be made, if they have not already been resorted to. In some cases, however, the application of leeches, or cupping around the part, may still be ventured on, if the local action be high, and the changes now in question be only commencing. But where matter has already formed, or parts have sloughed, venæsection, or emetics, or even lowering purgatives, will only promote the absorption of morbid matters from the diseased part, and the consequent contamination of the circulating fluids, instead of throwing them out upon the surface, and facilitating their expulsion through the outlets which ought to be made for them, by incisions down to their seats. In proportion as disorganisation is manifest, or advances, so should restoratives and tonics be freely administered; and either those already mentioned, or those prescribed in the article on *Diffusive Inflammation of the* CELLULAR TISSUE (§ 34.), ought to be liberally used; with the aid of wine, and such nourishment as the state of the digestive organs will admit of. The stomachic purgatives and evacuants, directed above (§ 55. 58.), should be given occasionally, in order to remove morbid collections, and promote the depurating actions of the abdominal viscera on the blood. In constitutions broken down by intemperance, the beverage to which they have become habituated is the most serviceable, as Sir A. COOPER has justly remarked; but, in other circumstances, wine may be taken in soda water, or in spruce beer, to which a little of the subcarbonate of soda or of potash has been added. When a free outlet has been given to matter or sloughs, advantage will often accrue from the injection of a weak solution of any of the chlorurets, or of Kréosote water; and the use of compresses and bandages around or above the seat of disorganisation, in order to prevent its extension.

65. *C. Erysipelas with Nervous and Cephalic Symptoms.* — *a.* When the nervous symptoms appear early, and the head or face is not the seat of the disease, the attendant fever assuming this form, gentle tonics and diaphoretics are serviceable, especially the infusion of valerian, with the solution of the acetate, and the aromatic spirit, of ammonia; or the infusion of bark or of cascarilla, with the alkaline subcarbonates, and the preparations of camphor; or either of these infusions, with the tincture of serpentaria and the chlorate of potash. RICHTER remarks, that, when the attendant fever is of the nervous kind, the local affection is most prone to change its place, or to recede from the surface, and attack internal organs. I believe that there is much truth in this; and that these changes are less likely to occur when the above remedies are resorted to, and a blister is applied over the affected part; the excreting functions being moderately promoted by stomachic purgatives and enemata.

66. *b.* Where *delirium* supervenes, its treatment must depend upon its form, the seat of the local affection, and state of the system. When the fever is of the nervous kind, delirium is an early symptom, and the result chiefly of the febrile action, and depression of nervous power; the means now mentioned, especially if morbid excretions have been evacuated, being then beneficial. If the tongue be, at the time, moist, camphor and anodynes may also be prescribed. But when delirium is connected with general vascular excitement, depressed power, and manifest disorder of the circulating and secreted fluids, the alterative and stomachic purgatives, and enemata prescribed above (§ 55. 58.), are most to be depended on. Where the disease attacks the face and head, the delirium frequently proceeds from inflammatory action in the membranes of the brain, and rapidly passes into coma, from effusion and exhaustion of vital power. In this case, early bleeding from the feet, or cupping on the nape of the neck, or a number of leeches to the occiput and behind the ears; mustard pediluvia; cold applications to the head, if the heat be excessive and the patient young or robust; and active cathartics, both by the mouth and in enemata; are to be prescribed. If great and deep-seated tumefaction take place in the scalp, particularly about the occiput, incisions should not be overlooked.

67. *c.* When profound *coma* comes on, the excretions being voided involuntarily and unconsciously, when the pulse is rapid, and the tongue and gums covered by a thick fuliginous coating, what measures should be resorted to? This occurrence is frequent; is attended by the utmost danger; and is seldom satisfactorily treated. In several cases, I have resorted to the following means with success: — 1st, Unless calomel has been already taken largely, a full dose of it, with camphor, ought to be prescribed, in some thick substance, and placed upon the back part of the tongue, when it will gradually be swallowed; — 2d, Two or three hours afterwards, turpentine, with an equal quantity, or with one half or two thirds the quantity, of castor oil, with a little liquor potassæ, should be exhibited in the form of an electuary, and as just directed, if the coma be profound, or in any other form, if the patient can be roused sufficiently to take it; and repeated frequently until the bowels begin to act; when its operation may be promoted by enemata (F. 150, 151.); — 3d, If matter form in any part, incisions

should be made early, and through the aponeurotic expansions, where there is the least risk of matter forming beneath them * ; and 4th, Blisters to the insides of the thigh, or to the nape of the neck, and between the shoulders, should also be directed, if the symptoms be not soon ameliorated by the preceding means; and the calomel and camphor repeated every five or six hours, until the tongue and gums evince the specific operation of the former; when warm or stomachic purgatives, aided by the enemata already advised, and gentle tonics, ought to be given from time to time, to evacuate morbid secretions and support the vital powers.

68. *D. Treatment of Gastric and Bilious Erysipelas.* — *a.* Where the yellowish coating of the tongue, the appearance of the surface, or of the excretions, and nausea or vomiting unattended by much tenderness at the epigastrium, indicate *biliary disorder*, an *emetic*, given early in the disease, if the head be not seriously affected, is usually of service. After its operation, a full dose of calomel, purgatives, laxative enemata, diaphoretics, and the other measures already recommended, according to the external character of the disease, and the states of general and local vascular action and of vital power, should be prescribed, and repeated as circumstances may require. Wherever tenderness of the epigastrium or hypochondria exists in connection with the nausea or vomiting, local depletions in the vicinity, blisters, sinapisms, or warm terebinthinated epithems, placed over these regions, will be of essential service. The last of these should be applied until it produce redness, and be repeated according to its effects upon the disease. Whenever any part within the abdominal or thoracic cavity is affected, either coëtaneously with, or consecutively upon, or even after the disappearance of, erysipelas, these are the most effectual remedies, especially when aided by mercurials, prescribed either alone, or with camphor and opium.

69. *b.* Where this specific form of inflammation seems to affect *the digestive mucous surface*, small and repeated doses of nitre, with the subcarbonate of soda, in the decoction of quince seed, or of the lime bark; camphorated emulsions; diaphoretics in mucilaginous vehicles; local depletion, and the external means just specified, are most to be depended upon. In both this and the hepatic complication, calomel, blue pill, or hydrargyrum cum creta, may also be given with opium and small doses of camphor, until the gums are affected; but it also will often be necessary to evacuate morbid matters by stomachic and mild purgatives, and to support the strength by light tonics, especially at an advanced stage. In most cases of internal erysipelas, particularly if parts within the abdominal cavity be affected, calomel with camphor and opium, terebinthinated purgatives, and the epithems above mentioned (§ 68.), are of the greatest benefit.

70. *E. The association with Inflammation of the Throat and Pharynx*, being often attended by much danger, especially if the fever be of an adynamic kind, or if the head and face be affected, requires early and active treatment. Venæsection, or local depletion, or both, are frequently necessary; but the propriety of having recourse to them, and the extent to which either of them may be carried, must depend upon the state of general, as well as of local, vascular action, and vital power. Where there are great swelling of the external throat, and tension of the integuments (§ 33.), *incisions* should be made in the manner about to be directed (§ 80.), and the internal treatment conducted appropriately to the states of the different functions, conformably with the principles developed above. If the swelling and tension be less, and the symptoms not so urgent as to require incisions, a large *blister* may be applied to the lower half of the neck, extending over a part of the sternal region. Active *cathartics*, aided by the frequent exhibition of

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* The following case occurred, eleven years since, to a very able practitioner, Mr. H. Cox, formerly House-Surgeon to the Infirmary for Children; and was soon afterwards published by him. I quote it in an abridged form, as it illustrates this complication, and the treatment recommended. It, moreover, is evidence of facts connected with the treatment not only of this, but of other maladies: — "Jane Guest, aged 21, was seized, Jan. 22. 1824, with rigors, and fits of hysteria, to which she was subject. On the fourth day, her scalp had become red and swollen, and the tongue tumid and red. Delirium and great restlessness afterwards supervened, and the erysipelas extended over the face and neck to the sternum. The eyes were now completely shut, and the features so swollen that she could not be recognised. In two or three days she passed into a state of coma and insensibility." — "The pulse, which was formerly full, but easily compressed, was now excessively quick; the tongue was black and crusted; and she rolled towards the foot of the bed. The treatment usually resorted to in similar cases had failed to ameliorate any of the symptoms. The condition of the patient was, on the 31st of January, the worst possible. The pulse could not be counted; she was profoundly comatose; the integuments of the head were distended to the utmost; and the tongue, teeth, and gums were covered by a fuliginous coating. At this date, I stated the case to Dr. Copland, as one for which there was no room for hope. He strongly advised me to exhibit the oil of turpentine in large doses, as he had experienced success from the use of it in several cases characterised by similar symptoms to this." — "I had had many opportunities of witnessing the beneficial effects of this substance at the Royal Dispensary for Children, where Dr. Copland had introduced its frequent use. I, therefore, according to his advice, prescribed as follows: —

"℞ Olei Terebinthinæ ℥ss.: Olei Ricini ʒij.; Mellis ʒij. Misce. Fiat Electuarium statim capiendum.

"℞ Olei Terebinthinæ ʒvj.; Olei Olivæ ℥j.; Aquæ ℥x. Misce. Fiat Enema statim administrandum.

"*Feb.* 1st. — Several offensive evacuations. Pulse somewhat stronger, and not quite so quick. The coma is less profound.

"℞ Olei Terebinth., Ol. Ricini, āā ℥jss.; Mellis q. s. ut fiat Elect. Sumat, tertiis horis, partem quartam.

"2d. — The patient could be roused. The mouth, teeth, and gums were cleaner; the pulse 130, and fuller. The local symptoms were ameliorated. The oils have procured several bilious evacuations.

"℞ Olei Terebinth. ℥jss.; Ol. Ricini ℥ss.; Liq. Potassæ ʒj.; Aq. Cinnamom. ℥iv. M. Capiat partem quartam, quartis horis.

"3d. — Much better. Pulse 120, and more natural as to strength. The tongue is beginning to become clean. The bowels have acted copiously, and much yellow bile has been voided. The patient now answers the questions put to her," &c. From this time her recovery was uninterrupted. (*Lond. Med. Repos.* for April, 1825, p. 299.)

There is much misapprehension as to the operation of full doses of turpentine, given either by the mouth or in enemata; many supposing that they increase vascular action in the brain. The reader will perceive, upon perusing the account (published in the *Lond. Med. and Phys. Journ.* for May and July, 1821.) of the experiments I performed — 1st, upon myself; 2dly, upon the lower animals; and, 3dly, in numerous cases of disease — that this substance, given so as to act upon the bowels, either from the largeness of the dose, or by the aid of a purgative conjoined with it, is a powerful derivative from the brain, diminishes vascular action in serous membranes, and restores lost tone to the extreme capillaries, especially in exhaling surfaces. The extensive experience I have since had of this medicine, has confirmed these inferences, but has shown that it may be injurious in the hands of those who are not well acquainted with the exact circumstances in which it may be given with advantage.

enemata (F 135. 151.); *gargles* with a solution of the chlorate of soda or of lime; or of the nitrate of silver; and diaphoretics; are also very generally appropriate and beneficial. Although *depletions* are very often necessary in this complication, yet venæsection is sometimes injurious, and always in the adynamic forms, or at an advanced stage. In two cases in which I was lately consulted, an aggravation of both the local and constitutional symptoms followed bloodletting, though resorted to early, and in moderation. In this, as in every other form of the disease, the treatment should mainly depend upon the states just mentioned; and upon the various circumstances peculiar to the case.

71. *F.* Where the *Erysipelatous Inflammation extends to the Larynx or Bronchi, or affects the Lungs,* venæsection is frequently required, but not always to a great amount: in some instances, it has even appeared injurious. Local depletions, however, are generally necessary. The chief dependence should be placed upon the external applications mentioned above (§ 68.), which ought to be repeated, sometimes oftener than once; and on purgatives, demulcents, and antimonials, or other diaphoretics; these being the chief means of exciting the excreting functions, and thereby of removing the constitutional derangement upon which the local affection depends.

72. *G. When erysipelas supervenes in the course of fevers,* venæsection is inadmissible; but the early application of leeches to the part is often of service. Internal inflammations appearing in connection with external erysipelas, admit not of vascular depletions nearly to the extent required by true or idiopathic inflammation; local depletions, calomel, camphor and opium, terebinthinated purgatives and enemata, and the external and other means just particularised, being the most efficient remedies in such cases. Whenever erysipelas attacks internal parts, it may be referred either to insufficient power to determine the morbid action to the surface, or to pre-existing disorder of the part affected, or rather to both. But as all such complications present similar states of vital action to the more simple forms of the disease—varying from the more phlogistic to the most diffusive or adynamic, according to the age, constitution, and habits of the patient, the causes and stage of the disease, and the characters of the prevailing epidemic — so do they require a treatment varying from the strictly antiphlogistic, to the most energetically restorative and tonic.

73. *H.* If *Inflammation of the Lymphatics* or *of the Veins* appear in the course of the complaint, or be associated with it — circumstances by no means uncommon when the upper or lower limbs, especially the former, are affected — general blood-letting is always injurious, and even local depletion is seldom beneficial. The liberal exhibition of tonics and stimulants; of stomachic and mild aperients; and of warm diaphoretics; with anodynes (§ 62.) if the pain and irritability be great; and emollient and anodyne applications to the part, particularly if the absorbents be inflamed; are chiefly to be trusted to; the intention being, in all such cases, to arrest the extension of disease, and prevent the contamination of the circulating fluids.

74. The *spurious forms of Erysipelas,* which are often connected with *inflammation of deep-seated parts,* and which most frequently occur in the extremities, should be treated according to the principles developed above, and in the article on the CELLULAR TISSUE; free incisions being particularly requisite for them (§ 80.).

75. *I. Depletions* and other *antiphlogistic remedies* are serviceable chiefly in a very early stage, whether of the simple or of the complicated disease, however high vascular action may seem; and, although they have been most requisite at that period, and energetically employed, a very active recourse to *stimulants* and *tonics* will often subsequently be necessary. Frequently, also, where the propriety of resorting to moderate or local depletions is unquestionable, the good effects of *restoratives* and tonics, *exhibited even at the same time,* are equally manifest; this complaint, oftener perhaps than any other, requiring vital power to be restored by the latter means, whilst vascular action and congestion are being subdued by the former, and by medicines which promote the secreting and excreting functions. The *stimulants* most to be depended upon, are — *camphor* and *ammonia,* or their preparations, given in large doses when the head is unaffected, or nervous power is exhausted; and the tonics already mentioned. Various substances, which are both stimulant and tonic, as *serpentaria, arnica,* &c. are useful adjuncts to the barks; and others, which possess more of an antiseptic property, as the *chlorates of potash* or of *soda,* or the *kréosote,* are often of essential service, especially in advanced stages of the disease. The frequent and manifest dependence of the complaint upon a morbid state of the circulating fluids, has induced some writers to recommend the carbonates of the fixed alkalies, and such other substances as affect more immediately the state of the blood; but although these are often beneficial, they ought not to be depended upon alone. The morbid condition of the blood is the result of imperfect action of the excreting organs, consequent upon defective vital power. The chief intention, therefore, should be to excite the functions of these organs, by agents which operate specifically and beneficially upon them, and by those which rouse the vital energies generally, and resist the extension of morbid changes.

76. iii. *Of the local Treatment.* — *A. a. Cold applications* have been recommended by several writers, but they are not always safe, and ought not to be prescribed when there is very evident adynamia, or for aged persons, or broken-down constitutions. In the more phlogistic states, at an early stage, and especially when these states occur in the face or head, they frequently afford much relief. — *b. Warm poultices* and *fomentations* are objectionable in the phlegmonoid, and, indeed, in the other varieties, unless under some circumstances of the disease connected with local injury. — *c.* In the strictly constitutional complaint, neither of these are of much service; dusting the part with flour or any other absorbent powder, when the vesicles break, or sponging it with some tepid and soothing fluid, if the heat and pricking pain be troublesome, being the safest practice.

77. *B. a.* The application of the *nitrate of silver,* in substance or in strong solution, as recommended by Mr. HIGGINBOTTOM, is often of great benefit.

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ERYTHEMA. — SYN. Ἐρύθημα (from ἔρευθος, red), Gr. *Erysipelas*, Celsus and Galen. *Erysipelas idiopathicum*, Sauvages. *Dartre érythémoide*, Alibert. *Die Röthe*, *Hautröthe*, Germ. *Erythême*, Fr.

CLASSIF. — 1. *Class*, Febrile Diseases; 2. *Order*, Inflammations (*Cullen*). 3. *Class*, Diseases of the Sanguineous Function; 2. *Order*, Inflammations (*Good*).

III. CLASS, I. ORDER (*Author*).

1. DEFIN. — *Superficial redness, with burning pain, of a part of the integuments, varying in extent and form, disappearing momentarily on pressure, usually of an acute character, and uninfectious.*

2. I. DESCRIPTION. — The varieties of *erythema* and of *erysipelas* have been confounded together by many writers, — a circumstance almost unavoidable, when it is considered, that several states of the one are merely modifications of certain forms of the other; distinctions between them being rather conventional and artificial, than essential, distinct, and unvarying. HIPPOCRATES used the term erythema merely to signify simple redness of a part. CALLISEN, SAUVAGES, and ROSTAN employed it to designate the slightest grade of erysipelas. J. P. FRANK and J. FRANK applied it to several affections of a chronic kind, entirely distinct from those to which it has been given by recent British and French pathologists. CULLEN viewed it as a superficial inflammation of the integuments, but little, or only symptomatically, affecting the constitution; and erysipelas as an affection primarily, and chiefly of the whole system. WILLAN, BATEMAN, and RAYER considered erythema as generally connected with more or less constitutional disorder, — a circumstance that cannot be disputed, although such disorder is frequently latent, or but little evident. Dr. M. GOOD has detached two of the most common forms of complex erysipelas, viz. the phlegmonoid and œdematous, from that head, and comprised them under this, — an arrangement in so far improper, as intimately allied and serious affections, depending upon very manifest febrile disturbance of the system, are thereby separated, and certain of them placed in connection with others unattended by any marked disorder, and of comparatively little importance. Erythema is either *primary*, and proceeding from local causes; or *symptomatic* of some other disease, or of constitutional disorder.

3. i. PRIMARY OR IDIOPATHIC ERYTHEMA presents various modifications, according to its causes and seat. — *A. Er. Intertrigo*, SAUVAGES, WILLAN — *E. ab Acri inquilino*, CULLEN — *Ecorchure*, Fr. — *Fret, or Excoriation of the Skin* — generally proceeds — (*a*) from the friction of two contiguous surfaces, particularly in fat persons, as in the upper parts of the thighs, arm-pits, &c.; — (*b*) or from the irritation of morbid secretions coming or remaining in contact with parts, as of the perspiration in the groins, and below the mammæ; or of the leucorrheal discharge, or catamenia, and of the alvine and urinary excretions, particularly in the course of other diseases; — (*c*) or from chemical

or mechanical irritants, and artificially from sinapisms, or ammoniacal and terebinthinated liniments, &c.; — (*d*) or from excessive heat, or vicissitudes of heat and cold, or the rapid abstraction of heat — *E. pernio*, or chilblain; — (*e*) or from pressure, especially lying long in one position — *E. paratrima*, Sauvages; — (*f*) or from the stings and bites of insects, &c. — *E. punctura* of Sauvages.

4. When the epidermis is partially removed in this species of erythema, either by friction of the surfaces, or by the excoriation produced by acrid secretions, as in the intertrigo occurring in females and infants of a full habit from neglect of due cleanliness, a serous or sero-puriform fluid exudes from the inflamed surface during some days; but vesicles are not formed, nor is there any manifest swelling of the part as in erysipelas.

5. ii. Symptomatic Erythema — *l'Érythême Symptomatique*, Biett, Rayer, Cazenave, &c. — often accompanies other eruptions, especially at their commencement and termination, as remarked by Billard; and is occasionally complicated with them. It most frequently is dependent upon disorder of the digestive organs; and is often observed in children about the periods of dentition, in plethoric or fat persons, and at the critical periods of female life. It is most commonly caused by the ingestion of irritating substances, and by certain kinds of food, especially in irritable temperaments, feeble or delicate constitutions, and individuals of a peculiar diathesis.

6. *A. Fugacious Erythema* — *E. fugax*, Willan, Bateman — the *maculæ volaticæ* of various writers — consists of irregular and evanescent red patches, with increased heat of the part, which appear successively on the arms, neck, breast, and face, in various febrile diseases, and in bilious fevers and diarrhœa (Bateman); often denoting, as Hippocrates has remarked, a tedious and dangerous malady. This variety sometimes attends derangements of the digestive organs, and, more rarely, hysteria and hemicrania. It is not usually followed by sensible desquamation of the cuticle; but exceptions to this occasionally are observed.

7. *B. Shining Erythema* — *E. læve*, Bateman — is sometimes symptomatic of disorder of the *primâ via*, and occasionally attends the catamenia in delicate and irritable females; but it most frequently accompanies anasarca, or œdematous swellings. The inflamed surface is smooth and shining. When it affects young and sedentary persons, it is often attended by slight fever, and it generally terminates in extensive desquamation as the anasarca subsides; but where it occurs in aged persons, or in those addicted to intemperance, it is liable to pass into spreading or sloughing ulcers. It is merely a modification of œdematous erysipelas.

8. *C. Marginated Erythema* — *E. marginatum* — occurs in patches, bounded on one side by a slightly elevated, tortuous, red border; but the redness has no boundary on the open side. It appears on the extremities and loins of old persons, produces little or no irritation, and remains for an uncertain time. It is generally connected with internal disorder of a serious or dangerous tendency.

9. *D. Papulated Erythema* — *E. papulatum*, Bateman — appears chiefly on the arms, neck, and breast, in irregular extensive patches, and most frequently in females and young persons. The patches are of a bright red hue, often slightly elevated; and, for a day or two, before the colour becomes vivid, they are rough or imperfectly papulated. The redness afterwards continues for several days; and, as it declines, assumes, in the central parts, a bluish or pale purple tinge. This variety is generally attended by a tingling sensation, passing to soreness as the colour changes; and sometimes with much constitutional disturbance, — with a frequent small pulse, anorexia, depression of strength and spirits, watchfulness, and pains or tenderness of the limbs; but the general disorder is often trifling.

10. *E. Tuberculated Erythema* — *E. tuberculatum* — is merely a slight modification or an advanced stage of the *papulated*. The patches resemble those of this variety; but there are small, slightly elevated tumours interspersed through them, subsiding in about a week; the erythema becoming livid and disappearing in about a week more. It commences with fever; is attended by languor, irritability, and restlessness; and is succeeded by hectic. It is so rare, that Bateman never met with it, and Willan saw only three cases; and, in these, treatment did not "alleviate the symptoms nor prevent the subsequent hectic" (Bateman).

11. *F. Nodose Erythema* — *E. nodosum* — affects chiefly females, children, and young persons of a lax and lymphatic constitution; and rarely occurs in boys. It is preceded by slight febrile symptoms, for a week or more, which generally abate upon its appearance. It shows itself on the fore part of the leg, and rarely on the arm, and, in large oval patches, the long diameter of which is usually parallel with the tibia, and slowly rises into hard and painful protuberances. In the course of nine or ten days these soften and subside, the red colour turning bluish or dusky a day or two earlier. It is sometimes connected with the approach of the catamenia; and its premature disappearance is sometimes followed by dangerous internal disease. Mr. Dendy saw pneumonia suddenly supervene on its retrocession.

12. iii. J. Frank and Rayer have described, *as a chronic form of erythema*, the redness affecting parts of the face, and often associated with *Acne*, particularly *A. rosacea*, which it sometimes so nearly resembles, as to appear rather as a modification than as a complication of that eruption.[*] It generally commences in the nose, extending to the cheeks, and more rarely to the forehead and chin; is characterised by vascular arborisations in the alæ nasi and summits of the cheeks, with shining redness disappearing momentarily from pressure; and is attended by a sensation of heat, tension, and itching, which, with the redness, are increased by external and internal stimulants, or whatever determines the blood to the head; and,

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[*] Nicolaus Nicolus Florentinus took a tolerably accurate view of these complaints, in making them varieties or degrees of the same eruption The one here described, he names, "*Rubedo simplex seu facies rubra*;" the *Acne rosacea*, he calls "*Rubedo pustulosa*" (*Serm.* vii. tr. vi. cap. 15.): and T. Mayerne was, upon the whole, right in connecting the former with disorder of the liver (*Opera Medica*, p. 213.), and in prescribing for it, local depletions from the nape of the neck, and behind the ears, setons, mercurial purgatives, antimonials, &c.

at first, by slight exfoliations of the cuticle. The reddened skin, at much later periods, becomes irregularly granulated, rough, thickened, and occasionally tuberculated. It is dependent upon protracted disorder of the digestive organs, usually resulting from a long course of indulgence or intemperance, and seldom appears till after middle age.

13. iv. M. **ALIBERT** describes two other species of erythema, — the *Epidemic* and *Endemic*. The *former* is characterised by burning itching, with pricking in the hands and feet. In some cases, the skin is red; in others, it is black, as if covered with a layer of soot. The epidermis exfoliates, or forms vesications; and the constitutional symptoms are very severe. This disease was epidemic in Paris in 1828. The *endemic* is the chronic affection of the skin, which attacks the peasants of the north of Italy, and is better known by the name of **PELLAGRA** (*which see*).

14. II. The **CAUSES**, particularly of primary erythema, have been already noticed (§ 3.); but, even when appearing in this manner, it is favoured, if not in a great measure caused, by disorder of the digestive and excreting organs. It often accompanies dentition and diarrhœa in children; and, in them especially, is frequently caused by particular kinds of food, or by errors in diet. It sometimes appears in the course of dysentery or fevers; and is indicative of inflammation or suppuration below fasciæ, or in deep-seated parts; it then generally assuming the shining or smooth form. Vascular plethora; the critical epochs in females; various irritating ingesta; very warm spices; disorder of the stomach, liver, and bowels, or of the excreting or eliminating functions; are chiefly concerned in its production.

15. III. **DIAGNOSIS.** — *A.* The superficial redness; the absence of tumefaction and vesication; the more or less circumscribed patches; the much less constant, severe, and burning pain; the generally slight form, and favourable termination, of both the local affection and the constitutional disorder; sufficiently distinguish erythema from *erysipelas*. — *B.* The redness is deeper in shade and in situation, and the patches are larger, but less numerous, in erythema than in *Roseola*: the latter eruption often appearing simultaneously in different parts of the body, which is never observed in the former. These two affections are, however, often distinguished from one another with difficulty; and there can be as little doubt, that they often insensibly pass into each other, as that they are both symptomatic of internal disorder; as, indeed, Mr. **PLUMBE** has properly observed.

16. IV. **TREATMENT.** — *A.* The *primary* or *idiopathic* forms generally disappear readily upon the removal of the causes which occasion them; aided by frequent tepid ablution, and by some mild absorbent powder, as that of calamine or of cerussa. When erythema occurs *in infants*, from inattention to the removal of the urinary and intestinal excretions, the tepid semicupium, mild aperients, and saline diaphoretics, may also be employed; and if it be attended by a serous or fœtid discharge, a lotion with a weak solution of the chlorate of lime or of soda, or of kréosote, will readily restore the parts to a healthy state. If the part be very irritable, Dr. **BATEMAN** directs a lotion consisting of ten grains of oxymuriate of mercury and six ounces of lime-water. A weak solution of the nitrate of silver is also of great service. — When it is produced by cold — *E. pernio* — turpentine and the balsams, or the former and tincture of camphor, soon remove it. — If it be caused by bites or stings of insects, ammonia and the essential oils are generally beneficial. — *Erythema from pressure* may be removed by the use of air-pillows; by spirituous, camphorated, or terebinthinated applications; and by suitable means of protecting the surface.

17. *B.* The *symptomatic states of erythema* should be treated according to the indications of internal disorder furnished by individual cases; and almost entirely by internal or constitutional means. The principles advocated in erysipelas, viz. that the excretions should be promoted, and the digestive and assimilating functions assisted, ought also to be followed in these affections. Therefore, deobstruent and alterative purgatives; mild tonics, with the alkaline subcarbonates, and diuretics; diaphoretics with sedatives, particularly at bedtime, as James's powder with small doses of calomel and opium, or hyoscyamus, are the most generally appropriate. In the *papulated variety* (§ 9.), gentle laxatives, mild tonics, and light diet, are sufficient; but, when local irritation, or restlessness, is much complained of, antimonials and anodynes may also be given at night. — The *nodose variety* (§ 11.) is soon removed by rest; small doses of mercurials, with James's powder, at bedtime; alterative mild purgatives given in the morning; and light tonics in the course of the day. Change of air and light diet are also of very great benefit. External applications are seldom useful, and may be hurtful. If this or any of the other varieties be connected with suppression of the catamenia, or of other discharges, bloodletting should precede the means recommended above; and measures ought to be used to restore the evacuation.

18. *C. The chronic form of erythema* (§ 12.) should be treated in the manner advised in the article **ACNE** (see § 23. *et seq.*), particularly for the *indurated* and *rosaceous varieties*, with which this form is often associated. Temperance; light mild diet; regular exercise; avoidance of stimulating and heating ingesta, especially hot spices, spirituous liquors, acescent vegetables, and fat meats; mild tonics and laxatives, with the alkaline subcarbonates; and frequent and very small doses of blue pill, or hydrargyrum cum cretâ, with taraxacum, &c.; constitute the most appropriate remedies. Astringent or other repellent washes are of use only at the commencement of the eruption. When it has become more diffused or chronic, it is not much affected by these applications; and if it were, the propriety of suppressing it by such means would be very questionable. When first appearing, the washes mentioned in the article **ACNE**, and a solution of borax in weak pyroligneous acid, are most useful. The severer forms of erythema, especially the shining, or œdematous, and the tuberculated, should be treated in the manner recommended for similar states of erysipelas; and the *regimen and diet* directed in that article ought to be adopted in this disorder.

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EXANTHEMATOUS DISEASES. — SYN. *Exanthemata*. Ἐξανθημα (from ἐξανθέω, I break forth, or effloresce). *Eruptive Fevers*, *Exanthems*.

CLASSIF. — 1. *Class*, Febrile Diseases; 3. *Order* (*Cullen*). 3. *Class*, Dis. of Sanguineous Functions; 3. *Order* (*Good*). The 3d *Order*, of *Willan* and *Bateman*. III. CLASS, III. ORDER (*Author*, in *Preface*).

1. DEFIN. — *Diseases usually arising from specific causes, and capable of perpetuating their kind; evincing, at their commencement, diminished vital power and function, followed by reaction throughout the vascular system; but expressed chiefly in the mucous surfaces and skin, especially in their earlier stages.*

2. The term ἐξάνθημα was employed by the ancients to signify any cutaneous eruption, whether acute or chronic, febrile or non-febrile; and a similar extension of its signification is very generally observable among medical writers until the commencement of the last century. The nosologists who wrote about the middle, or towards the close, of that century, either differed very remarkably as to the diseases which should be ranged under this order, or did not separate them from other febrile or inflammatory complaints. SAUVAGES, one of the earliest to make the distinction as to classification, placed the exanthemata as the *first order* of his *third class*, *Inflammations*; and comprised *plague*, *small-pox*, *pemphigus*, *measles*, *miliary fever*, *purpura*, *erysipelas*, *scarlatina*, *essera*, and *aphthæ*. — SAGAR arranged the same diseases into one *class*, which he divided into *two orders*, viz. *contagious* and *non-contagious* exanthemata; *miliary fever*, *erysipelas*, *essera*, and *aphthæ* constituting the latter order. — MACBRIDE made the exanthemata the fourth order of the *class*, *Fevers*; and omitted *purpura* and *essera*, on account of their non-febrile characters. — CULLEN added to the eruptive fevers of MACBRIDE's classification, *chicken-pox* and *nettle-rash*. — SELLE retained the more extended signification of the term, and distinguished *two orders* — the *acute* and *chronic*: the former embracing the diseases enumerated above; the latter, various chronic eruptions. — J. P. FRANK formed his *third class* of the exanthemata, and distinguished them into *two orders*: those with little elevation of the cuticle, as erysipelas, scarlatina, petechiæ, &c.; and those in which the skin is rendered scabrous, as variola, rubeola, &c. — PARR arranged them as the *first genus* under his *third order*, *Eruptions*; added *strophulus* and *achor* to those already mentioned; and made a distinction between those appearing epidemically, and those which never assume this form. — K. SPRENGEL comprised them in his *third book* or *class*; but, whilst he omitted plague, erysipelas, miliary fever, and aphthæ, he introduced *scabies* and *herpes*.

3. WILLAN and BATEMAN, in their artificial classification, restricted the term to *measles*, *scarlatina*, *urticaria*, *roseola*, *purpura*, and *erythema*; and Dr. GOOD extended it to the diseases admitted by SAUVAGES, with the addition of *urticaria*, *vaccinia*, and *yaws*. — RAYER, CAZENAVE, and SCHEDEL have merely substituted *erysipelas* for purpura, in modifying the arrangement of WILLAN. ALIBERT has enumerated in this, his *second group or order*, variola, vaccinia, clavus, varicella, nirlus, roseola, rubeola, scarlatina, and miliaria. Two of these he has introduced into this group for the first time — viz. *clavus* and *nirlus*. The former is a febrile exanthema peculiar to sheep, very contagious, and characterised by flat circular pustules, resembling nail-heads, which appear on the parts least covered with wool, and which, like variola and vaccinia, attacks only once during life. The nirlus — the nirles of Scotland, consists of distinct prominent papulæ, of a dull red colour, appearing after ephemeral fever, never suppurating, but terminating by absorption, or by desquamation. The febrile exanthemata formed the *third order* of the *third class*, in the outline published by me in 1822. — Lastly, Dr. WEATHERHEAD admits only rubeola, scarlatina, variola, vaccinia, varicella, and Frambœsia in his order of Exanthematici. — Other systematists, as VOGEL, PLOUCQUET, PINEL, and YOUNG, have not arranged the exanthems into a distinct group; but have classed them either with fevers or with inflammations. I have divided them into *two sub-orders*, viz. (*a*) those which attack the same person only once; and (*b*) those which may occur oftener than once; and have referred to a different order, such rashes, as erythema, roseola, and urticaria, as are chiefly sympathetic of disorder of the digestive organs.

4. There are various circumstances connected with all the diseases which I have classed as exanthematic, requiring to be constantly kept in mind by the practitioner: — 1st. They frequently prevail epidemically; — 2d. Different epidemics of the same malady often present very different or even opposite characters, chiefly as respects the state of vascular action, and of vital power and resistance; — 3d. The sporadic occurrences of the exanthemata are generally less severe or dangerous than their epidemic prevalence, although, occasionally, the latter is very mild; — 4th. Like all other febrile diseases, the severity of attack, the complications sometimes appearing in their course, and their terminations, depend in great measure upon the constitution and habit of body, upon pre-existing disorder; upon the occupation of, and other circumstances peculiar to, the individual; and upon the season of the year, and the treatment adopted at the invasion and in the early stages of the disease; — 5th. As these maladies, when once formed, run a determined course, a too perturbative treatment, or the *nimia medici diligentia*, particularly if misdirected or otherwise injudicious, may be more injurious than inactivity, or the unaided efforts of nature; — 6th. That we should protect vital organs from suffering injury, either from the reaction attending certain of their stages, or from the congestion

accompanying others of their periods; and, by endeavouring to interpret the procession of morbid phenomena aright, to follow where Nature points the way, and in the manner she indicates, in particular cases; in other words, that we should not treat the disease as a substantive, or entity, to which certain ideas are attached, but according to the actions, changes, and states presented at the commencement, and during the progress, of each case; — 7th. The advanced stages of, and convalescence from, the exanthemata require careful supervision; as, during the latter period, various affections are liable to supervene, that are sometimes more dangerous than the antecedent malady; — 8th. Opinions as to the result should generally be given with reservation, as sudden and unexpected changes may occur during their course, and during recovery, owing to moral and physical causes, over which the physician can often exercise no control.

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EXCRETION AND EXCRETIONS. — (Classif. Pathology — *Ætiology* — *Symptomatology*.)

1. Defin. — *Excretion is the separation of substances from the living body; and the secretions or substances separated are the fæcal parts of the ingesta, and the matters which have fulfilled their destined purposes in the frame; and which, being no longer suited to, or susceptible of, vital alliances, are eliminated from the blood in gaseous, vaporous, or liquid states; their discharge being necessary to the continuance of health, and being performed under the influence of life.*

2. A knowledge of the various functions excreting or eliminating effete matters from the blood, of the manner in which they are influenced by foreign agents, and of their mutual actions and reactions, is necessary to a philosophical and successful exercise of the healing art. The continued introduction of matters into the frame, and their temporary circulation and assimilation, is counterbalanced by a corresponding discharge; the substances received being, after indefinite periods, excreted in very different states of elementary combination. Matters are introduced into the frame almost entirely by the digestive and respiratory surfaces; they are discharged also by these surfaces, and by other channels almost exclusively appropriated to this function. I shall take a view, *first*, of the several excreting functions; and, *next*, of the manner in which their interruption or suppression affects each other, and disorders the vital actions.

3. The Excretions are either — (*a*) The Natural, or those which are ejected altogether from the body, as the fæces, urine, &c.; and which may be divided into — α. *exhaled*, as the transpirations from the skin and lungs; β. *secreted*, as the urine, &c.; and, γ. *fæcal*, consisting not only of exhaled and secreted fluids, but also of those parts of the ingesta which remain after the process of digestion is completed; — (*b*) The Morbid, or those — α. which are *imperfectly ejected* from the circulation, as the fatty matters which accumulate in situations where they do not materially interfere with the vital actions; and, β. the most remarkable *alterations from the healthy state* presented by, or attending, the excretions discharged by natural channels.

4. I. The Natural Excretions, the *excretions proper*, or *those matters which are ejected altogether from the body*. — A. *Exhaled Excretions.* — α. The *cutaneous transpiration*, whether in its more insensible states of aqueous vapour and carbonic acid, or in the form of sweat, is a most important evacuation. It consists chiefly of water, with oily matter, mucus, osmazome, lactic or acetic acid, and the salts usually found in the blood (Thenard, Berzelius, Anselmino, Tiedemann). When the large quantity of fluid discharged from the blood by this channel is considered, interruption or suppression of the function will manifestly appear most injurious; and calculated either to disorder other excreting functions, or, if these do not perform a compensating action, to induce febrile or inflammatory affections. The *causes* which chiefly affect this excretion are stated in the article Disease (§ 41. 101.).

5. The *quantity* of this evacuation may vary remarkably; and its *quality* may also change. — It is suppressed or much diminished in the early stages of febrile and inflammatory diseases, especially during the period of excitement; and is either restored or greatly increased as the excitement passes into exhaustion. When it becomes abundant, it is often a salutary crisis; unless in hectic fever, in hæmorrhage, or in acute diseases attended by sinking, and coldness of the surface. Copious perspiration accompanies healthy action and excitement, and then it is warm and general. It is most profuse in the advanced stage of consumption; and in some malignant diseases, as pestilential cholera, &c. It is sometimes fœtid, or contains more animal matters in solution than usual; and is at the same time more abundant, particularly in persons who are habitually costive, or who eat and drink largely or grossly; and still more so in the negro: in all whom, the suppression of the excretion is often followed by dangerous maladies. Profuse as well as offensive perspiration, particularly of the feet, also attends imperfect action of the liver or kidneys; whilst unusual heat and dryness of the feet, and of the palms of the hands, accompany chronic inflammation of these and other internal viscera. In *negroes* and the dark-skinned races, the integuments are a much more important organ of excretion than in the white variety — the perspiration, both sensible and insensible, of the former being very much more abundant, and containing more carbonic acid and animal matter, than that of the latter. I fully ascertained this fact by experiments made in Africa, in 1817; the cutaneous transpirations of the negro being from one fourth to nearly one half more abundant than that of the European. — Besides the matters usually found in it, the perspiration sometimes contains the colouring matter of the bile, or bile itself, especially in hepatic diseases and bilious fevers;

and, occasionally, minute quantities of urea and uric acid. It is very sensibly affected, particularly in costive habits, by the ingesta, especially some kinds of fish, and shellfish; the odour of these, and of numerous other articles, being very sensibly felt in this excretion.

6. *b. The Pulmonary Exhalation.*—*a.* The *carbonic acid gas* given out during respiration, is one of the most important excretions that takes place in the economy, whether this acid be formed within the blood-vessels, or in the air-cells, of the lungs; the quantity of it produced being an index of the extent to which the change from venous to arterial blood is carried in this organ. The evidence as to whether the carbonic acid is formed *within* the blood-vessels, or *without* them, is very contradictory. The experiments of Dr. **Edwards** show that the former process takes place to some extent; and they are supported by the fact observed by **Berzelius**, that blood, especially its colouring part, absorbs oxygen very quickly, and retains some part of the carbonic acid thereby produced. The passage of carbon from the vessels, and its combination with oxygen externally to them, is an inference from the experiments of Mr. **Ellis**; which, however, were performed out of the body, and under circumstances which entirely excluded the operation of the vital influence. The evidence, however, for the absorption of oxygen through the capillary parietes is nearly the same with that for the excretion of carbon; for, if the tissue intervening between the blood and the air will permit the transmission of the one, it may also allow the passage of the other. I am inclined to think that both operations go on simultaneously: that, whilst a portion of the carbonic acid gas is given out from the blood, it is accompanied with a portion of free carbon, or oxide or hydrate of carbon, which combines with an additional quantity of oxygen in the lungs, and thus forms the whole of the carbonic acid in question; and that, at the same time, a portion of oxygen is absorbed, which combines with a portion of carbon in the blood; and there forms the carbonic acid, or the oxide of carbon, which is a part of the matters discharged from the blood in the lungs. These processes may vary, and either may predominate, according to the state of vital influence at the time, under whose control they are placed. This view is supported by the experiments of Dr. **Edwards**, which show that the carbonic acid is not formed instantaneously in the lungs; but is, to a considerable extent, secreted from the blood in the respiratory surfaces. Nor is it contradicted by the experiments of MM. **Magendie** and **Orfila**; who found that phosphorus, dissolved in oil, and injected into the blood, was secreted by the lungs in the form of phosphorous acid vapour.

7. However formed, it is obvious that the carbonic acid should be viewed as an excretion from the blood, the combination of the carbon with the oxygen being the principal source of animal heat. The quantity of the gas thus excreted, necessarily varies with the size of the thorax, the activity of the circulation, the state of nervous energy, and the condition of the excreting organ. Dr. **Crawford** first found the quantity of the carbonic acid discharged, much diminished in a high temperature; and **Lavoisier**, **Seguin**, **Prout**, **Fyfe**, and myself confirmed the observation. In the experiments I made in an artificial high temperature in this country, and in nearly the same temperature in a hot climate, the diminution was very remarkable, more especially in the latter circumstances; the humid and miasmatous air of an unhealthy intertropical country depressing vital and nervous power, and thereby diminishing still further this important function.

8. *β.* Other gases are exhaled from the lungs, as shown by the experiments of **Nysten** and **Edwards**. The former found that, when these are injected into veins, they pass out with the expired air; and the latter concludes that azote, absorbed into the blood, is discharged from it by the lungs. It is probable, however, that a considerable portion of the azote which passes into the circulation during respiration, combines with the chyle, and contributes to its complete animalisation; the ultimate product being urea, which is excreted by the kidneys. From experiments I performed many years since (*Lond. Med. and Physical Journ.* vol. xlvi. p. 107. 185.), I inferred that numerous substances, as camphor, spirits of turpentine, several essential oils, spirits, æthers, &c., when absorbed or otherwise introduced into the circulation, are discharged from it chiefly by the lungs. Spirituous liquors, taken largely, pass off in great part through this channel — at least, their more volatile portions.

9. *γ.* The *aqueous vapour* constantly *transpiring* from the lungs is often a most important evacuation. It is slightly charged with animal matter; and proceeds chiefly from the blood in the pulmonary artery. Its quantity varies very much. **Lavoisier**, **Seguin**, and **Thomson** estimate it at about twenty ounces in the twenty-four hours: but it is increased much above this, by the free use of diluents, and malt or spirituous liquors, particularly the last; or by whatever increases vascular plethora. Diminished excretion by either the skin, kidneys, or intestines, also augments it; and, in these circumstances, it contains more animal or effete matters, to which, chiefly, is owing the fœtor of the breath so often remarked; the lungs, in these cases, compensating in some measure for the interruption of the other excreting actions. The circumstance of various substances, that are absorbed into the circulation, being eliminated from it, along with the pulmonary transpiration, explains their influence in diseases of the air-passages, and their action in promoting expectoration. The morbid conditions of these passages, especially such as impede the functions of transpiration —whether gaseous or vaporous — must necessarily influence the other excreting actions, particularly those of the skin, of the liver, and the intestinal canal. Hence the advantages, in such cases, resulting from the remedies which promote those evacuations, and restore the pulmonary functions.

10. *e.* The *Catamenial* or *Menstrual Discharge* may be considered as an excretion, most salutary in its effects in most instances. It diminishes both local and general plethora; and it sometimes seems to be the channel by which morbid states of the circulating fluid are removed. In such cases, the discharge is offensive, or altered in colour; and, occasionally, it induces irritation or excoriation of the parts over which it passes, or with which it remains a short time in contact; the cutaneous surface and countenance being

clearer, and the health improved, after such evacuations, particularly when copious, and when the indications they furnish are properly followed. The *lochia* is also a salutary excretion, inasmuch as vascular fulness and local determinations are obviated by it, and the circulating fluid rendered more pure. (See PUERPERAL STATES.)

11. *B. The Secreted Excretions.* — *a.* The *biliary secretion* is *excrementitial* as well as recrementitial; the liver manifestly compensating for the deficient excreting action of the lungs — as was first shown by me in 1815 — and combining a portion of the carbon, and other matters usually discharged from the lungs, into bile, preliminary to their excretion, as well as for the purposes of digestion; that portion of carbon, which does not combine with oxygen to form carbonic acid, being associated with the other constituents of bile in the formation of this fluid. Hence the abundant secretion of bile in circumstances which diminish the activity of the respiratory functions, as in warm moist states of the air, &c.

12. *b.* The *Urinary Excretion.* — MM. DUMAS, PREVOST, and SEGALAS, found, on examining the blood of living animals whose kidneys had been extirpated, that it contained *urea*, the quantity of which was increased according to the duration of life after the operation; and that this substance could not be detected in the blood of those animals in which the urinary secretion was interrupted. M. SEGALAS, having injected an aqueous solution of urea into the veins, observed the secretion of urine rapidly increased by it, and this substance so quickly eliminated in the process, that, after twenty-four hours, it could not be detected in the blood. It seems, therefore, not improbable that the effete and more highly animalised matters absorbed and carried into the circulation, are converted, by the influence of the vessels and organs through which they circulate, into the substance called urea; and that one of the functions of the kidneys is to eliminate it from the circulation. These experiments favour the conclusion that urea is not formed, or at least altogether formed, in the kidneys, by their appropriate actions; but that it, and probably other substances which are removed by these organs, exist in the blood, either already formed, or in certain stages of formation.

13. According to BERZELIUS's analysis, the urine contains, in its healthy state, somewhat more than 30 parts in 1000 of urea; and Dr. PROUT has shown that nearly one half of urea consists of azote. It consequently follows that the injurious accumulation of azote in the system, contingent either on assimilation or respiration, and the resulting putrefactive tendency of the fluids, are prevented by the action of the kidneys. Hence we observe the great proportion of urea in the urine of those who eat much animal food, in which nitrogen abounds; and we may therefore conclude, that the kidneys are the great outlet for azote, as the lungs and liver are for carbon.

14. *C. The Fæcal Excretions.* — *a.* In their course through the small intestines, the alimentary matters are deprived of their chyle; the residue being poured into the cæcum, where its course is more slow, and where it assumes new characters. The contents of the colon and rectum evidently consist — 1st, of the residue of the aliments; and, 2d, of the excrementitial parts of the secretions poured into the digestive canal. These constitute the fæces. It is, in some measure, owing to the quantity and properties of these latter, especially the biliary and follicular secretions, that the fæces present distinctive characters; their *consistence* depending upon their retention in the large bowel, and upon the quantity of exhaled and secreted fluids poured out in this, and the superior portions of the canal. Their *colour* is owing — 1st, to the abundance and properties of the bile, or to its suppression; 2d, to the fluids poured into the digestive tube; 3d, to acidity in some portion of the prima via; 4th, to the food and drink; and, 5th, to the properties of medicinal substances. A careful consideration of each of these is necessary, in estimating aright the indications furnished by the fæcal discharges. The *odour* of the fæces depends chiefly upon the secretion of the mucous follicles, particularly those of the cæcum, colon, and rectum; upon the states of constitutional and vital power, in connection with vascular action, and the conditions of the digestive canal; and upon their retention in the large bowels: an offensive or unnatural odour of the fæces generally proceeding from depressed vital energy, or long retention, and the extrication or secretion of gases in the intestinal canal.

15. II. MORBID EXCRETIONS. — *A. The Fatty Excretions* consist of the secretion of fat — 1st, in cellular parts; 2d, in the alimentary canal; 3d, by the kidneys; and, 4th, by the stomach. — *a.* I have stated in the article ADIPOSE TISSUE (§ 3.), in how far the excessive secretion of fat may be considered as a salutary excretion, in the circumstances which usually give rise to it; the excess of oily or fatty matter in the blood, consequent upon imperfect sanguifaction and assimilation, being deposited principally in the areolæ of the cellular tissue, whence it may be taken up by the absorbents for the purposes of nutrition, when the supply of food becomes deficient.

16. *b.* In some states, chiefly of disease, fatty substances are excreted *from the intestinal canal*, in a solid, semifluid, or liquid form.—1st. In some cases, the fat seems to be absorbed from the adipose tissue, carried into the circulation, and secreted or exhaled from the intestinal mucous surface; whence it is excreted of various consistence, according to the preponderance of certain of its elements, or to its combination with mucus or with an acid in the bowels.—2d. It may also proceed from an undue accumulation, owing to imperfect assimilation, of oily matter in the blood; which is excreted in this situation, instead of being secreted in the adipose cellular tissue: and, 3d. In those instances, where the fatty substance consists of small solid pieces, and resembles or approaches adipocire or cholesterine, it may be secreted in the liver. Cases of this morbid excretion are comparatively rare; but I am convinced that they would be much more frequently observed, if the alvine evacuations were more attentively examined than they generally are. I have met with only two cases; but several have been lately observed by Dr. ELLIOTSON, Dr. BRIGHT, and Mr. LLOYD. It should, however, be borne in mind, that olive and castor oils, in passing through the digestive canal, are some-

times so altered by combining with mucus, or with morbid secretions, as to assume a solid and fatty appearance; and that persons who eat largely of fat meats, occasionally pass portions of undigested fat, in either a fluid or consistent state.—In the cases recorded by MOEBIUS, MOELLENBROCK (*Ephem. Med. Phys. Germ. Curios.* dec. i. cen. 2. obs. 20.), and FABRICIUS HILDANUS (*Obs. et Curat. Med. Chirurg.* cent. iv. obs. 47.), emaciation appears to have been a prominent symptom; indicating the probable origin of the discharge in the rapid absorption of fat from the adipose tissue. Instances of fat voided from the bowels in large quantities are adduced also by TULPIUS (*Observ. Med.* Amst. 1685.), ARNOT (*Edin. Med. Essays*, vol. v. part ii. p. 652.), SCOTT (*Edin. Med. Comment*, vol. iv. p. 334.), BABINGTON (*Philos. Trans.* for 1813. part ii. p. 150.), Mr. HOWSHIP (*Pract. Observat. in Surgery and Morb. Anat.* p. 283.), CULLERIER, EASTCOTT (*Med. Gaz.* vol. xii. p. 49.), and Dr. TURNER (*Trans. of Med. and Chir. Soc.* vol. xviii. p. 73.).

17. In the first case detailed by Dr. ELLIOTSON (*Trans. of Med. and Chir. Soc.* vol. xviii. p. 76.), the fatty matter discharged was fluid, of a yellow colour, concreted when cold, and burnt with a large flame, like oil. It was generally evacuated with the fæces, in large quantity; and occasionally it ran from the patient involuntarily. The discharge was preceded by bloody stools, was continued for several months, was attended by great pain, and was associated with phthisis and mellitic diabetes; pus being thus evacuated from the lungs, saccharine urine from the kidneys, and fat from the bowels, at the same time. On *dissection*, all the intestines appeared greasy, as if soaked in oil, with numerous black points in their mucous membrane; but there was no other lesion in them. The liver was healthy, and the gall-bladder full of thick dark bile. The pancreatic duct, and large lateral branches, were filled with white calculi. The kidneys were sound, the lungs tuberculated and ulcerated. In the second case adduced by Dr. ELLIOTSON, the fat was discharged in both a solid and fluid state. The patient died of this complaint and phthisis. No disease was discernible after death, in the alimentary canal or urinary organs. The liver was large and pale, but healthy in structure; and, with the gall-bladder, destitute of bile. Dr. PROUT (*Ibid.* p. 79.) saw a young lady, who voided, "for many months before death, fatty matter in large quantities, mixed with blood and other things." The cæcum was found thickened; and the mucous coat of it and of the colon was ulcerated. The other abdominal viscera were healthy.

18. In the first of the cases detailed by Dr. BRIGHT (*Trans. of Med. and Chirurg. Soc.* vol. xviii. p. 3.), the fatty matter was observed in the stools, in the course of diabetes, on which jaundice had supervened from obliteration of the common bile-duct, caused by disease of the pancreas, with malignant ulceration of the duodenum. The second instance of this kind of excretion recorded by this physician was remarked during jaundice caused also by obliteration of the common bile-duct, owing to disease of the pancreas and malignant ulceration of the duodenum. In the third case, a nearly similar association of morbid phenomena, and of organic lesions, to those characterising the second, was observed. In the case detailed by Mr. LLOYD (*Ibid.* p. 57.), the excretion of fat in the stools was remarked in the course of jaundice caused by enlarged pancreas; the gall-bladder and hepatic ducts being greatly distended with bile, and the common and pancreatic ducts obliterated.

19. I was recently called to a married female of about forty, who had never been pregnant, and who complained of symptoms which I attributed at first to the passage of gall-stones along the ducts, and afterwards to a concretion in the bowels. Upon examining the evacuations, with the expectation of detecting something of this kind, two lumps were found, the largest of which was above the size of a walnut. They were of a whitish colour, with a slight greyish green tinge, were greasy to the touch, imparted a permanent greasy stain to paper, resembled adipocire in consistence, and burned with a whitish blue flame and much smoke. After their evacuation, much relief was procured, and the opportunities of examining the evacuations ceased; but the patient, who occasionally calls at my house for advice, still complains of disorder of the digestive organs, particularly of the liver and bowels. In the autumn of 1833, I saw, through the kindness of Dr. O'DONNELL, a most able physician in Liverpool, a lady who had long suffered chronic disease of the bowels, particularly of the large bowels. The evacuations, which were fluid, contained a number of small lumps, varying from the size of a split pea to that of a bean; but presenting all the characters just described.

20. *b.* The excretion of fatty matter by the *urinary organs* is more rare.—Dr. PROUT, in a communication to Dr. ELLIOTSON, states, that he has seen, several times, a fatty or adipocirous matter voided with the urine; and that, in every instance, malignant disease of the kidney or bladder has supervened, and ultimately proved fatal. TULPIUS mentions a case of an old woman who *voided fat from both the bowels and bladder*, and died remarkably emaciated. Mr. PEARSON, in Dr. ELLIOTSON's interesting paper, details the case of a lady of seventy-nine, who, after suffering from gall-stones, observed in her stools, which were without bile, a fatty substance, that passed in the form of oil, but quickly concreted; and in her urine a similar oil, which floated on its surface, and concreted like that passed from the intestines. The quantity excreted by the bowels averaged an ounce and a half daily; and by the urinary organs, about the third of an ounce. The patient died emaciated, but no inspection was allowed.

21. *c.* A case is given, in the *Medico-Chirurgical Review* for July, 1826, from the *Annali Universali*, of a man who, after irregularities of diet, was seized with vomiting every week or fortnight, for two years. During an unusually severe attack, occasioned by great imprudence in diet, a quantity of pure blood, and a thick oil, or melted fat, were thrown up; amounting in all to thirty pounds in twenty-four hours: He nearly sunk; and his skin hung in folds, as though all the fat had been absorbed. After some time he was restored to health. It is reasonably supposed that his fat had been rapidly absorbed during the attack of vomiting, and

poured into the stomach. Diemerbroeck (*Observ. et Curat. Med. Cent.* obs. 93.) minutely details the case of a female of twenty-seven years of age, who was long afflicted by violent gastrodynia, and obstinate vomiting of a black fluid containing lumps of fat of the colour and consistence of butter. The bowels were costive; but the uterine, biliary, and urinary functions were not deranged. She was ultimately cured by cathartics, enemata, and cordial anodynes. Instances of the ejection of fatty matters from the stomach, after prolonged or repeated vomiting, and without the possibility of a foreign origin, are recorded also in the *Philosophical Transactions* (for 1673, No. 96.), and by Gesner (*Beobachtungen*, b. i. No. 10.), Gourrand (*Journ. de Méd.* t. lxxxv. p. 366.), and J. P. Frank (*De Cur. Hom. Morb.* l. v. pars. ii. p. 370.)

22. From a consideration of the circumstances attending the excretion of fatty matter from the digestive and urinary organs, in the cases now referred to, the inference that it takes place in one or other of the three modes already stated (§ 16.), according to the nature of the disease in the course of which it supervenes, seems to be well founded. The fact, that the milk-like state of the serum of the blood, so often observed, depends upon the admixture of animal oil or fat in it, remarkably favours the inference as to the first and second of these sources of the fat found in the excretions. The opinion entertained by Sir E. Home (*Philos. Trans.* 1813, part ii. p. 150.), and attempted to be proved by experiments, that the fat is formed in the lower intestines by means of bile, is disproved by the cases recorded by Dr. Bright and Mr. Lloyd. The passage of bile into the digestive canal was completely prevented in all these. But the inference, that imperfect digestion and assimilation, and the consequent formation of oil in the blood, or the absorption of it from the adipose tissue into the circulation, and its excretion from the blood by the bowels, are the true source of this phenomenon, is fully evinced by the history of these, as well as of the other cases. The presence of oil in the urine, remarked in rare instances, is a further proof of the origin now contended for. There is strong reason to believe that the excretion of superabundant oil in the blood takes place much more frequently than is supposed, by this latter channel. Hippocrates, Galen, Prosper Alpinus, and several other writers, noticed it as an unfavourable occurrence, and not incorrectly considered it as a symptom of colliquation.

23. *B. The most remarkable changes presented by the excretions through natural channels* are described in the articles Blood (§ 115. *et seq.*), and Disease (§ 99. *et seq.*), and in the numerous articles on diseases in which the excretions are early or principally affected. The more isolated and prominent of them only will therefore be noticed at this place. — *a.* The *fæcal excretions* are either diminished or increased, or otherwise changed; alterations of these being generally connected with disorder of the hepatic organs. Obstructed or diminished discharge of bile, arising either from torpor of the liver, from congestion, or from obstruction of the ducts, &c., deranges not only the intestinal functions and excretions, rendering the latter pale and offensive, but also the digestive and assimilative actions, the urinary and perspiratory functions, and the conditions of the nervous system, occasionally terminating in coma and death; especially when the bile has been taken into the circulation, and has coloured the tissues and exhaled fluids. The bile may be so altered in colour and consistence, owing either to the superabundance of certain of its elements in the blood, or to its remora in the ducts and gall-bladder, and to the consequent changes, as to impart to the fæces a very dark green or almost black colour, even independently of the exhalation of blood in the prima via. I have remarked this uncommon state of the fæcal discharges chiefly in diseases impeding respiration, as asthma, bronchitis, hydrothorax, and chronic affections of the liver. A black appearance of the alvine excretions is, however, more frequently produced by the escape of blood into the upper portions of the alimentary tube; but upon diluting or mixing the evacuation with water, a greenish hue will be assumed in the former case, and a reddish or ochry tint in the latter. The remarkably copious, rice-coloured, watery evacuations in pestilential cholera, are attended with an albuminous coating of the intestinal mucous surface; the serum of the blood having exuded from this surface, owing to deficient vital power of this part, and of the frame generally, and to a morbid state (dyscrasy) of the blood itself; its albumen partially concreting on, and adhering to, this surface, as proved by the examination of bodies, in which treatment had not removed it previously to dissolution. The fæcal excretions are more or less altered in most diseases; but it would lead to repetitions to pursue the subject further at this place. The excretion of gaseous matters from the alimentary canal is considered in the article Flatulence.

24. *b.* The *urinary excretion* varies in quantity, influenced by the interruption or abundance — 1st, of the respiratory exhalation; 2d, of the cutaneous transpiration; 3d, of the intestinal exhalations: copious discharges from one or more of these surfaces diminishing this excretion, and opposite states increasing it. The urine may also contain various foreign matters, or certain of its usual constituents in excess; but generally as a consequence of disease. It contains much gelatine and urea, in *typhoid* or *adynamic fevers*; much albumen and phosphate of lime, in *rickets*; much urea or lithic acid, in *dyspeptic affections* and gout; and much saccharine matter, in diabetes. In *inflammatory fevers*, the urine is red, deep-coloured, or even a deep brown, and transparent, until a crisis occurs; when it becomes more copious, and deposits the lateritious sediment, which is of a reddish colour, and consists of phosphate of lime, lithic acid, sometimes lithate of ammonia, and animal matter, with lithate of soda, and purpurates of ammonia and soda, according to Dr. Prout. In *intermittents*, it varies with the stage of the paroxysm; but, after the seizure, it deposits a red powder, consisting of rosacic acid. In *gout* and *rheumatism*, it contains much lithic acid. In *hysteria*, it is copious, of a pale colour, is deficient in urea and animal matter, and abounds with the usual salts. In *jaundice*, and other diseases interrupting the functions of the liver, the urine presents a brown or muddy appearance, or contains bile; the kidneys having to a certain extent assumed an office vicarious of that of the liver. In

bilious remittent fevers, it often possesses a similar character. In *dropsies*, it is sometimes yellowish green and extremely viscid. It generally deposits a copious sediment of rosacic acid, lithic acid, phosphate of lime, and animal matter; and in acute dropsy is frequently so loaded with albumen as to coagulate when heated, or when sulphuric or nitric acid is added to it.

25. In all *inflammatory diseases*, the urine is small in quantity and high-coloured, and contains acids in excess; but in *disorders of irritation* or *debility*, it is generally pale, in large quantity, and abounds in neutral saline, or alkaline substances. *Blood* is sometimes found in the urine; and the inky or black colour it presents on rare occasions, most probably is caused by the passage of the colouring matter of the blood along with it from the kidneys, and by the action of the salts contained in it. Dr. MARCET ascribed this colour to a particular acid, which he called the melanic. In a few cases, the urine assumes an almost gelatinous state shortly after it is voided. I met with an instance of this kind in an advanced stage of pregnancy; severe pains in the loins and sickness being complained of. Antiphlogistic treatment removed it. *Mucus* and *puriform* matters are also seen in the urine, during and after irritation, or inflammatory diseases, of the kidneys, bladder, or prostate gland. (See KIDNEYS, and URINE.)

26. *c. Vicarious excretion* is of frequent occurrence in several diseases; and takes place to a certain extent even in health; causes which merely diminish excretion in one part, increasing it in others, without manifest disorder ensuing. But no excretion can ever be long, or much interrupted, without disease supervening; the increased function, which supplies its place for a while, itself sooner or later passing into disorder of a more or less acute kind and dangerous character. The perspiratory and respiratory exhalations are seldom altogether suppressed; but when they are interrupted, one or two things generally ensue: — 1st. When the vital powers are not materially depressed, nor any organ disposed to disease, the actions of the kidneys, of the liver, and bowels, are individually or conjointly increased, so as to compensate for the interruption of either of these exhalations; — 2d. If such compensation does not take place, or if some organ is disposed to disorder, the vascular system is overloaded by the consequent augmentation of the serous parts of the blood, or irritated by the retention of matters requiring to be excreted; and the predisposed organ becomes congested or inflamed; fevers, inflammations, &c. supervening, according to individual predisposition and concurrent causes.

27. *d. Interruption or suppression of the urinary function* is one of the most serious occurrences to which the frame is liable, and the least admits of being replaced even for a time by other excretions. Yet a compensation sometimes takes place to an extent preservative of life, for several days, or until suppression is removed. In such cases, the exhalations from the lungs, the cutaneous transpiration, and the actions of the alimentary canal, are individually or conjointly increased, so as to supply the deficiency; and the urinous or ammoniacal fœtor of the breath and perspiration often indicates that the excretion of urea and other injurious matters is effected chiefly by the cutaneous and pulmonary surfaces. In some instances, a urinous fluid, or rather fluid containing urea and the salts usually found in the urine, is exhaled in considerable quantity during the repeated or prolonged vomiting that often attends disease of the kidneys with suppression of urine; and, in other instances, the intestinal discharges become watery, urinous, and abundant. When the suppression is complete, much more serious results follow: a *urinous species of fever* supervenes, owing to the retention in the blood of an excess of serum holding alkaline and highly azotised salts in solution, and to the actions of other excreting organs being insufficient to compensate for the suppression. In such instances, the pulse is accelerated, large, full, and oppressed; the perspiration copious and offensive; the soft solids and muscles flaccid; the bowels irregular or relaxed, and the stools morbid and fœtid; the countenance and cutaneous surface foul or lurid; and the fœtor of the patient's apartment often remarkable. These cases generally terminate in coma, or sudden death, with or without convulsions, owing to the influence of the impure blood on the brain; and in effusion into serous cavities: but similar terminations of interrupted urinary excretion sometimes take place without antecedent urinous fever. In a very hopeless case of this form of fever, in the cook of a friend's family, the secretion of urine, which had been suppressed entirely for several days, was restored by cupping repeatedly on the loins, and by diuretics, purgatives, and deobstruents. The abundance and fœtor of the exhalations from the lungs and skin were very great in this case.

28. *e. Interruption of the biliary excretion* may continue for a long time without a fatal result; but whether the secretion be suppressed, or the discharge of it into the intestines prevented, serious consequences usually ensue, although the bile may not pass or be absorbed into the circulation. If the secretion does not proceed, the other excretions become morbid, particularly the fæcal and urinary; the breath and perspiration are offensive; the skin sallow or lurid; digestion and assimilation are interrupted; and, in the process of eliminating those matters from the blood, by which the organs are irritated, additional disease is excited, and complications induced. Thus the alimentary canal, lungs, kidneys, as well as the liver, often become affected. Even when bile is secreted, its discharge being prevented by obstruction of the ducts, the part of it which passes into the circulation is frequently so far removed by the kidneys and skin as to prevent, for a considerable time, any change in the blood sufficient to destroy life. (See DISEASE, § 162. 168.)

29. *f. Protracted or frequent interruption of the fæcal excretions* are generally in some degree compensated by an increase of the cutaneous and pulmonary exhalations and of the urine, and serious effects are thereby prevented for a time. These vicarious excretions are generally very offensive, owing to the quantity of effete animal matter carried off in the exhaled vapour; and they not infrequently excite dangerous disease of the organs by which they are principally effected. In a case of stricture of the transverse colon, at present under my care, with nearly complete

matter is yellow, whitish yellow, yellowish green, or reddish yellow; presents all the characters of pure pus, excepting in the intervals when the more scanty sputa is generally mixed with mucus; and ultimately becomes more offensive, and assumes deeper shades of colour. I lately attended a case where abscess formed in the substance of the right lung presented these well-defined characters; yet the patient never coughed during its formation — although it was so large as to bulge out the right side of the thorax — nor until the time of its bursting into the bronchi.

11. *D.* The appearance of fine, white streaks; or the presence of *whitish*, or *whitish yellow*, *small masses*, like boiled rice, in a mucous or muco-puriform sputa, generally indicates the softening of tubercles: but the earlier and more advanced stages of phthisis are attended by the very varying state of the expectoration described in the article on that malady. *Sabulous*, *calculous*, or *earthy matters* are sometimes expectorated in certain states of pulmonary or phthisical disease; but these matters do not indicate the most dangerous forms: for I have known several cases where recovery took place after their discharge. The presence of *hydatids* in the expectoration is very rare. — Substances that are swallowed, are sometimes coughed up from the trachea, through an ulcerated communication formed between it and the œsophagus. Zeviani records a case of this kind; and one was, a few years since, attended by Mr. Byam and myself. The various modifications of the expectoration, during the progress of pulmonary diseases, are minutely described in the articles Bronchi, Hæmorrhage, Lungs, and Tubercular Consumption; and the indications derived from this source are there duly pointed out.

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EYE, DISEASES OF THE.—Syn. Ὀφθαλμός. *Oculus*. *Dus Auge*, Germ. *Œil*, Fr. *Occhio*, Ital.

Classif. Special Pathology — Morbid Structures.

1. The progress of knowledge, in respect of diseases of the eye, has been very remarkable since the end of the last century; owing chiefly to the researches and writings of Beer, Schmidt, Himly, Scarpa, Benedict, Demours, Edmondston, Vetch, Wardrop, Weller, Travers, Guthrie, Mackenzie, and Lawrence. In the account that will be here given of these diseases, those only which are inflammatory, and consequent upon inflammation, will be considered. Functional disorders are treated of in separate articles. (See Amaurosis, Sight, &c.) The order in which these maladies will be discussed, will differ but little from that adopted in the truly valuable works of Mr. Lawrence and Mr. Mackenzie; to which I have much pleasure in stating my obligations. —The latter of these writers, and J. Frank, treat first of the diseases of the eyelids and lachrymal apparatus, and next of the eye itself. Mr. Lawrence enters at once upon the consideration of the inflammatory diseases of the tissues of the eye-ball, and concludes his classical production with those of the appendages. Either arrangement is unexceptionable; but I shall follow the latter, merely as being more congruous with the medical view of the subject, to which I shall chiefly confine myself. The surgical treatment of such of those diseases as require it, must be studied in the works now referred to, or in Mr. Cooper's *Surgical Dictionary*. I shall, therefore, *first* treat of inflammations affecting the external coats of the eye, and *afterwards* of those attacking the internal tissues of the organ.

I. Inflammations of the Eye. — Syn. *Ophthalmia*; *Lippitudo*, Celsus; *Augenentzündung*, Germ.; *Ophthalmie*, Fr.; *Ottalmia*, Ital.

Classif. — 1. *Class*, 2. *Order* (*Cullen*). 3. *Class*, 2. *Order* (*Good*). III. Class, I. Order (*Author*).

2. Defin. — *Pain in one or both eyes, with vascular injection of one or more of their constituent tissues, and constitutional disorder.*

3. Inflammations of the eye are of various grades and kinds: they commence in any one of the different tissues forming the organ; and they are thus limited more or less, and for a longer or shorter period of their course, according to the temperament, habit of body, and diathesis of the patient; to the state of predisposition, and the nature of the exciting causes; and to the treatment adopted. Before considering separately the different varieties of ophthalmia, I shall *first* take a general view of their *causes*; and *next* of the numerous *forms* they present, owing to the varied concurrence of predisposing and exciting causes.

4. i. Causes. — *A.* The *predisposing causes* of inflammation of the eye are nearly the same as those of inflammatory diseases of other organs.— (*a*) *Temperament*, *idiosyncrasy*, and consequently *hereditary disposition*, evidently favour its occurrence. The colour of the eye has apparently but little influence, for Dr. Smith found the relative proportion of cases in light eyes nearly the same as in dark eyes. — (*b*) *Morbid diathesis*, especially the *scrofulous*, has the most remarkable effect, and next the *gouty* and *rheumatic*. These not only dispose to, but also modify, the disease and its consequences, and require for it appropriate modes of treatment. — (*c*) It is difficult to determine how far *age* and *sex* have any influence; but advanced age certainly favours the supervention of chronic inflammation of this organ. — (*d*) *Climate* has a much more manifest effect. The excessive cold, and reflected light, in hyperborean regions; and the great warmth, dryness, and reflected heat of some countries, especially Egypt, Arabia, &c., heightened by the quantity of fine dust floating in the atmosphere; not only predispose to, but excite, ophthalmia. — (*e*) Great *exertion of the eyes* occasions disease of

them; but chiefly when aided by too full living, by the use of stimulating liquors, and by an improper management of light, in respect both of the object on which the sight is exerted, and of the eye itself. — (*f*) Various *occupations*, consequently, are very liable to ophthalmia; as engraving, watchmaking, wool-sorting, and the manufacture of minute objects. — (*g*) The *suppression of accustomed discharges*, as of the catamenia and hæmorrhoids, and an impeded return of blood from the head, favour the supervention of inflammation of this organ, by occasioning cerebral congestion.— (*h*) A *plethoric habit*, and particularly *fulness of blood in the head*, are very common predisposing causes; and often exist in connection with the preceding.—(*i*) *Impaired constitutional power* is most influential, especially during convalescence from exanthematous diseases. — (*k*) An unhealthy or *cachectic state*, owing to impaired digestive, assimilative, and excreting functions, has also a most marked effect, and is often further associated with local or general plethora; particularly in those addicted to spirituous or fermented liquors, or who lead a sedentary and indolent life, or live in close, smoky, crowded, and unhealthy situations, or are subjected to anxiety of mind and other depressing passions. — (*l*) *Too full or rich living*, *errors in diet*, and the inordinate indulgence of the appetites, frequently predispose to ophthalmia by inducing plethora, and consecutively hepatic and cerebral congestions, imperfect secretion and excretion, torpor of the biliary and intestinal functions, and ultimately a morbid state of the circulating fluids and disordered vascular action. — (*m*) *Inordinate indulgence of the sexual propensities* has often a powerful influence, especially in connection with any of the preceding causes; the eyes sympathising remarkably with the generative organs.

5. *B*. The *exciting causes* of ophthalmia are numerous and diversified. Injuries inflicted on the eye, its appendages, or parts adjoining; wounds of a filament of the ophthalmic branches of the fifth pair of nerves; carious teeth; the presence of dust, or minute foreign bodies, between the surface of the globe and the eyelids; the irritation produced by acrid, stimulating, or chemical bodies, whether in the form of powder, fumes, or vapours; stimulating, acrid, or caustic applications to the organ; operations on the eye, or on adjoining parts; the introduction of contagious secretions, as the gonorrhœal discharge, or the matter of purulent ophthalmia; excessive exertion of the eyes, especially with artificial light, at late hours, or with the head held low, and on bright or minute objects; an impure, smoky, or fuliginous atmosphere, particularly in manufacturing towns, crowded and close streets, confined dwellings, poor-houses, hospitals, and the low cabins of the peasantry; the fogs of large cities, which prevent the smoke and vapours from rising in the atmosphere, and from being otherwise dissipated; exposure of the eyes to cold, or to currents of air; riding in an open carriage, or in a close carriage with the face to the horses and the carriage windows open; and too full living, or the abuse of intoxicating liquors; are the most common causes of ophthalmic inflammations. The eyes, moreover, participate with other parts, frequently in a very remarkable degree, in the inflammatory state characterising the exanthemata; and hence certain specific forms of ophthalmia hereafter to be noticed.

6. The modes in which these causes act are sufficiently obvious: but there are one or two that require a more particular notice. *Exposure to light* is injurious — 1st, by its sudden or powerful impression; 2dly, by its combination with heat, as in glass-houses, founderies, forges, &c.; and, 3dly, by being reflected or refracted. Owing to this last circumstance, certain colours, especially red and orange, or the simultaneous impression of a variety of colours, or their rapid succession, irritate the eyes in a very remarkable manner. The reflected light from snow has also a very great effect; and from which the Tartars protect themselves by wearing spectacles of closely netted black horsehair; and the Esquimaux by an excavated piece of light wood, with a narrow slit corresponding with the fissure between the eyelids, and blackened on the inner or concave surface. Reflected light attended by high temperature is equally injurious. The glare from the white chalky roads in some parts during summer, and from the white houses and sandy surfaces of some warm countries, is a very frequent cause of ophthalmia. Another and a hitherto unrecognised cause, particularly of inflammation of the internal tunics, is reading, writing, or otherwise exerting the eyes, by the light refracted by ground glass shades placed around the flame of lamps used for illuminating rooms. About fifteen years ago, I was affected with slight inflammation of the internal tunics of the eye; but having fully ascertained its cause to have been the use of a table-lamp of this description, it soon subsided upon adopting suitable treatment and a different kind of light. I have since had no return of the disease, although I have continued for many years to read or write from eight o'clock in the evening till two or three in the morning.* The intimate vascular and nervous connection of the eye with the brain causes it to participate in several of the inflammatory states of the latter. Hence those causes which excite increased vascular action, or congestions, in the brain or its membranes, both predispose to and excite similar affections of the eye, especially of its internal tunics. In a perfectly healthy state of the system, a single exciting cause seldom occasions the disease, unless its operation be long continued, or very intense. It is the co-operation of two or more causes, or the action of several in quick succession, that is most injurious. But when the system is rendered susceptible of their impression, by the prolonged or continued influence of the predisposing agents, either of the more immediate causes, although acting singly, will frequently take effect.

7. ii. THE VARIETIES AND FORMS which inflammation of the eye presents, are very diversified. The severity or *acuteness* of the symptoms,

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* I write, and generally read, at a desk placed sufficiently high to prevent the head from being held low; and use two lamps with single wicks, the flames of which are equal to two large wax candles, and which are raised so high that the eyebrows and eyelids completely shade the eyeballs from the light. These are fed with the finest sperm oil; and, the flame being duly adjusted, they burn eight hours, without any diminution of their light, and without requiring to be once touched. The chief advantages of this light are its softness and clearness, the permanent height at which it remains, and the entire absence of the smallest trouble.

and the *rapidity* of the progress, of ophthalmia, vary from the slightest increase of vascular injection and action, and the most prolonged continuance, up to the most violent and rapid states in which inflammatory action is ever manifested. Hence the conventional terms of *acute*, *chronic*, and *sub-acute* or intermediate, are to be viewed with due latitude as to their import. But ophthalmia, like other inflammations, may be modified in *kind or form*, as well as in *grade* and *duration*, owing to peculiarity of constitution, morbid diathesis, the manifestations of vital power, and the state of the circulating fluids. Thus, ophthalmia in the scrofulous, gouty, or rheumatic diathesis, is different from that affecting sound constitutions; and that occurring in the course of, or subsequent to, the exanthemata, or during typhus fever, or after the passage of purulent matter into the circulation, is individually different from either of the foregoing, although the grade of action and of vascular injection may be apparently the same in all. I cannot, therefore, agree with Mr. Lawrence, when he infers that no such distinctions as sthenic and asthenic actually exist (*Treatise, &c.* p. 66.). This conclusion is the result of considering inflammation merely as increased vascular action, and without reference to the state of local and general vital power. But the phenomena, the progress, and the results of inflammation, in the various forms and circumstances in which it occurs, as well as the effects of treatment, show, that excited vascular action does not imply increased power; and that the former often exists, not only without the latter, but even with a diminution of it, as fully shown in the articles Disease, Erysipelas, Fever, and Inflammation.

8. Ophthalmia differs in degree, at different periods of its course. Thus, it may be slight and prolonged, and suddenly become most violent, acute, and rapid; or, from the latter, it may lapse into an indolent, slow, or chronic form; owing to various contingent causes, to constitution, and to the treatment adopted. It is also remarkably modified by the tissue in which it is seated; by the nature of the predisposing and exciting causes; by its supervention upon, or complication with, other morbid states, or specific forms of disease; and by the age, habit of body, and regimen of the patient. Out of these circumstances arise the numerous varieties distinctly established by modern writers, and recognised by every observing practitioner, and the arrangements of them adopted in recent systematic works. The importance of divisions of this subject is shown by the different consequences or terminations usually observed to belong to each of the varieties, and by the modified treatment they individually require. Without carrying the subdivision as far as J. Frank, or too far for practical purposes, I shall *first* consider inflammation of the *external tissues* of the eye ball, *next* those seated in the *internal tissues*, and *lastly* the much more rare occurrence of inflammation of the *whole eye*. In treating of inflammation of each of the tissues, its *common form* will be first described and afterwards those *specific* or modified kinds, it occasionally assumes from peculiarity of cause or of diathesis.

II. Inflammation of the External Tissues of the Eye.—i. Of the Conjunctiva.

—Syn. *Conjunctivitis*, Mackenzie; *Ophthalmia*, of numerous writers.

9. Charact.—*Redness, from increased vascularity of the external coat of the eye, with pain, tumefaction, and febrile disturbance of the system; the enlarged vessels shifting their place with the motions of the eyeball or eyelids.*

10. The muco-cutaneous membrane that covers the insides of the eyelids, and anterior third of the eyeball, may be inflamed in particular parts, or throughout its extent, in every grade of severity, and for various periods of duration. When this membrane is inflamed, the vessels are comparatively large, tortuous, and of a scarlet colour. They anastomose very freely, or form a network over the white of the eye, and are drawn aside by dragging the eyelids, or moved by rolling the eyeball; whereas, when the sclerotica is inflamed, the vessels are small, straight, of a pink hue, and unsusceptible of motion, either by dragging the eyelids or rolling the globe. When, however, the inflammation is so severe that chemosis exists, or the conjunctiva becomes tumid, and the discharge copious and muco-purulent, this distinction cannot be made, nor, indeed, does it altogether exist, as the inflammatory action from contiguity extends more or less to the sclerotica, and even to the iris and the cornea.

A. Mild Inflammation of the Conjunctiva.

—Syn. *Catarrhal Ophthalmia*, Lawrence; *Conjunctivitis puro-mucosa atmospherica*, Mackenzie; *Conjunctivitis catarrhalis*.

11. *a.* I have adopted the appellation employed by Dr. Jacob as the most appropriate; for, although the disease is generally *caused* by exposure to cold, yet it sometimes also arises otherwise. It is most common in spring and autumn; is sometimes epidemic; affects young persons oftener than adults; and frequently attacks most of the members of a family, or, when it appears in a school, a large number of children. Exposure to currents of cold air, or to the night air; north-east or easterly winds, and other atmospheric influences; damp feet; intoxication; fogs, smoky apartments, irritating vapours; and disorders of the digestive organs; most commonly occasion it. A person who has once experienced an attack, is very liable to a return of it; and I believe, with Mr. Mackenzie, that, in the most severe cases, when the discharge is puriform, it may be propagated by contagion; the disease then passing into the purulent and severe form.

12. *b. Symptoms.*—This form of ophthalmia seldom extends deeper than the conjunctiva. It may be confined chiefly to the lids (*Blepharo-conjunctivitis catarrhalis*); and may affect also the globe (*Ophthalmo-conjunctivitis catarrhalis*). It commonly commences in the eyelids, or circumference of the globe, and extends gradually to the cornea, with a sense of stiffness, smarting, dryness, and as if dust had got into the eye. The intolerance of light and pain are slight; and the secretion at first is diminished, but it is soon succeeded by watering and increased redness. When more fully developed, the redness is superficial, somewhat irregular, of a bright scarlet; and the enlarged vessels are superficial, and are readily pushed aside by pulling the eyelids. In the most severe and acute cases, the membranes become generally and uniformly red; sometimes with spots of ecchymosis, or with minute vesicles or

pustules near the margin of the cornea. There is very little swelling, and rarely any chemosis. An increased *mucous* discharge, which is at first thin and colourless, but afterwards yellowish or whitish, proceeds from the inflamed surface; but it is seldom in considerable quantity, unless in the most severe cases, when it is copious and muco-puriform. Inflammatory irritation frequently also affects the lining membrane of the frontal sinuses and antrum, occasioning pain and sense of weight in these parts. The patient complains of chills, of headach, exacerbations of fever, especially towards night, of impaired appetite, and of sickness or disorder of the stomach. The tongue is generally loaded, and the bowels constipated.

13. *c. Terminations and Prognosis.*—The symptoms continue for three or four days; or, under unfavourable circumstances, for a longer time; but they generally yield to treatment, and gradually subside; the secretion becoming more puriform and thick, but less copious, until the affection disappears. If the inflammation be very violent, or improperly treated, or if it occur in the scrofulous constitution, or in persons imperfectly nourished, or of dirty habits, considerable chemosis may ensue, and the sclerotica and cornea may also become inflamed; causing opacity, or even ulceration, of the latter; and giving rise to a copious puriform discharge, capable of propagating the disease, if introduced into the eye of a sound person. When catarrhal ophthalmia has been severe or of long duration, or has frequently recurred, the palpebral conjunctiva experiences change of structure, and becomes thickened, wlth elevations or granulations on its surface. The lower lid generally suffers most; the granulations being, according to Dr. Eble, more numerous in the folds of the membrane between the globe and lid, than on the lid itself. Catarrhal ophthalmia, also, particularly in children of scrofulous constitutions, is liable to degenerate into the pustular or phlyctenular form of strumous ophthalmia.

14. *d. Diagnosis.*—The very slight pain and intolerance of light, although the vascularity be great; the superficial and scarlet redness of the membrane; the diurnal remissions, and evening exacerbations; the motion of the superficial and enlarged vessels; and the natural state of the sclerotica; distinguish this variety from common *inflammation of the external proper coats*, or catarrhal-rheumatic ophthalmia. But the one affection may nearly approximate, or even run into, the other, in the most severe cases. The catarrhal origin, and usually mild character of this affection, and the mucous secretion, are the only circumstances which really distinguish it from *purulent ophthalmia;* the severer states of the former and the mildest of the latter being so nearly allied that they be justly viewed as merely grades of the same disease.

15. *e. Treatment.*—In the mildest states of the affection, smart purgatives, diaphoretics, and low diet are sufficient to produce a cure. If the tongue be loaded, an emetic is of service. In more severe cases, local depletion, followed by an emetic, purgatives, and diaphoretics, is necessary. Venæsection is required only in the most acute states, occurring in young or plethoric persons, and when both eyes are attacked. When the affection is connected with disorder of the digestive organs, it is readily removed by an emetic, by calomel and James's powder at night, by an active cathartic the following morning, and by sudorifics, aided by diluents, and warm poppy fomentations to the eye. When the inflammation is considerable, and not readily removed by these means, local depletions should be repeated, a blister applied to the nape of the neck, and purgatives, diaphoretics, and low diet persevered in. I agree with the German writers in considering warm applications to the eye preferable to cold, where the affection is produced by exposure to cold: but, when it is otherwise caused, and when the heat and smarting are considerable, cold washes are agreeable and generally beneficial. When the eyelids are gummed together in the night, a little spermaceti, or any other mild and fresh ointment, should be inserted between their edges in the evening.

16. Mr. Lawrence considers that this affection is one of those to which the application of strong astringents is most appropriate, especially if the inflammation do not extend beyond the mucous membrane; and those who more particularly recommend this treatment, believe that it may advantageously supersede general remedies, especially vascular depletion. Mr. Mackenzie states, that it was most advantageously employed by Beer in 1817. Mr. Melin directs a strong astringent, consisting of a solution of four grains of lunar caustic in an ounce of distilled water, to be dropped into the eyes twice a day, in the very commencement of the affection, with the view of arresting its progress. Mr. Bacot (*Treatise on Syphilis, &c.* p. 136.) states, that Dr. Ridgway originated this treatment, and that he prescribed ten grains of the lunar caustic to the ounce of water; he using this solution in gonorrhœal, as well as in catarrhal ophthalmia. Mr. Mackenzie, who appears to have had extensive experience of this practice, employs a solution of from two to four grains of this caustic in the ounce, and applies a large drop of it to the eye once a day; fomenting the organ thrice daily with a lukewarm collyrium consisting of one grain of corrosive sublimate and eight ounces of water. He introduces, at night, between the edges of the lids, a minute portion of an ointment containing a grain and a half of red precipitate to the drachm. Mr. Guthrie advises an ointment with ten grains of the nitrate of silver (§ 49.); and Dr. Jacob a few drops of a saturated solution of acetate of lead or of alum, to be introduced between the lids every night and morning.

17. A green shade may be worn before the eyes; but it is not necessary to confine the patient to the house, unless the weather be cold, windy, or rainy. Exposure to a mild atmosphere is advantageous (Lawrence).

18. *B.* Severe Inflammation of the Conjunctiva, or *Purulent Ophthalmia.*—Under this appellation I shall comprise those forms of conjunctivitis, whose symptoms are very violent, and whose progress is very acute; the discharge possessing the purulent character. Hence they have received the appellation of *blennorhœa*, and *suppurative* ophthalmia; the latter term, as Mr. Lawrence remarks, being objectionable. *Purulent ophthalmia* generally begins in the linings of

the lids. It soon extends to the conjunctiva of the globe; and, if not checked, to the cornea, which it either injures or altogether destroys. The conjunctiva is swollen and intensely red; the blood-vessels injected and enlarged; and the surface villous, pulpy, or granular. The discharge from the inflamed membrane is purulent and copious. When the disease extends to the cornea, interstitial deposition, causing opacity, and subsequently bursting, sloughing, and ulceration, if the malady proceeds, is a frequent result; prolapsus of the iris, escape of the humours, and collapse of the tunics, being ultimately produced. It is properly seated in the conjunctiva, and often goes through its course without extending deeper, unless the cornea become affected, or ulceration or sloughing takes place, as now stated.

19. *a.* Severe Inflammation of the Conjunctiva of Infants. — Syn. *Purulent Ophthalmia of Infants; Purulent Eye of Children*, Ware; *Ophthalmia Neonatorum*, Auct. var.; *Ophthalmia of new-born Children*, Mackenzie; *Blephar-Ophthalmitis glandulosa*, Beer. — The term used by Ware is inappropriate: and that employed by Beer implies that the disease originates in the Meibomian glands, and is incorrect; these glands being merely involved in the severe inflammation attacking the whole of the membrane.

20. *α. Causes.* — Purulent ophthalmia of new-born infants has been very generally imputed chiefly to leucorrhœal discharge in the mother. Schmidt, Mackenzie, and Lawrence maintain this opinion; and the last writer refers to cases in which the infant was affected with the disease, owing to the mother having had gonorrhœa at the time of parturition. But these are instances of gonorrhœal ophthalmia in new-born infants, which is a still more severe affection than that now being considered. I have strong reasons for concluding that the disease does not so frequently arise from leucorrhœa in the mother as is supposed; for, in many instances in which I have enquired into the causes, and in two or three where the intelligence of the mothers seemed decisive of the matter, no such disorder had ever been complained of. It should not be overlooked, as Dr. Jacob has, indeed, mentioned, that a mild form of conjunctivitis sometimes attacks very young infants from exposure to cold, — *mild catarrhal ophthalmia in new-born children.* Of this I have seen numerous instances. But the present violent state of disease depends, perhaps, as much upon the predisposition as upon the exciting causes; and there can be no doubt that infants are frequently born of mothers affected by leucorrhœa, or even by gonorrhœa, at the time of parturition, without being infected by purulent ophthalmia.

21. The *predisposing causes* are, delicacy and susceptibility of constitution, premature birth, and whatever depresses the system. The disease is most common in twins and weakly infants; in those newly born; in those subjected to bad or foul air, to cold, and to insufficient or inappropriate nourishment; in those deprived of the mother's care, and of the mother's breast; and in the children of the poor, and the dissolute. It is particularly prevalent and severe in Continental foundling hospitals, where the infant is without maternal care; but it is not very frequent in lying-in hospitals. Langenbeck (*Neue Chirurg. Biblioth.* b. iii. p. 208.) states, that in the Lying-in Hospital of Vienna, where the mothers are generally affected with leucorrhœa and gonorrhœa, but where the infants remain with them, the disease is not common; while in the foundling hospital, where the infants are half dead from cold and starvation when they are received, and deprived of their mothers, it is very prevalent. The *chief causes*, according to my enquiries, are those now stated, exposure to damp and cold air, improper nutriment, and especially the neglect of due ablution immediately after birth. In many of the cases that I have seen, the secretion covering the cutaneous surface in utero, which had not been removed from the eyelids and angles of the eyes, had evidently been the chief cause; and I am convinced that the presence of this matter, owing to the changes it undergoes when allowed to remain in contact with the external surfaces, especially near natural openings, after birth, is much more frequently a cause of purulent ophthalmia, than infection by leucorrhœa, although I do not deny the influence of this latter circumstance.

22. *β. Symptoms and Progress.* — This affection is of the utmost importance, as the majority of instances of blindness is caused by it. In a great proportion of cases it is far advanced before medical aid is required; it being frequently considered, at its commencement, as a common cold in the eye. It generally begins three or four days after birth; but it may occur at any subsequent period; the liability to it, owing to the nature of the exciting causes, being remarkably diminished when the child is some days, or a few weeks, old. In its *first stage* — the *Blepharo-blennorrhœa* of German writers — the inflammatton is chiefly confined to the lids; a circumstance further proving its origin in the cause now, for the first time, pointed out. The lids at first stick somewhat together when the child awakes; and their edges are red, particularly at the corners. External redness of them is sometimes, also, observed. The eye is usually closed, from pain occasioned by light. The globe is in a natural state; but the linings of the lids are red and villous, especially the lower, the insides of which are covered with a little white mucus. In the *second stage* — *Ophthalmo-blennorrhœa* of some writers — the inflammation is more severe, and extends to the conjunctiva of the globe. Redness and tumefaction are increased; the lids are swollen and red even externally; and the discharge becomes copious and purulent, agglutinates the edges of the palpebræ, accumulates beneath them, and bursts out between them, and pours over the face. The whole of the conjunctiva is now minutely injected, of a uniform bright scarlet colour, and tumefied; its surface is villous; and its loose folds between the lid and the globe become enlarged, form tumid rolls, and are finely granulated. These folds often evert the tarsi, causing ectropium, which generally subsides with the disappearance of the disease. When the swelling of the lids is great, the upper usually overhangs the lower, and is externally of a bright red. These appearances are aggravated by crying, when the globe is pushed forwards. The discharge is yellowish in various tints; and, in unhealthy or jaundiced children, it is often yellowish green. It is sometimes whitish; and it is

then less abundant and thicker. It is more rarely ichorous or sanious; but it is then thin and excoriating. An admixture of blood in the discharge is also rare.

23. Both eyes are usually affected; but the complaint commences generally a few days earlier in one than in the other. The attendant constitutional disturbance is very considerable; the tongue being white and loaded, and the bowels disordered. The infant is restless, feeble, and ultimately, especially if an unfavourable issue has taken place, pale, emaciated, and cachectic. When the disease extends to the conjunctiva of the globe, its *duration*, until either of its bad effects supervene, is various, but commonly from seven to fourteen days. It, however, is sometimes confined, for a considerable time, to the conjunctiva of the lids in a slight or chronic form, before the globe is affected.

24. γ. *Terminations.* — In the course of the disease, it is important that the practitioner should examine the eye so as not to increase the disorder. If the infant be asleep, the tarsus of the upper lid should be pushed very gently and lightly, upwards and backwards; but no further than to obtain a clear view of the cornea. If it be awake, the lids should be separated quickly, whilst it is quiet, and before the muscles can resist. An attempt to see the eye when it is crying is either ineffectual or injurious. — 1st. In the less severe cases, and in the more violent attacks, if early and judiciously treated, the tumefaction of the conjunctiva *subsides* gradually; the discharge is lessened, and becomes whitish; and the membrane gradually resumes its healthy state. — 2d. *Opacity* of the cornea may supervene, partially or generally; and, from interstitial infiltration of lymph, either into the tissue of the corneal conjunctiva, cause a superficial bluish film, or into the laminæ of the cornea, produce dense and total opacity. — 3d. *Adhesion* of the iris to the opaque cornea may occur, especially when the inflammation has extended throughout the latter, and passed to the iris. — 4th. Infiltration of pus between the lamellæ of the cornea, or *onyx*, causing *ulceration* of the external lamellæ, may take place. The ulceration may be of various extent and depth, — may affect nearly the whole surface of the cornea, or penetrate it, causing prolapse of the iris. This latter may adhere to the ulcerated part, and the ulceration either cease, or extend to the interior of the eye. — 5th. *Sloughing* of the cornea, which has been described by Saunders and Lawrence, but doubted by Mackenzie, may supervene, partially or generally. The part becomes dusky, loses its polish and vital cohesion, and assumes a dirty greyish or brownish appearance. A line of separation afterwards forms at the margin, and the dead part is thrown off. The whole cornea may perish thus, and the iris protrude through the aperture, presenting an irregular brownish or dirty prominence; and being either covered by the membrane of the aqueous humour, or nakedly exposed, the humours having escaped. Partial sloughing generally leaves a ragged ulcer, which often extends into the anterior chamber, causing prolapse of the iris. These terminations often quickly supervene and rapidly proceed, in young, feeble, and ill-nourished children, until the humours escape and the eye is destroyed.

25. When the *entire* cornea has either sloughed or ulcerated, and the humours have not escaped, the projecting iris recedes, and becomes covered by an opaque pellicle, the front of the eye being flattened. After *partial* ulceration or sloughing, the iris either adheres to the internal surface of the cornea, or prolapses through the opening; the projecting part gradually subsiding and disappearing, leaving a cicatrix in the cornea. In this case, the iris also adheres to the cornea, and there is change of figure, with contraction of the pupil; vision being either impaired or lost, according to the extent of the change. When *ulcers* of the cornea are spreading, they are of a dusky or yellowish white, irregular in their surface, and often with a ragged edge; but when they begin to heal, they have a greyish or bluish aspect; become smooth, soft, and gelatinous, from deposition of the matter which is to repair the breach; and red vessels pass from the conjunctiva, through the intervening transparent portion of the cornea. They thus heal, leaving a permanent opaque cicatrix (Lawrence).

26. δ. *Prognosis.* — Although remarkably violent, this affection readily yields, if treated early, and before the cornea has sustained any injury. The appearance of the discharge often indicates the state of the disease. The whiter and smaller in quantity, the lower is the grade of inflammation. The yellower and more copious the discharge, the more acute the disorder. An admixture of blood in it, indicates a violent state of action; but is not, in itself, dangerous. A thin, ichorous, or sanious discharge, marks the existence of sloughing or destructive ulceration. If there be superficial ulceration without onyx, probably only a slight speck may remain. If the ulceration be deep, permanent opacity will be the result. If the iris protrude, the pupil will be disfigured, and vision more or less impaired. If there be considerable onyx, the matter may be absorbed, or the purulent infiltration may increase, the cornea burst, and the eye become partially or totally staphylomatous.

27. ε. *Treatment.* — In the most acute cases, when the conjunctiva oculi is bright red and swollen, especially if the cornea looks hazy, or the palpebræ bright red and tumefied, depletion by leeches is requisite. A leech may be placed upon the temple, or, as Mr. Lawrence advises, upon the middle of the swollen upper lid; and it will generally procure a sufficient evacuation. If both eyes are affected, one may be applied to each temple or superior palpebra; but in weak infants, the two leeches should be small. If the state of the cornea be doubtful, and vascular action in the conjunctiva still acute, although the lids be not much swollen, nor very red, it will be better to apply the leech. Dr. Monteath (*Trans. of* Weller, &c. vol. i. p. 61.) advises scarification of the inner fleshy and granular surface of the lids, in preference to the application of leeches, the lids being kept everted until a sufficient quantity of blood has flowed, the replacement of them being always followed by arrest of the bleeding. Mr. Mackenzie directs the immediate application of astringents; but in the more violent cases, before the cornea has been materially injured, the depletion is beneficial. In the less severe attacks, and in feeble

or ill-nourished infants, the astringents about to be noticed may be at once employed. In every instance, purgatives ought to be prescribed. One grain of hydrargyrum cum creta, or of calomel, may be given, with three or four of magnesia or of rhubarb, at bedtime, and a dose of castor oil in the morning. A small blister may be applied on the posterior and middle part of the scalp, as advised by Dr. Monteath; but it should be removed in five or six hours, and the part carefully attended to. The eye should be bathed frequently with tepid milk and water, and a little fresh butter, or a mild form of the red precipitate ointment, applied between the edges of the lids at night, to prevent their agglutination, and favour the escape of the discharge.

28. Astringent collyria are more efficacious, and safer in this affection, than in any other, especially when resorted to at its commencement. But in severe cases, when the inflammation has proceeded so far as to endanger the cornea, it will be much safer to premise depletion, than to enter at once upon the use of astringents. Mr. Ware recommends a preparation formed by pouring eight ounces of boiling water on eight grains each of sulphate of copper and Armenian bole, and two of camphor. Schmidt prescribes a lotion of two grains of sulphate of zinc, three drops of liquor plumbi super-acetatis, twelve drops of spiritus vini camphoratus, and an ounce of distilled water. Mr. Guthrie directs the nitrate of silver ointment (§ 49.) to be applied with a brush over the inside of the lids. Mr. Mackenzie employs a collyrium of one grain of corrosive sublimate and eight ounces of water, three or four times in the day; and, having washed off the discharge by this lotion, he applies, once, or at most twice, a day, to the conjunctiva, a solution of four grains of lunar caustic, or of six grains of sulphate of copper, in an ounce of water, by means of a camel-hair pencil; preventing the agglutination of the lids by smearing their edges at night with the mild red precipitate ointment (consisting of from twelve to twenty grains of the precipitate to the ounce). Dr. Monteath uses a nearly similar collyrium to that prescribed by this writer. Mr. Lawrence advises a solution of from two to ten grains of alum in an ounce of water, to be carefully injected between the lids three or four times in the twenty-four hours, so as to wash out the purulent secretion; and afterwards a soft rag, moistened in the solution, to be laid over the eye for a short time; the bowels being regulated by a mild aperient. If there be occasion to change the astringent, he prefers the lunar caustic solution, gradually increasing its strength from two grains to the ounce, to four or six, to be dropped between the lids twice or thrice a day.

29. When the cornea has ulcerated or sloughed, the infant is generally pale, weak, irritable, and restless; and tonics are required. The sulphate of quinine in the form of syrup, and the resinous extract of bark blended in milk, and given every three, four, or six hours, are the best preparations. The solution of the nitrate of silver, or of alum, may be applied to the eye. Opacity of the cornea is generally permanent; but instances of recovery have occurred. M. Billard mentions a case in which the recovery was spontaneous.

30. *ζ. Purulent Ophthalmia in Children.* —The treatment just recommended is most appropriate to newly-born infants, or to children of one, two, or three years old. In these latter, and in those somewhat older, the local depletion should be more active, according to their habit of body and strength; and *blisters* behind the ears are of much service. Blisters, unless employed with caution, and only so far as to produce slight redness, and followed by the application of warm poultices to the part, often are productive of much trouble in young infants; in older subjects, they are more beneficial. In the latter class of patients, vascular depletion, according to the circumstances of the case and of the patient, purgatives, blisters, and astringent applications, constitute the chief means of cure. Purulent ophthalmia introduced in large or crowded schools or foundling hospitals, may spread extensively and prevail long. Mr. Macgregor has described its prevalence for some years among the children of the Military Asylum at Chelsea. It was most severe in those having red hair, or of the scrofulous diathesis. It commenced in the eyelids with itching, sticking together of the lids on waking in the morning, followed, in twenty-four or thirty-six hours, by a viscid mucous secretion, extension of the inflammation of the conjunctiva oculi, redness of the skin around the eye, and a purulent discharge. General bleeding, leeching, purgatives, blisters behind the ears and on the nape of the neck, cold lotions, low diet, and, subsequently, astringent collyria, and the unguentum hydrarg. nitratis, at first mixed with twice its quantity of lard, but afterwards of its full strength, applied to the lids by means of a camel-hair pencil, were the remedies found most beneficial.

b. Purulent Ophthalmia in Adults.—Syn. *Oph. purulenta or puriformis, Suppurative Oph., Egyptian Oph., Ophthalmo and Blepharo-blennorrhœa*, Auct. var.; *Oph. contagiosa; Oph. caturrhalis bellica; Blepharotis glandularis contagiosa*, Beer; *Adenitis palpebrarum contagiosa; Epidemic contagious Oph.*, Rosas; *Conjunctivitis puro-mucosa contagiosa vel Egyptiaca*, Mackenzie; *Purulent Oph. in the Adult*, Lawrence.

31. This affection is essentially the same as that just described, as to both nature and seat; it commences and extends in a similar manner, and produces the same ill effects, especially as respects the cornea and iris. Its severity, its serious consequences, its contagious properties, and its extensive prevalence at the commencement of this century, impart to it the highest interest. Assalini states, that two thirds of the French army in Egypt were affected with the complaint. Dr. Vetch treated 636 cases, including relapses, belonging to the second battalion of the 52d regiment, from August 1805, to August 1806; fifty having lost both eyes, and forty, one eye: and the ophthalmia depôt, under his able care, contained, in the summer of 1808, upwards of 900 cases. Mr. Macgregor mentions that, the returns of Chelsea and Kilmainham hospitals furnished 2317 cases; soldiers who had lost the sight of one eye not being included in the number: and that, from April to December, 1804, nearly 400 cases of this disease occurred in the Royal Military Asylum; and from that time to the end of 1820, upwards

of 900 cases additional, exclusive of relapses, had taken place in the same establishment. About this time it appeared in a large boys' school in Yorkshire; blindness, or serious injury to sight, having resulted in nearly twenty instances. **MUELLER** treated 1604 cases, including 200 relapses, in the Prussian garrison of Mentz, during three years and a half: 1344 were restored to the service; fifteen became blind in both eyes; eighteen had vision impaired in both; and twenty-six were blind of one eye, — furnishing the most successful results upon record; but the complaint was more mild than in the British troops.

32. *a. Causes.* — The much discussed question as to the propagation of the disease by contagion* has been fully and ably considered by **EDMONDSTON**, **VETCH**, **MACGREGOR**, **GRAEFFE**, **MUELLER**, **OMODEI**, **RUST**, **LAWRENCE**, and **MACKENZIE**; and completely set at rest by the evidence they have adduced. My limits will permit only a brief view of the matter. It has been contended — 1st. That the complaint is produced by atmopheric and other causes, and that it is *not* contagious; — 2d. That, although it arises from these causes, it *is* contagious; — and, 3d. That it is a *specific* disease, communicable by contact of the purulent discharge, and not arising sporadically from other causes. — One of these opinions must be true; and, if true in all respects, the others must be false. In order to arrive at a correct conclusion, I shall *first* briefly review the facts adduced in support of the non-contagious nature of the complaint; *next*, notice those proving its contagious properties; and, *lastly*, show in what manner and under what circumstances it manifests these properties.

33. 1st. Those who contend that this disease is not contagious, argue that, in Egypt, the country in which it is endemic, and whence it was brought by the European armies invading it at the termination of the last and the commencement of the present century, it was not considered contagious; that this property was not noticed by any of the ancient visiters of that country, or by any who travelled thither before the period now mentioned; and that the army physicians and surgeons, who treated the malady there, did not suppose it to be contagious. **ASSALINI**, a physician who accompanied the French army into Egypt, denies this property, and refers it to the causes of ophthalmic diseases existing in that country; especially the powerful light and glare from the sandy surface, the dust floating in the air, the night chills and dews following the burning heat of day, and other atmospheric vicissitudes, to which the troops in very active service were necessarily subjected. Hence he, and other army physicians, viewed it as a very acute catarrhal inflammation, affecting those chiefly who were most exposed to these causes. Those who espouse this opinion, further appeal to the alleged fact, that there was no dissemination of it in the families, or districts, to which soldiers or other persons affected by it returned. But this argument is, in my opinion, more specious than correct; for instances were not numerous of soldiers having been dispersed in civil communities with the disease in its early and active stages; and where such occurrences did actually take place, many of the circumstances favouring contagion thereby ceased to exist. But, besides, the results were not altogether such as the non-contagionists have asserted, as exceptions now and then occurred to this broad and incautious statement. The fact noticed by **WALTHER**, that the complaint seemed to lose its contagious properties when single patients lived in their families, under the ordinary domestic relations, is admitted by him to be weakened by one exception; and is open to the objection just offered. The experiments of **MUELLER**, who attempted to transmit the disease by applying the matter to the eyes of dogs, cats, and birds, without infecting them, is contradicted by others which succeeded. The experiment of Mr. **MACKESEY** (*Edin. Med. and Surg. Journ.* vol. XII. p. 411.), who applied the discharge to his own eyes without communicating the malady, only shows that what is known and allowed of other contagious affections also obtains in this, viz. that the state of health, and of the organ of the exposed person, as well as the state of weather, frequently both dispose to, and prevent, the communication of a contagious disease; and that even inoculation will sometimes fail to convey it, owing to these and other circumstances.

34. 2d. Numerous facts have been adduced in proof of the contagious nature of the disease, to which only the most cavilling scepticism can object. Mr. **MACGREGOR** met with three instances of nurses, in the Military Asylum, having been infected by the accidental introduction of the matter into their eyes whilst injecting the eyes of patients; the affection manifesting itself within twelve hours afterwards in all the cases. Dr. **VETCH** applied the morbid secretion to the eye of a dog, in which it soon produced great irritation; but the animal was lost before the result could be ascertained fully. . **RIMA**, **VA-**

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* It may be supposed from the lines in **OVID**,

> "Dum spectant læsos oculi, læduntur et ipsi,
> Multaque corporibus transitione nocent."

and the remark in **PLUTARCH** (L. v. Symp. 7.) as to "the readiness and certainty with which the contagion of ophthalmia spreads amongst persons living together," that the contagious nature of the disease was well known to the ancients. **GALEN** (*De Differ. Febr.* i. c. 2.) enumerates it amongst infectious maladies; and Rabbi **MOYSES** (*Aphor.* 24.) avers, that whoever attentively regards inflamed eyes, will contract the complaint. **BENEDICTUS FAVENTINUS** (*Prax.* v. i. sect. ii. c. 2.) gives it as his opinion, that a morbid effluvium proceeds from the eyes in ophthalmia, which, through the medium of the atmosphere, will affect those that are near. The same opinion is stated by **MERCURIALIS** (*Prax.* lib. i. cap. 38.). **DIEMERBROECK** (*Observat.* 55.) mentions the case of a lady who was attacked by the complaint, and two or three days afterwards three of her servants were also seized. He arrested the disorder by the following collyrium: —

℞ Zinci Sulphatis ℈j.; Sacchari Candi ʒj.; Aquæ Plantaginis ℥ij.; Aq. Rosarum ℥j. M.

Similar facts and opinions are to be found in the writings of **RIEDLIN** (*Curat. Med. Millen. Observ.* 187.), **WEDEL** (*De Ophthal.* Jenæ, 1684.), and **BOERHAAVE** (*De Morbis Nervorum*, ii. p. 512.). Dr. **EDMONDSTON** has adduced a very striking fact, about to be referred to, from the thesis of a Dr. **ARMSTRONG**. From this it will appear, that although the contagious nature of the disease was not fully shown, nor generally believed in, until it was demonstrated by Dr. **EDMONDSTON**, yet it did not altogether escape the notice of writers; some of whom, as **DIEMERBROECK**, were at a loss to account for the facts they observed; or to explain how a virus could be conveyed, through the medium of the air, from the eyes of the diseased to those of mere spectators. The vulgar belief, however, in its contagious nature, has long subsisted in various countries; but the vulgar judge by results and assemblages of facts, without caring for the explanation, or disbelieving them because they are unable to account for them; and they often judge aright.

SANI, GRAEFFE, and others, produced the disease repeatedly in dogs and cats by the application of matter to their eyes; and M. GUILLIÉ introduced under the eyelids of four blind children the purulent discharge, and the disease was communicated in each instance.

35. But independently of these incontrovertible facts, others equally satisfactory may be adduced. It is not denied that the disease extended from the detachments of the French and English armies which returned from Egypt, to the troops in Italy, Sicily, Malta, Gibraltar, France, and England, which had direct communication with them; the progress of the complaint having been clearly traced from the infected detachments to the fresh troops. The excellent accounts furnished by Dr. EDMONDSTON, VETCH, MACGREGOR, RUST, WALTHER, MUELLER, GRAEFFE, and others, completely demonstrate its spread by contagion, and show that it extends rapidly among soldiers crowded in barracks, using the same utensils and linen, whilst the officers, who live separately, are seldom attacked. RUST states that, in Mentz, which was garrisoned by Prussians and Austrians, it spread extensively among the former; while the latter, who inhabited separate barracks, in a different quarter of the town, entirely escaped. Dr. EDMONDSTON adduces a most conclusive fact. In 1782, the Albemarle ship of war took on board, in the West Indies, three sailors, with inflamed eyes, from a slave-ship, in which the disease prevailed. On the fourth day after their reception, the disorder appeared in the Albemarle; and, by the seventh morning, twenty-two men were unfit for duty. Those affected were now separated from the healthy, and the progress of the malady was arrested, and, in the course of a few weeks, entirely ceased. Similar facts to the above may be adduced; and most of those about to be noticed in illustration of points connected with this subject, fully prove contagion. Numerous instances have occurred in civil life, of the disease extending from one, to all the members of a family; and, in the public service, where the circumstances favouring its spread are more numerous and influential than elsewhere, it has been arrested by separating the diseased from the healthy, and confining each person to his own utensils, cloths, and sponges. Mr. MACGREGOR states that, when the complaint was spreading rapidly in the spring of 1810, among the children of the Military Asylum, those affected were removed into a detached building, so as to cut off the communication between the healthy and diseased; and that it afterwards declined. That it did not arise from the state of the air, or any other general cause, is shown by the circumstance of its prevalence among the boys for nearly a month, before the girls were attacked; and by the fact, that all the adults who did not mix with the sick escaped, while those who were connected with them all suffered, the assistant surgeon excepted. Similar proofs are adduced by RUST, WALTHER, and OMODEI, in the works referred to in the *Bibliography*. Mr. MACGREGOR has given a most convincing account of its extension, by contagion, from two boys, brothers, in the Military Asylum, in his Memoir referred to hereafter.

36. 3d. *The origin of the contagious property, and the manner of, and the circumstances favouring, its propagation*, are matters of great practical importance, as respects both prophylactic and curative measures.—(*a*) As to the *origin* of the contagion, Dr. VETCH has made an important observation, and one which appears to approach very nearly to the truth. He remarks that, from whatever cause inflammation of the conjunctiva may originate, when the action is of such a nature or degree as to produce a purulent discharge (*Ophthalmo-blennorrhœa*), the discharge so produced operates as an animal virus when applied to the conjunctiva of a healthy eye. To this I would merely add, of a predisposed or susceptible person.—The opinion of Mr. MACKENZIE agrees with that now stated. He observes, that it scarcely admits of a doubt, that the discharge in *catarrhal* ophthalmia, especially when distinctly puriform, if conveyed by a towel, or by the fingers, to the eyes of other persons, will excite a conjunctivitis still more severe, more distinctly puriform, and more dangerous in its effects, than was the original affection. He has arrived at this conclusion, from having observed many instances, in which the disease had arisen in one of a family from atmospheric exposure, and several others had become affected, it having been, in the first attacked, comparatively moderate, but, in the rest, much more violent and puriform. Similar facts have been remarked by myself. That the disease may arise spontaneously, and afterwards extend by contagion, is evinced by the following occurrence adduced by M. GUILLIÉ. A French slave-ship left the coast of Africa in 1819, with 160 slaves crowded in the hold. No case of ophthalmia existed among them, nor among the crew, when they put to sea. But fifteen days afterwards it broke out in the negroes, and spread rapidly among them, and subsequently among the crew, twenty-two in number, one only of whom escaped. On their passage across the Atlantic to the West Indies, they met another slave-ship, the crew of which was similarly circumstanced to themselves. Nearly one half of the crew and slaves lost their sight in one or both eyes.

37. (*b*) As to the *manner* of the propagation of the disease, some difference of opinion is entertained. Dr. VETCH believes that it is not communicable by a contagious miasm conveyed through the medium of the atmosphere; and thinks that direct application of matter is necessary to infection. Mr. MACGREGOR expresses a similar opinion, although many of his facts favour the conclusion at which I shall arrive in the sequel. MUELLER, on the other hand, considers that the contagion is generally conveyed by the air, although it necessarily also admits of being propagated by direct contact; and, in proof of this position, adduces the fact of the medical attendants and nurses, notwithstanding their care to avoid the contact of the discharge, having been frequently affected. WALTHER entertains the same opinion, and appeals to similar facts in support of it. Dr. EDMONDSTON, the first writer who demonstrated the contagious nature of the complaint, and attempted to assign the range and laws of this property in respect of it, considers that it is contagious, not only by the contact of the discharge, but also by fomites, and through the medium of the atmosphere within a limited range, when a number of cases are brought

together, in close apartments or crowded hospitals. Such appears to be the opinion of this able physician, promulgated as early as 1802; and, although not always candidly objected to at the time, and for some years afterwards, it is now confirmed in every respect by the more recent experience of the best writers on the disease in this country and on the Continent.

38. (*c*) The *circumstances favouring* the diffusion of this contagion are in no respects different from those which promote the spread of other contagions: — 1st. Novelty of morbid impression, or the unblunted sensibility and unimpaired susceptibility of those who are exposed to the infectious miasm for the first time; as a person coming out of a pure air into a foul atmosphere or close apartment, or breathing an effluvium to which he has heretofore been a stranger, is much more sensible of its operation, and much more affected by it, than one who has gradually become accustomed to it by frequent or continued exposure. — 2d. Whatever increases the discharge, or accumulates or concentrates the emanations from it, and from the diseased organ; as want of ventilation, crowding together of the sick, want of cleanliness, &c.; will greatly increase the contamination of the air more immediately surrounding the patient, and favour the infection of the healthy who are most susceptible, when they approach within a certain limited range. — 3d. Whatever multiplies the chances of conveying the morbid secretion directly to the eyes of the sound; as sleeping in the same bed or apartment, using the same towels, sponges, and utensils, and the want of domestic cleanliness; will augment the number of cases. — 4th. Whatever depresses the vital powers; as unwholesome diet, insufficient clothing, intoxication, exposure to cold, &c., fatigue, malaria, a confined or foul air, the depressing passions, and venereal excesses; will render persons more susceptible of infection.—And, 5th. Exposure to the more common causes of ophthalmia about the same time as to contagion, or shortly before or after it, will likewise assist or determine its influence. — It is hardly requisite to appeal to facts in support of these positions. The numerous works referred to furnish them in abundance, especially those of EDMONDSTON, MACGREGOR, and VETCH. Mr. MACGREGOR found that the complaint was much more severe and of longer duration in hot and moist, than in cold, weather; and Dr. VETCH ascertained that a humid atmosphere and marshy soil increased both its violence and spread.

39. From the above, it may be *inferred* — 1st, that the disease may be produced by common causes, and without the operation of contagion; — 2dly, that, when so excited, and existing to such a degree as to give rise to a puriform discharge, it is capable of propagating itself, under favourable or particular circumstances; — 3dly, that it spreads, not only by contact, but also through the medium of the atmosphere, within narrow limits; more especially when numbers affected by it are crowded together, and the air is humid or impure, and those exposed to the contagion are predisposed by the operation of the causes mentioned above (§ 4.). Hence its remarkable virulency in ships, particularly transports, slave-ships, barracks, prisons, workhouses, and schools; and it therefore should be referred to the *second* category, stated at the commencement of the enquiry (§ 32.).

40. *β. Symptoms and Progress.*—The symptoms succeed each other with different degrees of rapidity and severity, even in persons suffering from the same infection, and in the same place, owing to the previous health, the habits, and constitution of the patients. The disease is more mild in females than in males; and it is more violent about the period of puberty than at an earlier or later age. It has also been more severe in one place, or regiment, than in another; and it was evidently more violent among the British troops, than among the French, Germans, or Italians, owing most probably to the more phlogistic diathesis and robust constitutions of the former than of the latter, and to their fuller living and greater intemperance.

41. (*a*) *The more acute and violent states.*— In its *first stage*, the complaint is confined to the palpebral conjunctiva; and is attended by stiffness of the lids, itching or watering of the eye, a sense of sand or some foreign body below the lids, succeeded by sticking of them together, on wakening from sleep, and greater fulness of them externally than usual.— It is seldom seen by the physician at this period; or until it has advanced to the conjunctiva oculi, or its *second stage*. This membrane then rapidly becomes bright red, remarkably vascular, and greatly swollen; the chemosis being sometimes such as to conceal the cornea. Patches of ecchymosis are also seen, and the whole palpebræ are much tumefied, and occasionally also red externally. The discharge is profuse and purulent, often in a few hours from the commencement, but always soon after the inflammation has extended to the globe; and sometimes it is so copious as to pour over the face and clothes; but there is no secretion of pus in the chambers. In this stage, the pain becomes severe, seated deep in the eye, and attended by a sense of a foreign body in the eye, of fulness or great distension, with throbbing in the temples, and headach. These symptoms, especially the pain, often remit, or occur in paroxysms, or return after having been removed for a time. The *constitutional disturbance* is not severe; the pulse, tongue, and appetite, not being materially affected. The cornea is liable to the same effects as have been described above (§ 24, 25.); but the swelling of the lids, and the tumefaction and overlapping of the conjunctiva, and the accumulation of pus over the cornea, or in the depression of which it forms the bottom, frequently prevent its state from being ascertained.—In the *third stage*, the symptoms gradually subside; the swelling, pain, and discharge are diminished; the external tumefaction is lessened; and the lids, which before were somewhat inverted, from the cartilages not yielding, are now slightly everted, especially the lower. As the discharge diminishes, it gradually loses its purulent characters, and becomes thinner, more mucous, or gleety. The internal surface of the eyelids, the semilunar membrane, and caruncula lachrymalis, which were the first parts affected, are the last from which the disease disappears. The right eye is more frequently, and generally more severely, attacked than the left; and its sight oftener lost. In some cases, only one eye is affected; but commonly both are seized, although an

of several days occur before the second becomes inflamed. Such are the features of this disease as it prevailed in the British army, and as it sometimes occurs in civil life under certain circumstances.

42. (*b*) *The milder or chronic states.* — These were most common on the Continent, both in the army and in civil society. Mr. Macgregor, Dr. Vetch, Professor Walther, and Dr. Mueller, particularly the last, have pointed out, not only the origin of the complaint, in the conjunctiva of the lids, but also its long persistence in this part, in some cases, and its entire limitation to it, in others. In all the grades, the inflammation both begins and terminates in it. — In the *slightest grades*, the patient complains of pressure or uneasiness, with a sense of dust or sand, in the eye; but without redness of the globe, or of the external surface of the palpebræ. The conjunctiva tarsi is villous and dark red; but towards the globe it is smooth, and its vessels distended. The eyeball has an irritated appearance: there are an increased flow of tears, and a mucous secretion, but little or no pain. The disease may continue long in this mild form, or may yield to treatment in two or three weeks; or it may pass into a higher or severer grade. — The *second or intermediate degree* may be an aggravation of the first or slightest grade, or may commence with all its characteristic features. The conjunctiva of the lids has a granular appearance, which becomes more conspicuous when the inflammatory tension is abated, and is swollen, dark red, and covered by a puriform secretion. The lids are tumefied; the pain is considerable, and as if caused by a foreign body. This form may continue for weeks or even months, and pass into the severe or acute state already described (§ 41.), owing to atmospheric changes or other causes; unfavourable consequences to the organ supervening sometimes in twenty-four or thirty-six hours.

43. (*c*) The *alterations* which the conjunctiva undergoes are of much importance. In the mildest grade, the membrane appears as if covered with dust, or velvety; in the severest degrees, it seems strewed with rough bodies, or with granulations, resembling those of a healing wound. These bodies exist in great number, arise by a broad basis, and have a round prominence at first, which becomes flattened or angular, by pressure against the globe. The largest of them are in the middle of the lid, the smallest at the edge and near the angles. They are sometimes crowded very close, and are most remarkable in the upper lid. Their colour varies from the darkest blood red to the palest brick hue. Mueller considers this change of structure not as a mere effect of inflammation, but as proper to the disease, and as connected with the production of the contagious secretion disseminating the complaint.

44. γ. *Consequences.* — 1. *Suppuration of the Cornea*, and destruction by ulceration, sometimes supervene; the progress of the disease usually leading to the escape of the humours, and collapse of the globe. — 2. *Ulceration* frequently takes place, to the extent, and in the manner, described above (§ 24, 25.). — 3. *Sloughing of the cornea* rarely or never occurs in this variety. Mr. Lawrence has not met with it, and other writers do not mention it. — 4. *Bursting of the cornea* is less rare, particularly during suppuration or ulceration. Dr. Vetch met with cases, in which the rupture occurred without previous change; the aqueous humour having escaped by a clear division or rent in the cornea, which afterwards became opaque, and projected around the opening; but this occurrence is very seldom observed. — 5. *Interstitial deposition* in the conjunctival covering, or the corneal laminæ, occasioning opacity of every degree; the slighter grades often disappearing after recovery. — 6. *Loosening or thickening of the mucous membrane* covering the cornea, with enlargement of its vessels, and diminution of its transparency. — 7. *Opacity* from cicatrisation of ulcers. — 8. *Prolapse of the iris*, partial or total (*Staphyloma racemosum*). — 9. *Adhesion of the iris to the cornea* (*Synechia anterior*), either with or without prolapse. — 10. *Staphyloma*, general or partial, or other changes, from extension of the inflammation to internal parts of the organ. — 11. *Weakness or irritability of the eyes*, which usually disappears sooner or later. — 12. *Impaired vision* (*Amblyopia*), arising from numerous causes; as turgidity of vessels in the orbit, and surrounding the optic nerves; slight alterations of the choroid, retina, or lens; and lesions within the cranium. — 13. *Thickening, induration, and granulation of the conjunctiva* of the lids. — 14. *Temporary and permanent ectropium and entropium.* — And, 15. A *great tendency to relapse*, upon exposure to very slight causes. This last especially occurs, when the palpebral conjunctiva has not been restored to its natural state, — a result not readily attained after severe or prolonged attacks, and which Walther doubts ever to be entirely accomplished. Hence a person may be considered as cured, but experience a return of the complaint, from exposure to cold or intoxication, and may spread the disease in the family in which he resides.

45. δ. *Diagnosis.* — Purulent ophthalmia in the adult may be mistaken for the *catarrhal* and *gonorrhœal* varieties. The peculiar change in the palpebral conjunctiva, the great chemosis and swelling of the lids, the extreme redness and vascular congestion, the profuse purulent discharge, the long continuance of the complaint, its tendency to affect the cornea, and the disposition to relapses, sufficiently distinguish it from *catarrhal* or mild ophthalmia. Nevertheless, the mildest cases of the former, and the severest of the latter, hardly differ in any respect. The specific cause and nature of *gonorrhœal* ophthalmia, and its uniformly acute and violent form, distinguish it from the purulent variety. There are, besides, other differences, which will be noticed hereafter (§ 59.).

46. ε. *Treatment.* — (*a*) *Of the most acute, or highest grade of the disease.* — The intention should be to arrest the violence of the inflammation, and prevent the extension of it to the cornea. If the patient be seen sufficiently early, or before the conjunctiva oculi be much inflamed, or chemosis have appeared, the treatment advised in catarrhal ophthalmia will generally succeed. But, if the disease be thus far advanced, and has assumed a severe form, the most active antiphlogistic means ought to be resorted to. Vetch, Mueller, Rust, Walther, Lawrence, and other experienced writers, recommend *venesection* carried at once sufficiently far to produce a decided effect upon the circulation, without regard

to the quantity abstracted. Drs. EDMONDSTON, MACKENZIE, and JACOB place much less reliance upon large general bloodlettings, which have but little effect upon the local inflammation. This opinion coincides with the result of my own limited experience. Dr. JACOB has seen the abstraction of blood carried to the utmost extent; "he has seen repeated bleedings of forty, fifty, and even sixty ounces, and streams flowing from the arm and temporal artery at the same time, without generally beneficial results." After one full bloodletting, these writers coincide in trusting chiefly to *local depletions*, by cupping in the temples, by the application of from twenty to thirty leeches over the cheek-bone and temple, and by *scarifications* of the inflamed conjunctiva. This last is advised chiefly by Dr. EDMONDSTON and Mr. MACKENZIE; but it is objected to by Mr. LAWRENCE, on the grounds that the wounds thus inflicted increase the local irritation; in the most severe cases, however, the advantage accruing from the practice far outweighs any inconvenience contingent on it. Mr. MACKENZIE places scarification of the conjunctiva among the most effectual means of combating the contagious ophthalmia; but makes no mention of Dr. EDMONDSTON, who, many years before, strongly insisted on this practice. When the chemosis is great, SCARPA and WALTHER recommend a portion of the conjunctiva to be cut out, either from the eyelid or the globe; several drachms of blood usually flowing from the incision, with great relief to the symptoms. When the tumefaction is such as to project the membrane between the lids, or to overlap the cornea, Dr. JACOB directs an extracting knife to be run from one end of the tumour to the other, the effused serum and much blood generally escaping by this means.

47. Having practised bloodletting so as to make an impression on the circulation, conformably with the principles espoused in other places (see BLOOD, § 64, 65.), and immediately afterwards applied leeches, or scarified the conjunctiva, according to circumstances, full doses of *calomel*, *antimony*, or James's powder, and *opium*, conjoined, should be immediately taken, and followed, in a few hours, by a brisk *purgative*, and this latter, by a *cathartic* enema. If the calomel, antimony, and opium have been exhibited for the first time in the morning, they may be given again at bedtime, if the case be very acute; the cathartic being repeated at an early hour in the morning. If the tongue be loaded, or the stomach disordered, an antimonial *emetic* should follow the bloodletting, and precede the medicines now directed, which should be given soon after the full operation of the emetic, and repeated according to their effects. Having thus acted upon the circulation and the *primæ viæ*, without materially diminishing the local action and pain, *diaphoretics* and *nauseants* may be resorted to. Full doses of DOVER's powder, or *antimony* conjoined with *opium*, promoting their operation by *diluents* and *pediluvia*, will generally be of much service. *Nausea* kept up by these medicines is sometimes of use, in the more severe or obstinate cases, before the cornea is affected; but under other circumstances, it is seldom beneficial. The same remark is applicable to mercury exhibited with the intention of affecting the system. The most efficient and certain derivative cathartics, in this disease, are equal quantities of castor oil and spirits of turpentine, the same being exhibited in enemata (F. 151.); but they should not supersede the other means. The antiphlogistic treatment ought to be strictly enforced in an early stage of the disease, particularly in robust, phlogistic, and well-fed persons. In the *dark-skinned races*, as well as in persons of relaxed or cachectic habits, bloodletting is injurious; and even local depletions should be cautiously prescribed.

48. The *local Treatment* is even more important than the constitutional. After local bleedings, the frequent application of cloths moistened with *cold water*, or vinegar and water, and, when the headach is urgent, or the chemosis great, the *cold effusion* on the head, repeated twice or thrice daily, are favourably mentioned by WALTHER, VETCH, GERICKÉ, and LAWRENCE. If the cold applications cannot be borne, or if there be spasm of the lids, *warm fomentations* may be used for a short time; but they should not be long persisted in, or too frequently repeated, unless they be alternated with astringents. *Tepid ablution* is, however, both serviceable and requisite. Cold or warm applications should, therefore, be employed according to circumstances. Mr. TRAVERS prefers those that are tepid, in the painfully acute stage. Whichever be adopted, ought to be carefully attended to by the practitioner himself. As soon as the conjunctiva becomes somewhat paler, or appears flabby, *astringent applications* ought no longer to be withheld. In relaxed habits they should be very early applied, or immediately follow the local depletion. Mr. MELIN and Dr. O'HALLORAN, from having been dissatisfied with the antiphlogistic treatment, were led to the use of powerful astringents, not only in the first stage, but also when the purulent discharge and chemosis were fully established. Dr. O'HALLORAN used, once a day, either the sulphate of copper in substance, rubbing it on the inner surface of the eyelids after everting them; or the nitrate of silver, dropping a ten grain solution of it on the eye. He also applied fomentations, and gave purgatives. If the symptoms indicated the extension of the inflammation to internal parts of the eye, then only he directed leeches.

49. Mr. GUTHRIE, considering the nitrate of silver in solution to be ineffective, in the most severe cases, recommends an ointment, made with ten grains of this salt, reduced to an impalpable powder, and thoroughly incorporated with a drachm of lard, to be inserted between the lids. The eyes ought previously to be well cleansed with a tepid solution of alum; and when the ointment is inserted, the lids are to be moved freely, so that the whole conjunctiva receives it. If the membrane become white, it is satisfactorily applied; if not, the ointment should be rubbed on the inside of the lids. He also directs the patient to be bled fully, and until an impression is made upon the pulse; he employs warm narcotic fomentations to the eye; exhibits an opiate internally; injects, from time to time, a weak solution of alum under the lids, to wash away the discharge; and applies a mild ointment to them at night, to prevent their adhering together. The next morning, the discharge is

to be removed, and the strong ointment re-applied, so that the new action that should be set up may not cease; the other remedies are likewise to be continued. In addition to these, he gives calomel and opium, so as to affect the mouth; and the other more common remedies.

50. As different writers prescribe different astringents, and of various grades of strength, it were desirable that some more precise knowledge were attained as to which is the safest and most efficient. Dr. Jacob, after passing acetate of lead, alum, sulphate of copper, sulphate of zinc, corrosive sublimate, and lunar caustic, in review, decides in favour of the undiluted liquor plumbi acetatis, and strong solutions of alum, or of the nitrate of silver; which, however, he recommends after the painfully acute stage has passed, and in the chronic or atonic state of the complaint. Mr. Mackenzie directs a tepid solution of one grain of corrosive sublimate in eight ounces of water, to be injected under the lids, for the purpose of cleaning the eyes; and, as an astringent, four grains of the nitrate of silver, or six of the sulphate of copper, dissolved in an ounce of distilled water. The solution of alum, or of the oxymuriate of mercury (j.—ij. gr. to ℥j.) may likewise be tried. Mueller prescribes one, two, or three drops of sulphuric acid, or two or three grains of acetate of copper, in an ounce of water. Mr. Briggs states, that a minute quantity of the oleum terebinthinæ introduced between the lids every morning, on the point of a camel-hair pencil, the eye being afterwards bathed with cold water, is most efficacious in checking the profuse discharge.

51. It will be observed, from the foregoing, that some difference of opinion exists as to when the use of active astringents should be commenced. The majority of authorities, as Edmondston, Vetch, Mackenzie, Lawrence, Jacob, &c., resorting to local depletions, and soothing or anodyne applications, in the early, acutely painful, or active inflammatory stage, and to strong astringents, when this stage is removed, and the chronic or atonic condition has commenced; whilst some military authorities, as Melin, O'Halloran, and Guthrie, advise the adoption of powerful astringents from the beginning. I agree, however, with the former; and with them consider, that the effects of astringents should be carefully watched, when early, or even at first employed; and, if the redness be increased by them, that they should be laid aside for a time, and antiphlogistic remedies adopted. The *citrine* or red *precipitate ointment* should be applied to the edges of the lids at night.

52. In the *dark races*, astringents ought to be early and energetically employed. Among the negro tribes, *vegetable astringents* and *stimulants*, especially lime-juice, are entirely confided in. The astringents above noticed are, however, equally appropriate in them; and the addition of anodynes, particularly opium and camphor, is also of service, with pure air, and suitable diet.

53. *Blisters* to the nape of the neck, or behind the ears, are sometimes serviceable, especially when kept open for some time. When the pain is very distressing in the acute stage, relief is afforded by the *steam of hot water*, to which *laudanum* and *camphor* have been added; and the *vinum opii* is often a useful application, when the conjunctiva is relaxed and painful upon the disappearance of the discharge. *Evacuation of the aqueous humour* by incision has been recommended by Mr. Wardrop, in order to remove the bursting pain in the eyes and forehead, and practised in twenty-three cases by Mr. Macgregor, from a dread of rupture of the cornea. In the advanced stage of the disease, exercise in the open air, exposure of the eye to as much light as it will bear, and the use of *gentle tonics*, with a free state of all the excretions, are serviceable. If, after depletions, the eye becomes irritable, or the pain intermittent or periodical, the preparations of *bark*, with the *mineral acids*, as Mueller advises, will be of benefit. If *ulceration of the cornea* have commenced, a tonic and stimulating treatment is required, especially if it spread and be attended by debility. When *ectropium* of the lower lid remains after the inflammation is gone, and presents a red fleshy mass, Mr. Lawrence directs the application of the nitrate of silver in substance to it.

54. (*b*) *Treatment of the milder grades.* — If the inflammation have extended to the conjunctiva oculi, however slight, *local depletion*, low diet, and *purgatives* should be directed. When active disorder is removed by these, the application of *astringents* to the diseased surface of the eyelids should be entered upon, and continued until the morbid state of this part described above (§ 43.) is entirely removed. The solution of alum, or of nitrate of silver, or of sulphate of copper, the strength of which should be gradually increased, or the undiluted liquor plumbi, ought to be dropped into the eye, once or twice a day, the citrine ointment being applied to the margins of the lids at night. Exercise in the open air, free exposure of the eyes, and due regulation of all the natural functions, are beneficial. Mueller recommends mercurial ointments to be rubbed over the diseased surface of the lids once or twice daily.

55. *When the palpebral conjunctiva becomes altered, or granulated*, in the chronic state, as above described (§ 43.), very active local means are necessary, as the irritation occasioned by the morbid surface produces vascularity and opacity of the cornea, or loosening and thickening of its conjunctival layer — or *pannus*. With the change in the surface of the eye-lids, may be associated some one of the unfavourable results of the more violent attacks, as leucoma, synechia anterior, staphyloma, &c.—Mr. Lawrence remarks that, if the globe be free from irritation, the *astringents* already specified, particularly a solution of twenty or thirty grains of nitrate of silver in an ounce of water, should be applied to the granulated surface, with a camel-hair pencil; the lids being everted. If this be not sufficient, *escharotics*, beginning with the weaker, and proceeding to the strongest, must be used. In order to prevent their injurious action on the conjunctiva oculi, the lids should be everted, the diseased part only touched, and they ought to be kept everted until the effect is produced. The acetate of copper, the sulphate of copper, or the nitrate of silver — the strongest — should be lightly applied to the granulated surface, previously freed from moisture; and, after waiting a minute or two, the lid should be carefully washed and restored. These applications cause severe pain,

redness, and swelling, with increased discharge, and should not be repeated until these effects have disappeared, which may not take place for five, seven, or eight days. In the intervals of the escharotics, some astringent solution may be applied. Mr. LAWRENCE and Professor WALTHER do not speak very favourably of this plan; and are more disposed to depend upon antiphlogistic means in the first instance, and the subsequent use of astringents, as above directed, with regulation of diet and of the digestive organs, residence in a pure air, exercise, and a moderate use of the organ. Rapid improvement, Mr. LAWRENCE states, sometimes has followed the substitution of soothing applications for strong astringents.

C. GONORRHŒAL OPHTHALMIA. — SYN. *Gonorrhœal Inflammation of the Conjunctiva; Specific Ophthalmia; Conjunctivitis specifica; Ophthalmia Gonorrhoica vera*, BEER.

56. *This is a violent inflammation of the mucous membrane of the eyelids and globe, attended with a profuse discharge of a fluid closely resembling that which issues from the urethra in gonorrhœa, and occurring in some kind of connection with that complaint.*—It is the most violent and rapidly destructive inflammation to which the eye is subject; fortunately it is one of the most rare. It sometimes destroys the eye within a very short time; or irreparably injures it before medical aid is resorted to, especially in the lower classes. Mr. MACKENZIE divides it into — 1st, that from inoculation; 2d, from metastasis; and, 3d, without inoculation or metastasis. Mr. LAWRENCE distinguishes three forms: — *a*. Acute gonorrhœal inflammation of the conjunctiva; —*b*. Mild inflammation of this membrane; — and, *c*. Gonorrhœal inflammation of the sclerotic coat. I shall here consider chiefly the former; the third form being merely rheumatic ophthalmia, occurring, like other rheumatic affections, in connection with gonorrhœa.

57. *a. Symptoms and Progress.*— *Acute gonorrhœal ophthalmia* presents all the fully developed characters of purulent ophthalmia. Mr. LAWRENCE distinguishes three stages; which, however, are not very clearly evinced, although the division is judicious. In the *first stage*, which is short, the inflammation is confined to the conjunctiva, and is attended with a sensation of sand in the eye, and soreness, stiffness, uneasiness on exposure to light, and a thin whitish mucous secretion. Extreme vascular congestion, intense and general redness, excessive tumefaction of the conjunctiva, great chemosis, and swelling of the lids, supervene; especially as the disease approaches the *second stage*, which is characterised by a profuse discharge of thick yellow matter, closely resembling in its appearance, and in the stain it communicates to linen, the gonorrhœal secretion. When the discharge is established, the inflammation causes effusion into the cellular tissue connecting the conjunctiva to the surrounding parts. Hence the very remarkable chemosis, which is sometimes so extreme, as to overlap or hide the cornea; and the palpebral swelling and enlargement, which is occasionally very great. The affection soon extends to the cornea, constituting the *third stage*, with agonising pain in the globe, orbit, and head, augmented on exposure to light, and attended by symptomatic inflammatory fever. The danger to the organ is now most imminent. The swelling of the lids and chemosis render it difficult, or even impossible, to obtain a view of the cornea. When this is the case, attempts to attain this end should not be made so as to increase the symptoms. Although pain is most acute in both the eye and head, as in other instances when the unyielding cornea is the seat of inflammation; and although patients often complain of burning pain, of tension as if the eye would burst, with deep-seated suffering extending to the brow, forehead, and head, there are some instances in which little or no pain is felt. The symptoms are, however, not equally violent through the whole course of the complaint; and the *duration* of the *stages* varies with the constitution and health of the patient, and the treatment adopted. The *first* and *second*, particularly the first, usually passes away rapidly.

58. *b. Consequences.*—The immediate effects of the inflammation on the cornea are sloughing, suppuration, ulceration, and interstitial deposition; these changes leading to escape of the humours and collapse of the globe, obliteration of the anterior chamber, and flattening of the front of the eye, staphyloma, prolapse of the iris, obliteration of the pupil, opacity of the cornea, and anterior adhesion of the iris. Sufficient notice has already been taken of each of these lesions; as they do not differ from those supervening upon the other varieties of purulent ophthalmia, although they more rapidly appear, and in severer forms, than in them.

59. *c. Diagnosis.*—The severest grade of *purulent* ophthalmia closely resembles the acute *gonorrhœal*. In the latter, however, the swelling of the conjunctiva oculi is greater, and that of the eyelids somewhat less, than in the former. The discharge, however, is thicker, and perhaps more abundant, and the constitutional disturbance greater, in the gonorrhœal, in which the peculiar granulated change of the conjunctiva of the lids does not occur. In purulent ophthalmia, the disease begins in the lids, and advances gradually; but in the gonorrhœal, it seems to commence in the conjunctiva oculi: in one case, Mr. LAWRENCE saw it distinctly begin there; and it attacks most violently and proceeds most rapidly. The former generally continues long, affects both eyes, remits, or returns, rarely destroys the eye by sloughing, and is much less destructive: whilst the latter more frequently affects only one eye, and the cornea is much oftener destroyed by sloughing. This disease is uncommon, occurs in single instances, and in persons who have had, or who still have, gonorrhœa; whilst purulent ophthalmia usually affects numbers, particularly when many live together.

60. *d. Prognosis.* — Nine cases out of fourteen related by Mr. LAWRENCE in his treatise on this disease, were seated in one eye; out of the fourteen, loss of vision took place in nine cases from sloughing, suppuration, or opacity of the cornea. In two cases, one eye was lost and the other recovered. Sight was restored in the other five, with partial opacity of the cornea and anterior adhesion of the iris in three of the number. This writer adds, that so short a period intervenes between the commencement and full development of the complaint, that irreparable mischief

is generally done to the eye before aid is resorted to. In the *first* or *second* stage, its progress may be arrested; but success even thus early must not be reckoned upon. If the cornea still possess its natural clearness, the eye may be saved; but if it have become hazy or dull, and particularly if it be white or nebulous, serious consequences will ensue. Sight may, however, be restored after partial sloughing of the cornea; and ulceration may occur in its circumference without injury to vision. When both eyes are successively attacked, the disease is often less severe in the second, which, therefore, is saved; but exceptions to this occasionally occur, the sight of both being lost.

61. *e. Causes.* — Dr. VETCH found that the matter of acute purulent ophthalmia, applied to the urethra of the same individual, excited no disease; but that, when it was applied to the urethra of another person, it produced a virulent gonorrhœa: he therefore infers that the matter from the urethra, coming in contact with the eye of the same individual, would not occasion gonorrhœal ophthalmia. But Mr. MACKENZIE, Mr. LAWRENCE, and Dr. JACOB, adduce cases from their own practice, which were produced in this way, and refer to others from WARDROP, ASTRUC, ALLAN, and FOOT. It has been incidentally mentioned by SCARPA and BEER, that gonorrhœal matter applied to the eye excites only slight inflammation; but they do not refer to the source whence it was derived—whether from the same person or from another. The cases observed by LAWRENCE and the other writers just mentioned, show that this statement does not hold in respect of the same person, and that he may infect himself, although such infection is not so frequent, as the inattention of gonorrhœal patients, particularly in the lower classes, would lead us to expect; and the experience of WARDROP, DELPECH, BACOT, ALLAN, and MACKENZIE fully proves that the disease may be caused by the application of gonorrhœal matter from a different person, although, for obvious reasons, this cannot be a frequent occurrence. It is, therefore, placed beyond doubt, by the cases observed by the above writers, that the complaint may be caused by the contact of gonorrhœal matter — 1st, from the same individual, and, 2dly, from another. But as, in the greater proportion of cases of gonorrhœal ophthalmia, no application of matter, either from the same or another individual, can be traced, in what other way does the disease arise? It has been very generally imputed to metastasis in all such; and the discharge from the urethra has been said to be suppressed by ST. YVES, RICHTER, SCARPA, and BEER, but erroneously, as contended by DELPECH and LAWRENCE. In the cases which this last writer has recorded, the discharge was not stopped in any one, although it was generally lessened, but in some not at all. He therefore concludes that, since the complaint may occur while the discharge from the urethra continues, and since it does not take place when that discharge is stopped, we cannot admit that it owes its origin to the cessation of the urethral discharge. This supposed metastatic form he refers to the state of the constitution, considering it as analogous to those successive attacks of different parts which are observed in gout and rheumatism; and he remarks that, although direct infection operates equally on the eyes of both sexes, this particular form seems confined to the male. BEER says that he has observed it only in young, robust, and plethoric men.

62. *f. Treatment.* — The antiphlogistic plan, and particularly vascular depletion, has been carried to the utmost extent, sometimes with complete, but as often with only partial, success. Of six cases which Mr. LAWRENCE saw at an early period, and treated by *extensive depletion*, general and local, loss of the eye occurred in one only, — a most satisfactory evidence of the propriety of the practice. But whenever the disease comes late under treatment, no plan can succeed, so violent and rapid is the disease. The application of strong *astringents* and *escharotics* to the eye, in order to arrest its progress, has been advised, as its consequences have been so destructive to the organ; and the nitrate of silver ointment, already described (§ 49.), has been recommended by Mr. GUTHRIE. The success of this practice in the severe purulent ophthalmia, warrants its adoption in this; and active depletions, found so successful by Mr. LAWRENCE, in an early stage, may precede it. One circumstance, however, may militate against our inferences in favour of it, namely, the original and principal seat of disease being in the palpebral conjunctiva, in purulent, and in the conjunctiva oculi, in gonorrhœal, ophthalmia, the pathological states are not therefore the same in both. Notwithstanding, both modes of practice may be conjoined with advantage, as Dr. JACOB suggests. The oleum terebinthinæ, dropped into the eye, is deserving of trial.

63. Large and repeated *bloodlettings* from the arm or jugular vein, followed by local depletion and the remedies above advised (§ 62.), are, in the present state of our knowledge, most to be depended upon. But if sloughing or suppuration of the cornea have occurred, this treatment will be of no service. Mr. LAWRENCE has seen mercury employed without any advantage, and he places no reliance on the reproduction of the urethral discharge, as advised by RICHTER, SCARPA, and BEER. He also thinks *blisters* to be of little use. The eyes should be very frequently cleansed by the usual means. When the inflammatory symptoms have been completely and quickly subdued, the effects will pass off in a little time without astringents and tonics; but when the conjunctiva becomes pale and flabby, and the patient pallid and weak, the purulent discharge being still abundant, *astringents* locally, and *tonics* internally, are usually recommended. When sloughing or ulceration of the cornea is attended by signs of great depression, *quinine* and *generous diet* are necessary, and *astringent lotions* are sometimes of service. Mr. LAWRENCE prefers a solution of from two to ten grains of alum in an ounce of water, the solution of the nitrate of silver, and undiluted liquor plumbi acetatis.

64. *g. Mild gonorrhœal Inflammation of the Conjunctiva.* — Mr. LAWRENCE has described a very slight variety of gonorrhœal ophthalmia, consisting of external redness of a bright scarlet tint, with distension of the superficial vessels of the globe, and increased mucous secretion. In still slighter attacks, the redness is not deep nor gene-

ral, the membrane is not swollen, the secretion is but little increased, and the pain is trifling. The severer grades of this form approach to those of acute purulent ophthalmia, the conjunctiva being red throughout, tumefied, and secreting a copious yellow mucous matter. These milder states of the disease usually occur in patients with gonorrhœa of a rheumatic or gouty diathesis, and most frequently in conjunction with rheumatic affections consequent upon the gonorrhœal disease of the urethra.

65. *h. The Treatment* consists of antiphlogistic remedies, co-ordinate with the severity of the attack, and the strength of the patient; followed by astringent applications — the best of which, in the opinion of Mr. LAWRENCE, is the solution of lunar caustic.

66. *D.* PUSTULAR OPHTHALMIA — *Pustular Inflammation of the Conjunctiva.* — *a.* Inflammation of the conjunctiva, with small *pustules*, or *phlyctenulæ*, sometimes occurs from cold or other causes, and resembles, in its appearance, and occurrence chiefly in persons before puberty, the strumous form of the disease. But it is met with in those who are not strumous; and it does not exhibit the other symptoms of scrofulous or catarrhal ophthalmia: it therefore constitutes a distinct variety. It is characterised by distended fasciculi of vessels upon the conjunctiva, which run towards the cornea, either terminating at its margin, or extending a short way over this boundary, and there form a small reddish or whitish elevation. This elevation contains, at first, a little watery fluid (*Phlyctenæ*), but it afterwards assumes a pustular appearance. Sometimes only one is observed, at others there are a greater number extending around the margin of the cornea. They are usually small; but, when single, they are occasionally as large as a split pea. They are not attended by much pain or intolerance of light. If the complaint is neglected, the pustules may ulcerate, and the ulceration spread.

67. *b. The Treatment* consists in the application of *leeches* and *blisters* in the more acute cases. The disorder generally disappears, under ordinary circumstances, without ulcerating, when due attention is paid to the secretions and excretions: *mild aperients* and a *saturnine lotion* are usually all that are required.

68. *E.* SCROFULOUS OPHTHALMIA. — SYN. *Scrofulous Inflammation of the Conjunctiva*; *Strumous Ophth.*; *Inflam. of the Conjunctiva in Scrofulous Constitutions.* — Scrofulous children are very liable to this disease. It is sometimes the first manifestation of the strumous diathesis; and, if neglected, it often becomes the source of impaired, or entirely lost, vision. It seldom attacks infants before weaning; but, from that period to nine or ten years of age, it is very prevalent; as many as three fourths of the cases of ophthalmia at this period being scrofulous. Sometimes only one eye is affected, at other times both are inflamed from the first; and very often the disease passes from the one to the other. When both are simultaneously attacked, one is usually much worse than the other.

69. *a. Causes.* — *a.* The *predisposing causes* are those of SCROFULA (see that article) which may be very generally referred to climate, air, exercise, food; and to the habits, health, and constitution of the parents. — *β.* The *exciting causes* are exposure to cold and moisture, injuries to the eye, irritating matters in the air, excessive use of the organ; the common causes of catarrhal ophthalmia, or an attack of this complaint; teething, hooping-cough, and more especially cow-pox exanthematous diseases, and porriginous eruptions on the scalp and face. Measles and small-pox very frequently excite it; and JUENGKEN represents vaccination as one of its most common causes. He disapproves of the practice of vaccinating children in the first year; as he considers that a certain degree of constitutional vigour is required to remove from the system the poison introduced by inoculation; and that, when the child is weak or too young, the morbific matter is not thrown off, and calls into action the scrofulous diathesis. BEER states that, in Breslau, where ninety-five cases out of one hundred of ophthalmia in children are scrofulous, the streets are narrow and filthy, and the food of the poorer families unwholesome. Mr. LAWRENCE and Mr. MACKENZIE think that the complaints described by Mr. WARDROP under the denomination of "*Exanthematous Ophthalmia*," and by Mr. CHRISTIAN under the name of "*Porriginous Ophthalmia*," belong in every essential respect to the disorder now being considered.

70. *b. Symptoms and Course.* — *External redness* is often inconsiderable, and most apparent at first in the linings of the lids. It is generally only partial in the conjunctiva oculi, particular enlarged vessels, or fasciculi of vessels, running in this situation towards the cornea, and extending over its margin, or stopping short of it. Where the fasciculi terminate, small *phlyctenæ* or *pustules* form, and contain either a little clear or a yellowish fluid. These pustules may be seated on the sclerotica or cornea, but more frequently on the boundary between them; and may be single, or several. Their presence has induced Mr. MACKENZIE to view strumous ophthalmia as an eruptive disease. — The *intolerance of light* is extreme, and characteristic of the complaint. The lids are spasmodically closed, and resist any attempt to open them; and, when opened, the cornea is turned up under the edge of the orbit, and away from the light. The child puts all the muscles into action to protect the organ; and hence a peculiar and characteristic physiognomy is assumed. It seeks the darkest part of the room, or presses its face against the pillow in bed, to escape from the light. This excessive sensibility of the retina (*Photophobia scrofulosa*) is not caused by inflammation, nor is redness even essential to it; for it is often very remarkable where the eye appears almost natural; and the child opens its eyes and sees as well as usual in the dusk. This disordered sensibility is altogether sympathetic and functional; and is dependent, as Mr. LAWRENCE thinks, on the condition of the alimentary canal. I would impute it rather to the state of the organic nervous system.

71. There is a copious flow of tears at the commencement. The external surface of the organ suffers great irritation, extending to the lachrymal gland, so that when we attempt to examine the eye, or to expose it to the light, there is a copious discharge of scalding tears, causing redness of the lids, and excoriating them and the face. Owing to the itching and soreness

thereby occasioned, the child rubs or scratches the parts, which become sore and pustular, and produce a discharge which encrusts; the affection ultimately extending over the face and forehead, and in its worst form resembling *crusta lactea* and *porrigo larvalis*. The edges of the lids are often red, swollen, and painful. There are sometimes an acrid secretion from, and excoriation of, the nostrils; with redness and swelling of the alæ nasi and upper lip. The ears are frequently red and sore, or excoriated behind, and the absorbent glands of the neck are swollen. The bowels are costive, the tongue white or furred, the abdomen distended, the breath fœtid, the appetite is morbid, the head and sometimes the skin are hot, and the child is restless and grinds its teeth when asleep. The symptoms are worse during the day, but remit somewhat in the dusk of evening. The inflammation of the eye may suddenly subside, and return as suddenly; and very slight exciting causes will bring back the complaint; which may thus continue with slight intermission for months, or even for years. The affection of the eyes may also alternate with some other disorder, or symptoms, in remote parts. In the more chronic cases, the health suffers greatly from seclusion from light, air, and exercise; and the patient becomes pale, etiolated, and sickly, with a dry and harsh skin.

72. *c.* The *Consequences* of the disease on the cornea are often serious, although the external redness may not be great. The phlyctenular or pustular elevations in the cornea may subside, leaving *slight opacity*, or considerable thickening of the corneal conjunctiva with greater and more permanent opacity; but they more commonly *ulcerate*, in an irregular form, and with a ragged edge, the ulcers sometimes extending superficially, or making their way through the cornea to the anterior chamber, occasioning prolapse of the iris. The vessels passing over the cornea may, without forming pustules, occasion thickening and opacity, which may proceed so far as to render the whole corneal covering thick and vascular (*Pannus*). *Opacity* from interstitial deposition may also occur, either with or without enlargement of the proper corneal vessels; and, according to Dr. FRORIEP, a brownish red discolouration, from interstitial effusion of blood, may supervene. In addition to the opacity, the external layers of the cornea may yield from the pressure from behind, and form an external protuberance (*Staphyloma*); or adhesion of the iris to the internal surface of the cornea may take place. In some instances, the inflammation extends to the sclerotic coat and iris, and even to the parts seated behind them. This occurs most frequently in prolonged or after repeated attacks; and occasionally is followed by structural change of these parts, or by dropsical enlargement of the globe.

73. *d. Diagnosis.* — The extreme intolerance of light, and copious flow of tears in connection with the trifling external redness, the pustular elevations of the conjunctiva, sufficiently distinguish this affection, which frequently, also, co-exists with enlargement of the glands and scrofulous irritation of the nostrils, lips, behind the ears, and in other parts of the body. In many instances, however, of conjunctivitis in children, it is difficult to draw a distinction between the common and scrofulous forms of the disease; the characters of the one gradually merging into those of the other. This is more especially the case when the affection of the eyes is associated with, or consequent upon, either acute or chronic cutaneous eruptions, particularly such as affect the scalp and face.

74. *e.* The *Prognosis* is *favourable*, if the cornea be not affected, or if superficial or slight opacity, owing to deposition between its laminæ, only be present. Mere vascularity of the cornea will disappear; but if it be attended by thickening and opacity, the change will be more or less permanent. If ulceration have taken place to considerable depth or extent in the cornea, and especially if it be accompanied with affection of the iris, or lesion of the sclerotic coat, vision will be more or less impaired.

75. *f. Treatment.* — *a.* Constitutional or internal means are most important in this complaint. After the bowels have been freely evacuated, a course of *tonics* should be prescribed, with *alteratives*, to promote and improve the various secretions. A full dose of *calomel* and *rhubarb*, and afterwards equal quantities of the compound infusions of gentian and senna, or the compound decoction of aloes, repeated according to circumstances, will be most serviceable. In some cases, an *emetic* will advantageously precede the purgatives. Having thereby evacuated morbid matters, and excited the secreting and excreting viscera, tonics, especially the *sulphate of quinine*, will be productive of the greatest benefit. During the course of tonics, the hydrargyrum cum creta should be given, on alternate nights, with the sub-carbonate of potash and rhubarb or jalap. If the skin be pale, or the child languid and etiolated, the *preparations of iron* — especially the tinctura ferri ammoniata, the vinum ferri, the ferrum tartarizatum — may be preferred. An electuary of carbonate of iron, confection of senna, and treacle, may occasionally be substituted — particularly on the day following that on which the powder was taken. In some instances, the decoction of *bark*, with *sulphuric acid*, may be alternated with these tonics, especially after mercurials have been laid aside. Cascarilla with soda, or any of the tonic infusions, with small doses of the *chlorate of potash*, may likewise be tried.

76. *β. Regimen* and *diet* are most important items in the treatment. The patient should be warmly clothed, and take regular exercise in the open air, particularly when it is dry and bracing. Change of air, occasionally to the sea-side; and *warm, tepid, or cold bathing*, are also beneficial. In weak or irritable children, warm or tepid bathing, salt having been added to the water, or in sea water, should be first adopted; and cold bathing tried, as the health improves. The *diet* should be duly regulated; animal food in moderate quantity, suitable vegetables, and ripe baked fruits, being allowed; but all fermented liquors, indigestible substances, and rich crusts or pastry ought to be withheld. The usual farinaceous food should always constitute a chief part of the diet. The child ought to wear through the day a dark shade before the eyes; and sleep in a dark but well-aired room, with the head considerably raised.

77. γ. *Local Treatment.*—When the external inflammation is considerable, or approaches the characters of common ophthalmia, and is attended by symptomatic disturbance of the system, *local bleedings*, and the rest of the antiphlogistic regimen, should be prescribed, particularly at an early stage of the complaint. The intolerance of light is no indication of the propriety of local depletion; for it is generally aggravated by the practice, and relieved by tonics and a light and nutritious diet. Mr. MACKENZIE advises, particularly in chronic cases, and in the seat of the vascular fasciculi, *scarifications* of the eyes and lids. *Fomentations* with warm water, or a warm decoction of poppies and camomile flowers, are of service. Applications as warm as they can be borne are more beneficial than those that are cold, which are not suited to scrofulous persons. The steam of warm water to which camphor and opium have been added, is also useful; or a few drops of an opiate may be allowed to run between the lids. After the painfully acute symptoms have been removed, and the bowels freely evacuated, a solution of from two to six grains of lunar caustic in an ounce of water, dropped between the lids, is very serviceable in diminishing the irritability of the organ, and in healing slight ulcers. A stronger solution may be applied by a pencil to the ulcerated part, and the red precipitate ointment to the lids at night. In older children, *blisters* behind the ears or on the nucha are serviceable; but they ought to be removed after five or six hours. If thickening and opacity of the cornea be going on, the free administration of calomel or hydrarg. cum creta, either alone or with *James's* or *Dover's powder*, is advised by Mr. LAWRENCE, until the mouth is affected. When incrustations form in the vicinity of the organ, tepid ablution, and the mild ointments, at first alone, and afterwards with the oxyde of zinc, when the state of the complaint and of the system, or the previous treatment, will admit of drying them up, should be employed. — In cases attended by ulceration of the cornea, it will often be necessary to touch the part, every second or third day, with lunar caustic, as directed by SCARPA. The application of *belladonna* to the eye or its vicinity, to cause dilatation of the pupil, will occasionally be serviceable in preventing either adhesion or prolapse of the iris. — *Relapses* should be guarded against by a careful examination of the eye from time to time, by attention to the digestive organs, and by an invigorating regimen.

78. F. EXANTHEMATOUS OPHTHALMIA. SYN.— *Exanthematous Conjunctivitis — Inflammation of the Conjunctiva occurring during Exanthematous Fevers.*— Inflammation of the conjunctiva is frequently observed in the *course of*, or *consequent upon* —(*a*) *Small-pox*; (*b*) *Measles*; (*c*) *Scarlatina*; and (*d*) *Erysipelas.* — As to each of these associations, and the treatment most appropriate to it, I proceed to offer a few observations.

79. *a. Variolous Ophthalmia — Conjunctivitis Variolosa.* — *a. Small-pox* causes inflammation of the *lids*, of the lachrymal sac, and of the *eye*, during the active stages of the eruption; and it gives rise to inflammation of the eye, and of the conjunctiva of the lids, and of the nasal duct, after the eruption has subsided. When variolous pustules form *only* on the external surface of the *eyelids*, or the ciliary margins, the affection is comparatively mild. In confluent or severe cases of small-pox, the *lids* are much swollen and closed, and the oozing of matter usually agglutinates them, and confines the secretions poured out in the conjunctiva. As the disease subsides, the lids are opened, and the eye appears to have been but little affected. They are, however, often somewhat injured. The pustules on the ciliary margins partially destroy the cilia, and render the margins uneven and liable to inflammation from slight causes.

80. *β.* When the inflammation extends to the globe during the *eruptive stage* of small-pox, constituting true or *primary variolous ophthalmia*, and occasioning pustules on the conjunctiva or cornea, the affection is very severe, and is often rapidly followed by suppuration or sloughing of the latter, and by the more serious consequences of these changes. As the eyes are closed, and cannot easily be examined, it is important to ascertain by symptoms the existence of inflammation of the globe. This is indicated by a sense of dryness, stiffness, or of sand in the eye, with pain in the ball, increased on moving it, aggravated by light although the lids are closed, and attended by augmented lachrymal discharge as the affection proceeds.

81. γ. A form of the disease may occur two, three, or four weeks after the desiccation of the small-pox pustules (*Secondary Variolous Ophthalmia*). It is generally more mild in this case; but one or more pustular elevations may form on the cornea, with redness of the sclerotic, lachrymation, pain, and intolerance of light. It does not terminate by sloughing; but suppuration and ulceration often supervene, leaving more or less opacity, or a permanent white cicatrix, limited to a small extent, as the surrounding haziness of the cornea is removed, vision being partially or completely restored. In scrofulous constitutions, it assumes the characters described above, and degenerates into the chronic form.

82. δ. *The Treatment of these forms* of affection must be conducted conformably with the principles already explained. When the pustules are confined to the *lids*, they may be touched, in an early stage, with the lunar caustic, in order to arrest their progress, as advised by M. VELPEAU; or they may be opened, and the matter evacuated; the incrustations afterwards formed being removed by emollient applications and frequent tepid ablution. In the two other states, the danger to the organ is much greater, particularly in the *form attending the eruption.* But, as the affection of the eyes is most common in the confluent and adynamic states of small-pox, it cannot be advantageously combated by such free depletions as some surgical writers have advised. In many cases, local bloodletting and free purging may be of great service; but, when the constitutional powers are much depressed, no plan of ascertaining the state of the globe should be neglected, and a somewhat similar treatment of the pustules to that just advised should be practised as early as possible, to prevent their developement, and be followed by such astringent applications, alternated with soothing means, as the circumstances of the case may suggest. In the *secondary variolous ophthalmia*, *local depletions*, active *purgatives*, or even an *emetic*, resorted to at any

early stage, are more appropriate and beneficial. But the subsequent use of *astringents* will generally be required. In all the forms, *tonics* will afterwards be necessary; and the patient should be kept in a perfectly dark, but well-aired, apartment during the course of the disease.

83. *b. Morbillous Ophthalmia — Conjunctivitis morbillosa.* — Inflammation of the conjunctiva is a common attendant on *measles*. It is generally of a catarrhal kind, and may be either *primary* — preceding or accompanying the eruption; or *secondary* — remaining after, or following the disease at a short interval. Sometimes pustules form on the cornea, and pass into ulceration. There are generally much pain and intolerance of light in this variety; but it seldom assumes a severe, although often a chronic, character. The *Treatment* consists of *local depletion*, in the more acute cases; followed by active *purgatives, diaphoretics, blisters* behind the ears or on the nucha, *tepid washes*, and the protection of the organ from light.

84. *c. Scarlatinous Ophthalmia—Conjunctivitis Scarlatinosa.* — Inflammation of the conjunctiva may occur in the course of scarlet fever, in similar modes to those noticed in respect of the other exanthems; and although not so common in scarlet fever as in measles, it is sometimes more severe in the former than in the latter; ulceration occasionally supervening to a greater or less extent. This is, however, often the consequence of neglect. The *Treatment* is, in every respect, the same as that directed for the morbillous form.

85. *d. Erysipelatous Ophthalmia — Conjunctivitis Erysipelatosa.*—The inflammation of the conjunctiva attending erysipelas is preceded by redness and great swelling of the lids. In rarer instances, it follows upon an erysipelatous affection of the throat and posterior nares; and it is, in cases of severe affection of the face or scalp, often attended by much inflammation of, and effusion into, the cellular tissue surrounding the globe. It is most common in persons past middle age, or of a cachectic habit of body. The conjunctiva of the lids and ball is more or less injected; that of the latter often rises in soft yellowish red vesicles around the cornea, and occasionally it is affected in nearly a similar manner to the *pustular variety* already described. In some cases the redness partakes of a yellow tint, and in others of a livid or brownish hue. The eye has a watery appearance, and the cornea is often hazy from the fluid collected on its surface, but it is seldom otherwise affected. As the disease subsides, the copious lachrymation generally present is diminished, but the organ regains its natural state very slowly. The constitutional disturbance is very severe in this variety. (See ERYSIPELAS). The *Treatment* consists of local depletions, which, however, should be cautiously practised; of emetics, purgatives, blisters, diaphoretics; and of opening the vesicles that form, with the point of a lancet. In an advanced stage, tonics, and other remedies suited to particular cases, are requisite.

i. INFLAMMATION OF THE PROPER EXTERNAL TISSUES OF THE EYE. — *A.* COMMON INFLAMMATION OF THE EXTERNAL TUNICS. SYN. — *Ophthalmitis externa Idiopathica*, BEER; *Ophthalmia Sclerotica*, VETCH; *External Inflammation of the Globe*, LAWRENCE; *Catarrho-rheumatic Ophthalmia*, MACKENZIE, — *Phlegmonoid Sclerotitis.* — *a. Acute,* — *b. Subacute,* — *and c. Chronic.*

86. CHARACT.— *Redness of the external proper coats of the eye, with pain, intolerance of light, increased lachrymal discharge, and febrile disturbance.*

87. *a. Symptoms and Course.* — Simple or common inflammation of the eyes of persons otherwise healthy may originate in the conjunctiva or sclerotica; but, when severe in either, it generally extends to the other, and also to the cornea. It frequently also appears almost coëtaneously in both coats; and it presents every grade of severity. The external redness usually begins on the anterior part of the globe, forming a zone around the cornea, and arises from small vessels advancing from the posterior part of the sclerotica to the part adjoining the cornea. As the inflammation proceeds, the redness becomes uniformly diffused in the sclerotica, and is of a pink, rose red, or almost violet hue. In the more severe cases, the distended vessels are seen under the conjunctiva, occupying the whole surface of the sclerotica, and generally running in nearly straight lines from behind forwards. When the inflammation is seated in both this coat and the conjunctiva, the difference as to tint and situation between the vessels of each is very remarkable. The patient complains of stiffness and dryness of the eye, is intolerant of light, and feels a burning or aching pain, with a sense of tension, or pressure, or of dust in the eye (*Xerophthalmia*, or *Opht. Sicca*). The pain usually increases, and extends to the orbit and corresponding side of the head; the intolerance of light becomes greater; and the pupil is contracted. As the disease advances, the conjunctiva participates, its vessels are distended, and the cornea becomes dull, but not, at first, nebulous or opaque. In more violent cases, this membrane acquires a bright red colour, or even passes into a state of chemosis. At the same time pain and fever increase, the inflammation extends to the lids, and the cornea assumes a greyish hue. The dryness characterising the commencement of the complaint gives place to lachrymation, which is increased on opening the eye to the light, or moving it.

88. *b. The Effects* that present themselves, as the disease proceeds in an *acute form*, are observed chiefly in the cornea, and occasionally also in the iris.—The former becomes either vascular, and red or reddish brown, or greyish, and subsequently white, cloudy, and yellow, as if pus were infiltrated into its substance. It often afterwards *ulcerates*; the ulceration sometimes extending into the anterior chamber, and causing the usual consequences of this change. *Adhesion* also, of the iris to the cornea may occur either with or without ulceration of the latter, but always with more or less *opacity*. When the cornea presents only the first stage of change, is greyish, cloudy, or white, ulceration may be prevented, or arrested if it have begun, by suitable treatment; and, if it have not occurred, the cornea may regain its natural appearance.

89. *c. The sub-acute and chronic states* of the complaint are characterised by less severity, but longer duration, of the symptoms described above, particularly those depending upon the

affection of the sclerotica. They often follow the neglected or inactively treated acute disease. In these cases, the conjunctiva of the eyelids is somewhat irritated or inflamed. The eyes are painful on exertion, or exposure to much light; and the lachrymal discharge is thereby increased. In the more severe and protracted attacks, the transparency of the cornea and vision are more or less impaired. Although the chronic often thus supervenes upon the acute complaint, owing to neglect, to errors in diet, to indulgences in spirituous liquors, or to exertion of the organ, when the inflammation has been only partially subdued; yet, in persons of a cachectic habit of body, it may be the primary affection. In delicate or unsound constitutions, also, the complaint very frequently assumes a sub-acute or chronic form from the commencement, and continues long, until an increase of certain of the symptoms alarm the patient.

90. *d. Diagnosis.*— Inflammation of the external proper tunics of the eye is distinguished from that of the conjunctiva, by the redness commencing in the sclerotica, in the vicinity of the cornea, and extending backwards in the direction of the orbit, and only consecutively to the conjunctiva; inflammation of this membrane usually following an opposite course, and extending to the sclerotica only when it advances to the cornea. The discharge being lachrymal, and not mucous or purulent; the severity of the pain, and the intolerance of light; the situation and direction of the injected and enlarged vessels; the peculiar tint presented by the inflamed sclerotica; and the more frequent affection of the cornea; are circumstances sufficiently diagnostic of the complaint. The natural state of the pupil and iris, and the unimpaired vision, distinguish it from internal ophthalmia.

91. *e. The Prognosis* entirely depends upon the degree in which the cornea is affected.—As long as this part is unchanged, or if the lesion of it be but slight, a favourable opinion may be given. The case becomes serious, when the complaint occasions chemosis, and a greyish or whitish alteration of the cornea; and still more so, if matter be formed in it. In this case, ulceration will be inevitable; and the effect of ulceration or opacity upon the sight, will depend upon their extent and situation in reference to the pupil.

92. *f. Treatment.*—*a. In the acute form.*— *The predisposing and exciting causes* (§ 4, 5, 6.) to which the complaint may be referred, should be completely removed. The organ should next be protected from exertion, and from light and air. If one only be affected, the other should not be used, nor exposed to injurious influences. These measures, in slight cases, may be sufficient to cure the complaint; and have succeeded when further treatment could not be resorted to. But others should be employed, particularly in severe cases; and still more so in such as are violent, or are attended by affection of the cornea. Even in mild attacks, active treatment should not be withheld, as, even in these, neglect may be followed by serious results as respects the sight. *Bloodletting*, general or local, can rarely be dispensed with. The former ought always to be preferred when the complaint is attended by febrile disturbance, and should be carried sufficiently far to impress the circulation. It will be most advantageous if practised in the manner advised in the article BLOOD (§ 64.), and followed by the means there recommended (§ 65.). In milder cases, or in more delicate persons, or after venæsection, *local bleeding*, either by cupping on the nape of the neck, or behind the ears, or on the temples, may be directed; or leeches applied on the two latter situations. Mr. LAWRENCE advises them to be placed upon the lids, to the number of from twelve to twenty-four in the case of an adult. *Scarification* of the conjunctiva, is disapproved of by him, although recommended by some writers. WELLER advises it, when chemosis is present. In this form of ophthalmia, the modes of depletion now mentioned, are the most appropriate. *Cupping* in many cases may supersede venæsection; as a sufficient quantity of blood may be taken in this way, from either of the situations just named, for the exigencies of almost any case.

93. *Purgatives*, low diet, *refrigerants*, when the febrile excitement is considerable; and *diaphoretics*, are the next most important measures. *Calomel* and *James's powder*, either with or without *opium*, at bedtime; cathartics in the morning, and mild diaphoretics and diluents during the day; are generally appropriate. If vascular excitement continue notwithstanding, an antimonial *emetic* should be prescribed; or it may follow the depletion, and precede the exhibition of a full dose of calomel, and purgatives. In the more violent or protracted cases, *tartar emetic* may be given so as to keep up a continued nausea. When costiveness is present, or purgatives act insufficiently, drastic or terebinthinate *enemata* are requisite. If the free use of calomel, after the depletions, affect the mouth, the occurrence should be viewed as favourable; complete recovery being thereby accelerated, and the ill effects of the disease on the cornea prevented. *Colchicum* has been noticed in this complaint by several writers; and is serviceable either in the form of powder with calomel, or in aperient mixtures. It is most efficacious after the bowels have been fully evacuated. When the inflammation has been nearly removed by the preceding remedies, blisters on the nucha or behind the ears, and warm *pediluvia* at bedtime, are useful in preventing a relapse, or the passage of the complaint into a chronic state.

94. The *local means*, in addition to bleeding, consist chiefly of *cold*, *warm*, *emollient*, and *astringent* applications. The choice of these is a matter of some difficulty; but, when the disease is only commencing, or when the patient complains of great heat or burning in the eye, and experiences relief from *cold epithems*, then any of the various modes of applying cold may be adopted. If, however, the complaint be advanced, or if cold occasions an aching or chilling sensation, warm applications or *fomentations* should be preferred. It has been doubted by Mr. LAWRENCE and some other writers, whether such as are *emollient* and *narcotic* be at all superior to those which are more simple. The former have been recommended principally by Continental, the latter by British, physicians. The doubt has arisen chiefly from a physiological notion long entertained, although the grounds on which it is founded admit of a ready refutation. An intimate observation of phenomena — the only legitimate

experience — should alone decide the question. Although my experience in this matter has necessarily been limited of late years, yet have I seen enough even of this complaint, to convince me that fomentations with emollient and anodyne substances are superior to those which are simple — which consist only of warmth conjoined with humidity. Therefore, when the pain and intolerance of light are great, the disease somewhat advanced, or even established, warm emollient and anodyne applications ought to be preferred. Scarpa directs mallows boiled in fresh milk as a fomentation; or emollient and *anodyne vapours*, to be conveyed to the eye through an inverted funnel. Mr. Mackenzie directs *opiate frictions* of the forehead and temples, and the eye to be kept under the influence of *belladonna*. Fomentations with a decoction of poppy-heads and camomile flowers, or marshmallows; and the vapour of warm water, to which camphor and the watery extract of opium have been added; are generally beneficial in the circumstances just stated. Dr. Smith remarks, that when the pain was not alleviated by bloodletting or by fomentations, much and lasting relief was procured by exposing the eye, twice or thrice daily, to the steam arising from the following mixture brought to a boiling heat. It is now eighteen years since a nearly similar combination, but with much more opium and camphor than is here ordered, was prescribed by me with great relief, in a case of the disease.

No. 219. ℞ Mist. Camphoræ ℥ij.; Tinct. Opii ʒss.; Liq. Ammon. Acet. ℥ij.; Aq. Rosar. ℥iv. M.

95. *β. The sub-acute and chronic states*, especially the former, sometimes require either *venæsection*, or full *cupping*, particularly in young or robust persons. In most instances, *leeches* should be applied to the vicinity of the eye; and sometimes either they or cupping ought to be repeated oftener than once. *Purgatives* should be freely employed; and, if the tongue be loaded, and the evacuations offensive, an *emetic* should precede them. Great attention ought to be paid to the *diet*; and animal food must be taken only in small quantity, or nearly relinquished. *Counter-irritation* is generally beneficial; and either open blisters, pustulation by means of tartar emetic, setons, or issues, should be directed to the nape of the neck, behind the ears, or to the temples. During treatment, the bowels should be freely opened by stomachic purgatives, particularly if the tongue be loaded, and the discharges morbid; and the regimen as well as the diet rigorously restricted. If the above treatment have been actively employed, the complaint will be removed, without the necessity of resorting to *astringent* or *stimulating applications*. But, in neglected cases, they are sometimes very beneficial, especially if the affection of the conjunctiva be considerable, after the above measures have been appropriately prescribed, and when the complaint is far advanced, or in a chronic state. The *vinum opii*, dropped into the eye, was recommended by Mr. Ware; and is suited chiefly to chronic cases. The liquid laudanum of Sydenham (F. 729.), or preparations similar to it, may also be applied. The collyrium praised by Conradi, and which consists of one grain of corrosive sublimate dissolved in six ounces of rose water, with the addition of a drachm of mucilage of quince-seeds, and half a drachm or a drachm of Sydenham's laudanum, is often of service. Several other applications, some of them much more astringent than the above, have been recommended; but they are undeserving of particular notice. The astringent ointments and solutions, found so beneficial in the treatment of conjunctivitis (§ 16, 50.), may also be employed in the chronic states of this complaint, particularly under the circumstances just specified.

96. B. Rheumatic, Catarrho-Rheumatic, and Arthritic Ophthalmia. Syn. — *Opht. Rheumatica et Arthritica.—Sclerotitis Rheumatica et Arthritica.— Inflammation of the External proper Tunics in Rheumatic and Gouty Constitutions.*

97. *a.* The *Rheumatic* modification of ophthalmia — *Sclerotitis Rheumatica* or *Atmospherica* of Mackenzie — is seated in the external proper tunics of the eye, as in the common, or phlegmonoid, variety just described. The conjunctiva is only slightly affected; but the inflammation sometimes extends to the *iris*, or *cornea*, or to both, but generally in a slight degree. It is commonly *caused* by cold, or currents of air striking the eyes of persons of a rheumatic diathesis. It is not a common affection, and seldom arises from metastatis.

98. *b. Symptoms and Course.* — A stinging or tearing pain is complained of in the eye, increased by heat and by a warm bed, and extending to the orbit and adjoining parts of the head and face. The sclerotica is of a rose red, and shines through the conjunctiva, which is more injected than usual. There is an increased flow of tears, aggravated by changes of temperature. The pain subsequently becomes more dull and aching, extends with greater severity to the neighbouring parts, and lachrymation is augmented. The intolerance of light, which was only slight, is afterwards felt only in a strong light. Dullness or haziness of the cornea is frequently observed, but is seldom followed by any serious change. Sometimes *phlyctenulæ* appear in the conjunctiva oculi and cornea, but they do not often pass into ulceration. The biliary and intestinal functions are more or less disordered; and febrile disturbance is commonly present. The *severity* and *duration* of an attack vary very much. Slight cases soon subside; but severer attacks may give rise to *iritis*, which is, however, rarely acute, unless the disease be neglected, when it may go on to effusion of coagulable lymph. Rheumatic sclerotitis is not attended by affection of the lids, nor by chemosis; it does not give rise to suppuration, and rarely to ulceration, the ulcers being small or peculiar, and healing readily; and it sometimes lapses into a very chronic, slight, or recurring form.

99. *c.* The *Catarrho-rheumatic* ophthalmia of some writers does not differ materially from the common or phlegmonoid inflammation of the proper external tunics (§ 86.), being seated in the sclerotica and conjunctiva. It is usually *caused* by cold, and atmospheric changes; and, in the rheumatic diathesis, very nearly approaches, or merges into, the rheumatic form; the only difference being in the greater affection of the conjunctiva, and in the consequent manifestations of certain catarrhal symptoms.

100. *d. Arthritic Ophthalmia—Sclerotitis Arthritica.—Arthritic external Opht.*—or inflamma-

tion of the external proper coats occurring in the gouty habit, is oftener attended by *iritis*, than the rheumatic variety; but iritis is frequently observed in gouty persons without sclerotitis. Sometimes gouty inflammation of the sclerotica is accompanied with an *erysipelatous form of conjunctivitis*, which **Beer** has seen to follow the suppression of gout in the feet by cold. The *progress* of this modification of external ophthalmia, in its early course, is similar to the rheumatic, when it is confined chiefly to the sclerotica; but when the conjunctiva is also affected, it hardly differs from the *erysipelatous variety* already described (§ 85.). When the external proper tunics are the parts attacked by the gouty affection, pain of the eyeball is very acute, and darts in the course of the facial nerves, and is usually preceded by a pricking sensation. A flow of acrid tears takes place. The sclerotica around the cornea, becomes of a rose red colour, which is less vivid towards the circumference of the globe; and does not extend to the cornea, but leaves, immediately around it, as a pathognomic symptom, a narrow bluish white ring. The conjunctiva oculi soon partakes in the redness and increased vascularity, and is subsequently congested and varicose; the bright redness being changed to a dirty grey or violet colour. Arthritic ophthalmia runs a shorter or longer course; is milder in dry weather and in summer, than in wet weather and in winter; and is aggravated by, or accompanied with, derangements of the digestive organs. It is generally associated with iritis, but arthritic iritis may exist without the external proper tunics being materially affected. (See *Arthritic Iritis*, § 134.)

101. *e. The Prognosis* in *rheumatic ophthalmia* is favourable, unless phlyctenæ have formed and occasioned small ulcers; or iritis have supervened. But, in young or healthy persons these ulcers seldom leave permanent specks or cicatrices behind them. *Arthritic ophthalmia* is generally a more serious complaint than the rheumatic; and if it be attended with iritis, the association is much more dangerous to vision. It is also frequently accompanied with affection of the internal parts.

102. *f. Treatment.* — *a.* In *rheumatic ophthalmia*, general *bloodletting* is rarely necessary, but *local bleedings* are often serviceable. *Calomel* conjoined with *camphor*, *James's powder* and *opium*, at bedtime; and stomachic purgatives in the morning, assisted by *terebinthinate enemata*; are very beneficial in this variety. *Colchicum* is often of use, in conjunction with aperients and alkaline or magnesian carbonates: but it should not be given in the very large doses mentioned by some surgical writers. Its effects ought always to be carefully watched. After the bowels have been freely evacuated, the *spiritus colchici ammoniatus*, or a combination of the powder and camphor, should be preferred, particularly in delicate or aged persons. Warm applications and *fomentations* are most appropriate in this variety; and the steam of boiling water, containing camphor and tincture of opium, generally affords relief. *Diaphoretics* and warm *pediluvia* are also useful. If *iritis* has come on, *calomel*, in the combinations just stated, is especially indicated. If the mouth be affected by it, the good effects will be greater and more permanent.

103. Besides the above remedies, others may be employed in *chronic* or obstinate cases: as the compound decoction of guaiacum, or the decoction of bark with the ammoniated spirit of colchicum; quinine with or without the powder of colchicum; **Fowler**'s arsenical solution; **Plummer**'s pill and aperients; antimony or ipecacuanha with camphor and opium; vinous or spirituous preparations of opium dropped into the eye; frictions in the vicinity of the eye with opium or belladonna, or with both, to alleviate pain and dilate the pupil; and counter-irritation by blisters or the tartar emetic ointment behind the ears or on the temples. If phlyctenulæ form, and run into small ulcers, *astringent* and *stimulating applications* will be necessary. In cases presenting much biliary or gastric disorder, an *emetic* will be useful; and, under any circumstances, change of air, regulated diet, attention to the biliary and intestinal functions, and the repose or moderate exercise of the organ, will be of essential service.

104. *β.* The *treatment of arthritic ophthalmia* does not materially differ from that recommended in the rheumatic form. Warm stomachic purgatives, with full doses of the alkaline carbonates, and the ammoniated spirit of colchicum; mustard pediluvia; blisters behind the ears; and dry warmth applied to the eye; and anodynes rubbed upon the temples and eyebrows; are more particularly indicated in this variety. If *iritis* supervene, the means directed hereafter in *Arthritic Iritis* must be resorted to.

105. *C.* **Inflammation of the Cornea.** Syn. —*Corneitis*, *Ceratitis*, **Juengken**; *Keratitis*, **Rosas.** — Corneitis may be either *acute* or *chronic*, *primary* or *consecutive*. Inflammation may commence in the cornea, and be confined to it, or extend to the sclerotica and conjunctiva, and sometimes to the iris; or it may begin in either of these tunics, and advance to the cornea. Corneitis often comes on, in this latter form, in most of the varieties of ophthalmia which have been considered; and presents either the *acute*, *sub-acute*, or *chronic* states, especially the latter. The *primary form* of corneitis, therefore, remains to be noticed. It is much less common than the consecutive; and is most frequently *caused*, epecially its *acute* or *severe states*, by external injuries, and by foreign bodies or acrid substance brought in contact with the cornea.

106. *a. Acute Corneitis* may be of various degrees of severity in different persons. In some, there is but little local uneasiness beyond irritation on motion; whilst, in others of a full habit, or who are laboriously occupied, exposed to heat, or addicted to intoxicating liquors, the inflammation is most intense, and rapidly extends to the sclerotica and whole anterior chamber, with *hypopyon*. The more severe states usually commence with a pink zone in the sclerotica, around the cornea; which loses its transparency, and becomes minutely injected with delicate-coloured vessels, particularly at its circumference, and dull, turbid, or cloudy. If the inflammation be excited by a foreign body, ulceration takes place around it. If the disease be not soon arrested, the pink zone assumes a deeper tint, and extends further in the sclerotica; the cornea is rendered more opaque, and suppurates; and the chambers of the aqueous humour are involved. When the

cornea is penetrated either by ulceration or suppuration, the aqueous humour escapes, the iris and cornea coming in contact. When the wound in the cornea is small, it unites by adhesion, and the aqueous humour is soon reproduced; but, when it is large, prolapsus of the iris often results.

107. *b. Sub-acute and chronic Corneitis* are common in young persons of a fair complexion and delicate constitution. The cornea loses its transparency, presents a dull grey colour, or becomes hazy, nebulous, or nearly opaque; the opacity commencing at the circumference, and gradually but unequally extending. The nebulous and opaque spots are sometimes yellowish, as if matter were formed; and the surface loses its polish, and seems rough. The circumference of the cornea is minutely injected with a multitude of very fine vessels, which impart to it a reddish brown tint, and occasionally elevate it somewhat. The conjunctiva often retains its natural paleness, but the sclerotica is minutely injected, particularly around the cornea. As the brownish red tint of the circumference of the part increases, the opacity in its centre becomes greater, and vision more affected. There is generally much intolerance of light, notwithstanding the diminished transparency of the cornea, owing to affection of the sclerotica. A *partial form of corneitis*, which is generally of very long duration, is sometimes met with. Inflammation commences in one or two spots at the circumference of the cornea, with pain of the eye, and nebulosity; others being affected in succession. Redness is first observed in the sclerotica, in one or two points; and minute vessels extend from these into the cloudy spots in the cornea; more or less of which may become thus affected, or entirely opaque.

108. Although the severe and *acute* grades of corneitis often run into suppuration or ulceration, the slighter or more *chronic* states do not terminate in this manner, excepting in sub-acute cases, where partial or circumscribed points of suppuration may occur. The more severe grades are attended by much pain in the eye, temples, and forehead; with tension of the organ, white tongue, and febrile disturbance, particularly at an early stage; and they often pass into the slighter and chronic states; but the latter also occur primarily. Chronic corneitis presents much less febrile disorder than the acute, and often continues for several months, or remits. The inflammation sometimes extends to the iris, occasioning adhesion of its margin to the capsule of the lens.

109. *c. Scrofulous Corneitis — Corneitis scrofulosa.* — Inflammation of the cornea in scrofulous habits has been minutely described by Dr. Froriep and Mr. Mackenzie; but its local characters do not differ from those of the sub-acute and chronic forms noticed above (§ 107, 108.), excepting that it is more obstinate, and more liable to return. It is sometimes unattended by redness of the sclerotica; and the pain is not considerable. It is most common about the period of puberty, and is occasionally connected with amenorrhœa in the female, and with swollen lymphatic glands. In the more obstinate cases, increased secretion of the aqueous humour, and consequent enlargement of the anterior chamber, occasionally supervene.

110. *d. Treatment.* — *a. Acute corneitis* requires active depletory and other antiphlogistic measures. *Cupping* behind the ears or on the temples is always necessary. *Purgatives*, and afterwards *calomel* with *James's powder*, and occasionally with *opium*, until the mouth is affected, are beneficial, especially if the iris be inflamed. In the more obstinate and *chronic* cases, cupping, or the application of a number of leeches to the vicinity of the eye, should be repeated oftener than once, and be followed by open *blisters*, *setons*, or issues. Mr. Lawrence advises issues to be inserted in the temples. *Astringent* and stimulating applications to remove the opacity are generally injurious. Warm *fomentations* are more serviceable, particularly with emollient and anodyne substances. *Emetics*, if the digestive organs be loaded; and *diaphoretics*, assisted by warm pediluvia, if the skin be dry, and fever present; are also useful. — *β*. The *scrofulous variety*, especially its more chronic states, is benefited most by sarsaparilla, sulphate of quinine, decoction of bark with liquor potassæ, the compound myrrh mixture, the hydriodate of potash, and by small doses of the oxymuriate of mercury in tincture of bark. — As this variety often continues many months, perseverance in the use of these means, and changes from the one to the other, a dry warm air, and change of air, with attention to the state of the digestive organs, and a carefully regulated diet, are most requisite.

III. Inflammation of the Internal Parts of the Eye.

Syn. — *Internal Ophthalmia, Ophthalmitis Interna*, Auct. var.

111. Defin. — *Inflammation of one or more of the internal tissues of the eye, occurring either primarily, or consecutively of external disease, and attended by impaired vision, and frequently by constitutional disorder.*

112. In diseases of the internal eye, *artificial dilatation of the pupil* is necessary both to the investigation of their nature and extent, and to their treatment. Mr. Lawrence has given a learned account of the agents by which dilatation may be accomplished. Various narcotic vegetables possess this power, but *belladonna* in the highest degree. The tincture, extract, decoction, infusion, or powder of this plant may be employed for this purpose, either internally, or dropped into the eye, or rubbed on the brow or temple. *Hyoscyamus* is the next powerful substance. An aqueous solution of the extracts of either may be rubbed or placed upon the eyelids or parts in the vicinity, and washed off after remaining for about an hour; or it may be dropped into the eye, when a speedy and certain effect is desired.

i. Inflammation of the Anterior Chamber.

Syn. — *Inflammation of the Capsule of the Aqueous Humour*, Wardrop; *Aquo-Capsulitis*, Mackenzie; *Kerato-iritis*, Rosas; *Inflammation of the Anterior Chamber*, Lawrence.

113. Charact. — *Diffused muddiness, or mottled appearance of the cornea, dimuess of vision, fulness and tension of the eye, dullness of the iris, slightly contracted pupil, heudach, white tongue, and fever.*

114. Inflammation of the membrane of the aqueons humour is often *consequent* upon the varieties of ophthalmia already described; but it is also a *primary* disease, and is most common in this form among children. It cannot be considered, even when primary, to be confined to the anterior chamber, or to this membrane. The

posterior chamber, the cornea, and iris, evidently, are also affected more or less. External inflammation involving the cornea may extend to the anterior chamber and to the iris; or inflammation may commence in the latter, and spread over this cavity to the cornea, and either adhesion of the iris to the cornea, or hypopyon, be produced. Primary inflammation of this membrane presents the usual phenomena of inflamed serous surfaces; viz. effusion of albuminous or coagulating lymph, or of a serous fluid, and very rarely of pus; the first of these sometimes becoming organised into morbid adhesions.

115. *A. Symptoms.* — The anterior chamber is cloudy; the iris becomes dull and dark, its surface assumes a reddish brown tinge, the reddish tint being most evident in light eyes; and the pupil is somewhat contracted. The cornea loses its transparency, becomes nebulous or mottled, sometimes with an ulcer in its surface. There is but little external redness, excepting a pink zone around the cornea. An effusion of whitish or yellowish matter takes place in the anterior chamber; and the patient complains of pain and aching in the eye and forehead, of fulness or tightness in the organ, and of intolerance of light, especially early in the complaint; these symptoms subsiding at more advanced periods. Its progress in children is not rapid. Mr. Wardrop considers the opacity to be seated in the internal surface of the cornea; and that it arises from a number of round specks, which give a mottled appearance to this part, particularly in adults. He also believes the effusion into the chamber, which has been generally considered pus, to be albuminous, and similar to that which causes adhesions, but not coagulable.

116. *B. Hypopyon* — or the presence of a yellowish matter in the anterior chamber, resembling, and usually called, *pus*, and attending or consequent upon inflammation — accompanies the affection now under consideration. But it more frequently supervenes, in the advanced course of inflammation of the external coats, from the bursting of an abscess in the cornea. It may also occur from iritis, particularly if an abscess of this part burst into the anterior chamber. Inflammation, however, of the membrane of this chamber, is common to all these affections, in a consecutive or associated form. When matter is effused behind as well as before the iris, it constitutes *empyesis oculi*, or suppuration of the eye. Various forms and divisions of hypopyon have been devised by Beer, Richter, Benedict, and Juengken; but they do not deserve notice, as they lead not to any practical result, and as this is not a peculiar disease, but the result of inflammatory action consecutively or primarily affecting the membrane of the chamber, and tissues surrounding it. Whether the matter in hypopyon be pus or an albuminous fluid, it seems to sink to the bottom of the aqueous humour; but, in some instances, it appears as if heaped up or in lumps; and, in this case, a minute admixture of blood sometimes is seen in it.

117. *C. Treatment.* — *a. Inflammation of the anterior chamber* is readily controlled by local *bleedings*, *purgatives*, and *calomel* with *James's powder*, given twice or thrice a day. Mr. Wardrop has strongly advised puncture of the cornea, to *evacuate the aqueous humour*, in this and some other affections attended by inflammation of the membrane secreting this humour, after suitable treatment has been employed; and Macgregor, Mueller, Langenbeck, and Benedict speak favourably of it, as a measure calculated to prevent rupture of the cornea in purulent ophthalmia. Mr. Lawrence, who takes a candid view of the matter, thus remarks: — "I have tried it in some instances, but with so little benefit that I have not been induced to persist in the practice; and I have been the less inclined to do so in severe inflammations, because the ordinary antiphlogistic treatment enables us to control them."

118. *b. Hypopyon*, being an attendant, rather than a termination, of inflammation beginning in or extending to the anterior chamber, requires the antiphlogistic treatment recommended in the acute forms of ophthalmia. The only question is, whether or not the cornea should be punctured to evacuate the matter collected behind it. Puncture or incision has been advised for this purpose by Ware, Richter, Benedict, Langenbeck, and Wardrop. Beer at one time directed it, but afterwards reprobated it. Dr. Monteath and Mr. Mackenzie recommend its performance in every case in which the chambers are completely filled; as they consider absorption in such not to be depended upon, and dread the bursting and destruction of the eye. Scarpa and Lawrence, on the contrary, prefer active antiphlogistic treatment; as they consider that the operation aggravates the inflammation, and that when the inflammation is removed by judicious and energetic means, the effusion will be rapidly absorbed. In this opinion I entirely concur.

ii. Inflammation of the Iris. Syn: — *Iritis*, Schmidt.

119. Charact. *Fine vessels running in radii to the edge of the cornea; dark discolouration of the iris; contraction, irregularity, and immobility of the pupil; effusion of coagulable lymph into the pupil and posterior chamber, occasionally also into the anterior, causing adhesions of the iris to the capsule of the lens, with dimness of sight, sometimes almost amounting to blindness, pain in the eye, and nocturnal pain about the orbit.*

120. This affection was not known until it was ably described by Schmidt of Vienna. It may be *consecutive* of the diseases already noticed; but it often occurs in a *primary form*, and then generally assumes more or less of the characters of adhesive inflammation, the danger occasioned by it to the organ arising chiefly from this circumstance; for, if neglected or injudiciously treated, the pupil may become completely and irremediably obliterated by effusion of coagulable lymph. Some degree of inflammation of the sclerotica, and of the anterior hemisphere of the crystalline capsule, often extending to the choroid and retina, generally accompanies this disease; but the iris is the focus of morbid action, and the situation of the chief lesions. The primary states of the complaint commence in the pupillary edge of the iris, spread to the rest of the iris, to the capsule of the lens, and, perhaps, to the choroid and retina. The attendant inflammation of the sclerotica may be sympathetic, or otherwise related to it. — *Iritis* has been divided into the *idiopathic*, or that occurring primarily in persons of a healthy constitution; and the *sympathetic*, or that affecting those of an

arthritic diathesis, or supervening in the course of syphilitic cachexia.

121. *Causes.* — *Primary Iritis* occurs most frequently in persons of an unsound constitution — the gouty, rheumatic, and cachectic; and hence it presents certain modifications hereafter to be noticed. It rarely occurs in young and healthy persons; although it may supervene, in them, upon the other varieties of ophthalmia. It is *excited* by the common causes of inflammation of this organ (§ 5.); especially by over exertion, and employment of sight on minute or bright objects; by external injuries or operations on the eye; and by exposure to cold, wet, and atmospheric vicissitudes. These last are the common exciting causes in persons imbued with the syphilitic cachexia, and in those of a rheumatic and gouty diathesis. I do not believe that the use of *mercury* will cause the complaint, if it be given so as to affect the mouth.

122. *A.* Idiopathic Iritis. — *a. Symptoms and Course.* — Iritis presents various *grades of severity*, and *periods of duration*. It may hence be *mild* or *severe*; *acute*, *sub-acute*, or *chronic*. I shall adopt Mr. Mackenzie's division of iritis into *three grades*. — *α. In the first degree*, the vascularity of the sclerotica is barely perceptible, and exists only in one or more points, and chiefly behind the upper lid. The ring of the iris next the pupil is slightly discoloured; the pupil is not materially contracted, but is somewhat irregular, without its usual clean and sharp edge, and is hazy; and the motions of the iris are limited and slow. Vision is confused and slightly obscured. There is little or no pain, or aversion from light. This state of iritis may exist for many weeks, and yet be completely removed by suitable treatment.

123. *β.* The *second degree*, or that with evident external inflammation of the eye, is much more frequent than the foregoing. A zone of vascularity is observed in the sclerotica around the cornea, the vessels sinking through the sclerotica, and not advancing into the cornea. The iris, particularly its inner or smaller rings, is discoloured, either from injection of its vessels or the effusion of lymph; and its anterior surface, instead of being smooth and shining, appears dull, puckered, and swollen, especially near the pupillary opening, where it is retracted towards the lens. The pupil is contracted, irregular, motionless, and filled with coagulable lymph, which generally appears like half-boiled white of egg. Epiphora and intolerance of light are considerable, and vision becomes greatly impaired. The pain in the eye is constant, and attended by pain in the orbit and forehead, particularly at night; and by the usual symptoms of inflammatory fever.

124. *γ.* The *third degree* of iritis presents the following characters: — The eye externally is much more inflamed than in the foregoing grades; the redness of the conjunctiva being sometimes so great as to mask for a time the red zone of the sclerotica. Both the smaller and larger rings of the iris are discoloured; the anterior surface being swollen, puckered, and bolstered forwards so as to approach the cornea, excepting its pupillary edge, which is retracted towards the lens. Red vessels and spots of blood are sometimes seen on the iris, but more frequently in the lymph occupying the very contracted pupil. One or more minute elevations, of a yellowish colour, which are in some cases specks of effused lymph, in others small abscesses, appear on the surface of the iris; and pus discharged from these abscesses, with lymph, blood, and serum, sometimes occupy the anterior chamber. The cornea becomes hazy and turbid, and occasionally dotted with minute brownish spots. There are at first great intolerance of light and lachrymation; and subsequently vision is completely, and generally permanently, lost. Flashes of light in the eye are frequently perceived by the patient, indicating the extension of inflammation to the choroid and retina. The pain in the organ is constant, great, and sometimes excruciating; with pain in the orbit and eyebrow, increased at night. When attended with extreme pain, especially in syphilitic cases, very serious changes, even abscess of the anterior chamber, disorganisation of the vitreous humour, &c. frequently supervene. In these, the inflammation is extended more or less to the internal and external tissues of the eye, and general ophthalmitis is the result.

125. *δ.* The *discolouration of the iris* arises from vascular injection and effusion, and is of a yellowish or greenish tint, in light eyes; or of a reddish hue, in dark eyes: but it is very frequently dull, muddy, and dark; and the natural brilliancy and fibrous arrangement of this part are lost. The *effused lymph* is seen first at the pupillary edge, and afterwards on the lesser circle of the iris; causing a villous, rough, elevated, or irregular surface or outline of the part. The lymph may be in distinct masses of very various sizes on the anterior of the iris, or at its pupillary margin; and, in the most acute cases, it may fill the pupil or anterior chamber, or even the posterior chamber. The *colour* of the effused lymph is sometimes a light yellowish brown or ochrey; but a rusty hue is most common. It is occasionally of a light dirty yellowish tint, particularly when it is abundant, and fills the anterior chamber. In this case, or when a small abscess in the iris is discharged in this situation, a form of hypopyon is the result. The *pupil* is contracted, and becomes more and more so in the progress of the complaint. The effusion of lymph and adhesions render it also angular, irregular, and fixed at one or more points, and free in others. It loses its thin, sharp, and well-defined edge; and becomes dull and cloudy, or otherwise discoloured.

126. *ε. The acute states of iritis* are observed in persons of a full habit or robust constitution, after the action of powerful causes, especially if they continue to act, and the case have been neglected at the beginning; and in cachectic conditions of the frame. They are attended by the usual characters of severe vascular action; especially injection of the vessels, extreme contraction of the pupil, effusion of lymph, dullness of the cornea, external redness, loss of sight, violent pain in the eye, and severe headach, with watchfulness, restlessness, and febrile disturbance, terminating, in a few days, in disorganisation of the interior tissues, and in irreparable loss of vision. — *In chronic cases*, the origin of disease is almost imperceptible, and its progress slow. Little or no pain is felt, and the external

redness is very slight or unobserved. At last, lymph is effused, vision is impaired, and the complaint is brought under treatment.—*The sub-acute cases* are intermediate between these two extremes. The chronic form may also follow upon an inactive or partially successful treatment of the acute and sub-acute forms; but it usually presents itself in the *first grade*; the acute most commonly assuming the *third*, and the sub-acute the *second grades*.

127. *b. Consequences and Prognosis.*—*a. Change of texture and colour of the iris* follow inflammation which has been violent or of long duration. General adhesion of the iris to the cornea may occur, and lead to staphyloma; or the iris may become adherent both to the cornea and to the capsule of the lens, occasioning anterior flattening of the eye. This is, however, very rare. Dropsical enlargement of the anterior chamber, with closed pupil and staphyloma scleroticæ, may likewise supervene (LAWRENCE).—*β.* After acute or sub-acute attacks, *the pupillary margin often becomes adherent* to the capsule of the lens, either throughout, or in one or more points. When the inflammation has disappeared, the adhesion still continues, or is reduced to slender threads admitting of partial motion. In some cases, adhesions of the iris are detached, leaving black marks on the capsule, which are permanent.—*γ. An adventitious membrane* may form in the pupil, from organisation of the lymph effused on the surface of the capsule. Its opacity is greatest in the centre; and it may be connected with partial adhesion of the iris. In rarer instances, the adventitious substance is seen in one side of the pupil, and attached to the edge of the iris (*Atresia Iridis incompleta*).—*δ. Closure of the pupil* follows effusion into the posterior chamber, and the formation of an opaque adventitious substance to which the circumference of the pupil is fixed (*Atresia Iridis perfecta*). This adventitious membrane may extend over the anterior capsule, causing adhesion of the uvea to the lens, and enlargement of the anterior chamber.—*ε. Atrophy of the globe* may supervene upon copious effusion into both chambers, and deposition of lymph behind the iris in such quantity as to cause bulging of the sclerotica, or to escape through this membrane and raise the conjunctiva. In this case, the fluid is absorbed after the subsidence of the inflammation; but the internal parts of the ball are so altered that they waste and become flaccid, particularly after complete closure of the pupil. The vitreous humour may also be rendered fluid, and the eye soft, without shrinking in size; but this occurs only after acute syphilitic iritis.—*ζ. Impaired vision* may be the result of the extension of inflammation to the posterior tunics, although the disease has been arrested by appropriate treatment; and may follow the acute, sub-acute, or chronic states of the disease. The impaired vision may be caused solely by the lesions produced in these tunics, or by these and the changes in the pupil conjoined.

128. *c. The Prognosis.*— When the disease is recent, and appropriate treatment is adopted, effusion into the texture, or on the surface, of the iris, will be removed by absorption upon the subsidence of the inflammation. Hence we need not dread the result, if the changes be confined to the iris, although the effusion be copious. But when the complaint has continued some time, and is attended by increasing contraction of the pupil and effusion of lymph, with organisation of the latter into adhesions and adventitious membranes; or when the consequences described above (§ 127.) are present, or inflammation extends to the posterior parts of the globe and retina, or to the cornea with more or less opacity; the greatest danger to vision is to be apprehended. In most cases, a guarded prognosis should be given; for it is often difficult to determine how far the posterior tunics may be affected. Change of colour in the whole iris, with great contraction of the pupil, and an opaque substance in it; intense external redness, severe and deep-seated pain, extinction of sight, and flashes of light in the eye; large effusion behind the iris, and bulging of the sclerotica; and a protruded state of the iris, and adhesion of the pupil; are all hopeless states of the organ. If unfavourable changes have not appeared, recovery may take place, although the complaint has been of three or four weeks' duration, and sight is much impaired.

129. *d. The Diagnosis of iritis* cannot be difficult, if the history of the case be considered, and the state of the iris carefully examined. The affection most resembling iritis is inflammation of the capsule of the lens. Nebulous, contracted, and fixed pupil, discoloured iris, adhesions between the iris and capsule, are present in the latter, which, however, often supervenes in the course of iritis, and generally attends its most acute attacks; whilst, on the other hand, inflammation of the crystalline capsule is attended by some degree of iritis. The one is thus reciprocally conquent upon the other.—*Retinitis* resembles iritis chiefly in the great contraction of the pupil; but the former is more sudden, its progress more rapid, its attendant headach more violent, and vision more rapidly impaired, than in the latter.

130. *e. Treatment.*—The *indications of cure* are —1st, to subdue the inflammation; 2d, to prevent or arrest the effusion of lymph; 3d, to promote the absorption of what has been effused; and, 4th, to preserve the pupil entire. They are to be accomplished by bloodletting, mercurials, belladonna, &c.—*Bloodletting*, in acute and sub-acute cases; in young, robust, or plethoric persons; when the pain is severe, and febrile disturbance considerable; and the inflammation extending to the internal tunics; must be most promptly and actively practised. It will often be necessary to repeat it; and even to follow it by *cupping* on the nape of the neck, or behind the ears, or on the temples. In the circumstances now stated, local bleeding cannot be confided in alone. But, in chronic, sub-acute, or mild states, cupping will be preferable. *Leeches* may be employed; but they are, unless a great number be applied, much less efficient than cupping. Immediately after the first bleeding, a full dose of *calomel* and *James's powder*, with *opium*, should be given, and repeated at bedtime; and an active cathartic draught (F. 216.) in the morning, aided by a terebinthinate enema (F. 150, 151.). The specific effects of *mercury*, which are most effectual in fulfilling the second and third indications, will be hastened by its combination with an antimonial; and, if the bowels be acted upon daily by a draught containing equal parts of the spirits

of *turpentine* and *castor oil*, or a larger portion of the former, the specific operation of the calomel will not be prevented, or even delayed, but the beneficial effects on the disease will be insured.

131. *Belladonna* is of great benefit in every stage of the complaint, and should be applied as directed above (§ 112.), contemporaneously with the exhibition of mercury. Although the pupil be contracted, and effusion or even adhesion has taken place, the specific operation of the latter, and the effects of the former on the iris, will elongate or even entirely detach the adhesions, if they are soft or unorganised. In addition to these, *diaphoretics*, *diuretics*, and warm pediluvia are beneficial. The bowels ought to be kept freely open by the substances already noticed. *Turpentine* may be used for this purpose, or with the view of aiding the effects of calomel, or even as a substitute for it, as advised by Mr. Carmichael, who prescribes it in drachm doses, three times a day, suspended in almond emulsion. *Blisters* are of doubtful efficacy; Mr. Lawrence decides against them.

132. *B.* Sympathetic Iritis. — *a. Syphilitic Iritis*, or inflammation of the iris occurring in persons tainted by the syphilitic poison, is, perhaps, the most common variety of this disease. It is a symptom of syphilis in its constitutional stage; and, although sometimes appearing alone, it is more frequently one of several secondary symptoms, especially ulcerations of the throat, eruptions, swellings of the periosteum, pains of the limbs, affection of the nose, &c. It occurs most frequently along with the earlier secondary affections, and sometimes appears before the primary disorder is cured (Lawrence). It rarely occurs as a symptom of syphilis in infants, although secondary syphilis is not infrequent in them. It may be either *acute* or *chronic*; it is often associated with inflammation of other internal tissues of the organ; and it is most commonly determined or excited by exposure to cold, exertion of the eye, or external injury.

133. *Diagnosis*. — The characters and progress of syphilitic iritis are nearly the same as those of the idiopathic form; yet there are certain points of difference, which are frequently observed in the local symptoms, deserving of notice. These are the tubercular disposition, and the reddish brown discolouration of the lymph effused on the iris; the angular form of the pupil, and its displacement towards the root of the nose; and the violent exacerbations of pain felt chiefly in the brow during the night, and in a slighter degree or not at all in the day. The first and second of these are, however, not constant; the last is always present. But the most certain diagnosis are, the concomitance of other syphilitic affections, and the history of the case. — Lymph is effused from the margin of the pupil in *arthritic iritis*, but not deposited in a distinct form, and the adhesions are generally white; and both in it, and in the idiopathic variety, the pupil commonly retains its circular figure and central position.

134. *b. Arthritic Iritis.*—Inflammation of the iris is frequent in the *gouty diathesis*, but less so in the *rheumatic*, unless as a consequence of rheumatic inflammation of the sclerotica (§ 97.) In the gouty, it occurs most commonly in [illegible] iris from the commencement; although often some other tissues of the organ are affected at the same time; but, in the rheumatic, it rarely begins in the iris. The *gouty modification* is generally *acute*, and very severe; the *rheumatic*, *sub-acute* or *chronic*, and more mild. — The *former* generally commences with pain of the eye, intolerance of light, lachrymation, and zonular redness of the sclerotica. Pains are felt in the orbit, brow, and forehead. The iris soon becomes dull and discoloured; the pupil contracted, and fixed at one or more points to the capsule of the lens. The reddish zone in the sclerotica is of a dull or nearly livid tint, and does not advance to the edge of the cornea, but leaves a narrow white ring between. After a violent attack, with impaired vision, the symptoms subside, and sight is restored, the iris being attached to the capsule by whitish adhesions. This form of iritis often returns again and again, the eyes recovering almost completely after repeated attacks. Mr. Lawrence met with a case in which the disease returned fourteen times; yet vision was not materially impaired, though adhesions in each eye connected the pupillary edge of the iris to the capsule. But frequently a fresh effusion attends on each attack, until the pupil is more and more contracted, and at last filled with opaque adventitious membrane; the texture of the iris, notwithstanding, generally remaining but little altered.

135. *c. Scrofulous Iritis.* — This variety is consecutive of strumous ophthalmia (§ 68.), the inflammation extending from the external tunics. It is commonly preceded and accompanied by changes in the cornea, preventing the lesions of the iris from being observed. Hence it often escapes detection until it has completed its course. It very rarely occurs as a primary affection. Mr. Mackenzie adduces a case in which the attack seemed primary; but its history is not conclusive on this point.

136. *Treatment.* — *a.* The *syphilitic variety* requires *local bleedings* and *mercurials*, as advised for the idiopathic disease, and in similar combinations, until the symptoms and the constitutional malady, on which the local one is engrafted, are entirely removed. *Turpentine* may also be employed as an auxiliary, and to open the bowels, either as directed by Mr. Carmichael, or as prescribed by myself (§ 130, 131.). *Opiate frictions* around the eye, and *belladonna*, are also of great service. *General bloodletting* is seldom well borne in this variety, unless in robust or plethoric persons; but full or repeated *cupping* is often necessary.

137. *b. Arthritic Iritis.* — The *rheumatic modification* requires the treatment recommended in rheumatic inflammation of the external tunics — especially *cupping*, *leeching*, *blistering*, *alteratives*, with *colchicum*; and, subsequently, *cinchona* or *quinine*, with full doses of *colchicum*, aided by counter-irritation. *Turpentine* is also beneficial in this variety; but it should be given so as to act moderately on the bowels. Mr. Wallace advises *bark* to be given from the commencement, when this disease follows low fevers. — The *gouty modification* will be removed by a very similar treatment to that now stated. *Mercurials* given with any other intention than that of removing morbid secretions and excretions, are more injurious than beneficial. *Colchicum*,

in full doses, with the alkaline subcarbonates and warm purgatives, is especially indicated. *Blisters*, and derivatives to the lower extremities; *tepid fomentations* to the organ; frictions with opium and belladonna to the forehead; a free state of the bowels, and attention to diet; are particularly requisite. As the attacks are often repeated, measures of *prevention* should be adopted. The chief of these are, low living, a free state of the bowels and of all the excretions, the removal of plethora, and preserving the organ from cold or over-exertion. — Nothing can be added to what has been stated, both here and in a preceding section (§ 130, 131.), as to the treatment of the *scrofulous variety* of iritis.

iii. INFLAMMATION OF THE INTERNAL TUNICS.

SYN. — *Internal Ophthalmia; Ophthalmitis interna idiopathica*, BEER; *Ophthalmitis posterior totalis*, ROSAS.

138. DEFIN. — *Severe, deep-seated pain of the eye, with impaired vision, contracted pupil, a sense of aching, tension, and heat, without much external redness, but with symptomatic inflammatory fever.*

139. *A.* Inflammation may commence in the *retina*, or in the *choroid;* but it cannot remain long confined to either. It frequently extends from the *iris* to the latter, and to other internal parts. The disease probably begins most frequently in the retina, and may, therefore, be designated *retinitis* in its early stage. We are necessarily less acquainted with the phenomena attending it, than with those accompanying iritis. ROSAS considers that the whole retina is not equally affected, but chiefly the vicinity of the yellow spot. — The *Causes of retinitis* are sudden exposure to light; the action of a strong light, as looking at the sun or bright objects; the light and heat of a bright fire; exertion of the eyes, particularly when the rays of light are refracted; and the predisposing and exciting causes described above (§ 4—6.).

140. *a. Symptoms and Course of retinitis.* — The patient complains of pain and aching deep in the eye; of a sense of tension or of heat, aggravated by using the organ, by exposure to light, or by whatever determines the circulation to the head. The pain is often pulsating, and usually extends to the brow and head. The pupil is much contracted; vision is impaired, and hourly becomes more so. In severe cases, the pupil is nearly closed, and sight almost or altogether lost; and flashes or sparks of light are perceived in the eye. At this period there is little external redness, excepting in the sclerotica around the cornea; but there are thirst, white tongue, and fever. With the continuance of the disease, the sclerotic redness increases, and a bright zone is formed around the cornea; and the inflammation spreads inwards to the vitreous humour and to the capsule of the lens, and outwards to the choroid and iris. This last now loses its natural colour, becoming greenish and reddish; and it is pushed towards the cornea. Sight is lost, even before total closure of the pupil takes place. The disease now may be designated *Inflammation of the internal tunics generally*, or the *second stage* of retinitis. The redness of the sclerotic extends; the conjunctiva becomes injected; the pupil often obliterated from effusion of lymph; the cornea somewhat dull; and general ophthalmia supervenes. The pain of the eye is unequal, or pulsative; is attended by a sense of weight, sometimes of cold; and chills or rigors are felt. Suppuration now occurs, and matter is effused in front of the iris, particularly if the pupil is not entirely closed, constituting hypopyon; and blood is sometimes mixed with it. — Such is the course of the most acute and severe cases of internal ophthalmia commencing in the retina, when uncontrolled by treatment; and the *results* are — 1st, Insensibility of the retina, from change of structure — *Amaurosis;* — 2d, Contraction and partial obstruction of the pupil, with impaired function of the retina, and opaque capsule and lens; — 3d, Closed pupil, with the formation of an adventitious membrane; — 4th, Suppuration making its way externally, and leading to destruction of the eye, and collapse of the coats.

141. *b. Chronic Retinitis.* — A very much milder and more prolonged form of retinitis than the foregoing, is often observed in persons who greatly exert their eyes. It is characterised by sensibility to light; more or less weakness or obscurity of vision, especially beyond the distance at which the eye has usually been occupied; with gradual contraction of the pupil, immobility of the iris, and aching in the eyes and forehead. This slight grade of the disease is manifestly confined to the retina. There is but little increase of vascularity externally; excepting, in some cases, a narrow or partial zone in the sclerotica around the cornea. The complaint is aggravated by stimulants and a heating regimen; and benefited by opposite means. It often continues months, or even years, with occasional exacerbations; and either in great measure disappears; or becomes greatly aggravated, or assumes the above severe form.

142. *c. The Prognosis in retinitis* is favourable in the commencement, before the pupil is very much contracted, or vision greatly impaired; but it becomes less and less so in proportion to the duration of the complaint. If misunderstood at the commencement, neglected, or ill-treated, the organ is frequently endangered. If the pupil be much contracted, and sight lost; or if sight be quite gone before the closure of the pupil; blindness will be the result. — If the disease have gone on to general ophthalmitis, all that can be hoped is to preserve the form of the eye.

143. *d. Treatment.* — Copious general and local *bleeding*, the active exhibition of *mercurials* until the mouth is affected, the employment of *belladonna, cathartics*, low diet, and the rest of the antiphlogistic regimen, as directed for iritis, with complete rest of the eyes and of the body, and exclusion of light, are the most efficacious means of cure. Bloodletting, although early practised, will often fail, if *mercury* be not freely administered. *Turpentine* may be also given to aid its operation, and act upon the bowels. These measures will succeed only in the first stage, before the pupil is closed and sight is lost. Yet, if suppuration have not occurred, it is still requisite, in order to preserve the form of the eye. In the *slight and chronic form*, local depletion, active purging, low diet, attention to the digestive functions, and repose of the organ, are the chief remedies. Open *blisters* behind the ears, or the tartarised *antimonial ointment*, are also beneficial.

144. *B. Choroiditis* — *a. Inflammation of the choroid*, of the hyaloid membrane, of the capsule, &c.,

under the terms *Choroiditis*, *Hyaloiditis*, *Capsulitis*, and *Lentitis* — have been described by Juengken, Rosas, and Mackenzie. But admitting, from analogy, that inflammation may commence in, and be more or less confined to, either of these tissues, for a longer or shorter time, I question the possibility of their being often distinguished from *retinitis*, with which they must necessarily be in some degree associated. I must refer the reader to the observations of Mr. Mackenzie on *Choroiditis*. He believes that the choroid, although generally affected consecutively upon iritis, is sometimes *primarily* and separately inflamed. The inference is most probably correct; yet experience shows that such a state of disease can but rarely be recognised. He states that *choroiditis*, in its earliest stages, exists without any signs of disease of the iris, and without any effects upon the sclerotica and retina beyond those which must necessarily arise from the pressure of an inflamed and swollen membrane. The dark colour of the choroid shows through the sclerotica, which thus appears bluish or purplish, and distended. The part most discoloured protrudes, generally, on one side of the ball, and near the cornea; and is of a deep blue tint, with varicose vessels running over it (*Sclerotic Staphyloma*). Several such tumours may surround the cornea, or may protrude on the posterior hemisphere of the organ. A watery fluid is sometimes effused between the choroid and the retina during its progress; and redness is observed in parts of the sclerotica. Although the iris is not inflamed, it is always narrowed or drawn towards the portion of the choroid chiefly affected, causing displacement of the pupil. There are generally attendant, intolerance of light, pain, hemicrania, frequently partial opacity of the cornea, dimness of sight, proceeding to total blindness, and febrile disturbance, disorder of the digestive organs. The disease is most common in the scrofulous diathesis; in those who over-use their eyes, without taking sufficient exercise, and who expose them to too much heat and light.

145. *b. The Treatment* consists of copious *bloodletting*, active *cathartics*, *mercury* aided by *turpentine*, and *counter-irritation*, in the earlier stages; and, subsequently, the internal use of the preparations of *iodine*, or the precipitated carbonate of *iron*; or the ioduret of iron, and the sulphate of *quinine*.

146. *C. Arthritic Inflammation of the Internal Tunics — Ophthalmitis Arthritica*, Benedict and Rosas. — *a.* Arthritic iritis frequently is confined to the iris; but in gouty persons of very impaired constitution, inflammation is either extended to, or almost simultaneously appears in, the retina, the choroid, the lens and its capsule, and the vitreous humour; the sclerotica and cornea being secondarily affected. It usually attacks elderly persons, of a full habit, with bloated, red, purple, and veined faces; and it generally terminates in loss of sight, with dilated pupil and opaque lens or glaucoma. At first the patient complains of increased sensibility to light; of lachrymation; and of a severe burning or tearing pain deep in the globe, with a sensation as if the eye were too large for the orbit. A dull and livid redness is observed in the sclerotica; it increases towards the cornea, but is separated from this part by a narrow white ring. The conjunctiva afterwards becomes injected, and the cornea dull. The pain is now distracting, and extends to the orbit, face, and side of the head: the iris is dark, assumes a dirty appearance, is irregularly contracted and fixed, the pupil often having an oblong or oval figure, in the transverse direction. A greenish discolouration is observed deep in the eye, from lost transparency of the vitreous humour. The posterior tissues swell and push the lens forwards, wedging it into the dilated pupil, and squeezing it even against the cornea. The lens also turns green, yellowish green (*Glaucomatous Cataract*), or dull white. The congestion and swelling of the internal coats distend the sclerotica, or bulge it out in parts; the cornea becomes hazy; and the changes in the iris, pupil, and external tissues, impart to the organ a dead appearance. Luminous flashes are frequently perceived in the eye; but sight is either much impaired or altogether lost — sometimes suddenly — from the commencement. At this stage the symptoms frequently subside, the iris preserving its dull hue, the pupil being fixed and dilated, and sight totally lost. A varicose state of the vessels in the sclerotica sometimes remains; or a dull leaden appearance, with small projections or larger bulgings around the cornea, as in choroiditis (§ 144.).

147. This disease generally affects both eyes, either in succession, or at once. Its duration is various as well as its severity; and it often assumes a less violent form than that now described, especially when its early symptoms have been mitigated by treatment. In this case, sight is more gradually and slowly extinguished; the pain is less; and the external changes, particularly the bulgings of the sclerotica, are either less, or but slight. It is difficult to determine what tissue is primarily affected; but most probably the choroid, retina, and iris, are almost coëtaneously attacked. The early loss of sight indicates an early affection of the retina; and the equally early tension and pain show that congestion and swelling of the choroid is present from the first.

148. *b. The Prognosis* is extremely unfavourable. If the characteristic symptoms of this affection be present, and more especially if vision be lost, permanent extinction of sight will be the consequence.

149. *c. Treatment* has hitherto been found to have little influence on this disease. Nevertheless, bloodletting; warm purgatives, with full doses of colchicum and alkaline subcarbonates; revulsants to the lower extremities, or behind the ears, or to the nape of the neck; active doses of turpentine both by the mouth and in enemata, so as to act efficiently upon the bowels and vascular system; subsequently Plummer's pill and the decoction of guaiacum, with the ammoniated spirit of colchicum and liquor potassæ; and full doses of sulphate of quinine, or of cinchona with or without colchicum, &c.; should be fully tried.

150. *D. Inflammation of the internal tissues after fever* sometimes occurs. It has been described by Dr. Wallace and Dr. Jacob. Of forty cases which the former observed, there were only four who had the disease in the left eye, and only two who had it in both. It may occur very soon, or not for some months, after fever; and it presents *two stages*; in the *first* of which, amau-

rotic symptoms are alone present; in the *second*, those of inflammation are superadded. The period at which the former commences after fever, and its duration before redness comes on, are very uncertain. In some cases, dimness of sight and *muscæ volitantes* have been present from the earliest period of convalescence, yet the inflammatory stage has not supervened for weeks or months; and in other instances, the amaurotic symptoms have not appeared till months after the fever, and have been soon followed by the second stage. The inflammatory changes disappear before the amaurotic symptoms (WALLACE).

151. Dr. JACOB met with seventy or eighty cases of the disease in one year. It is most frequent among the poor, in young persons and in females; and attacks always only one eye. The affection of the retina having been present from a few days to several weeks, the transparent parts of the eye become more or less clouded or opaque; the circumference of the cornea presents an opaque whitish appearance or circle, resembling the arcus senilis. The anterior chamber seems clouded. The iris is always dull, and altered in colour; but tubercles of lymph or abscesses are not seen in it; and it often moves actively. The pupil is slightly irregular; yet it does not contract adhesions, or become closed. Hypopyon sometimes ensues. In the worst cases, the lens becomes partially opaque, and presents an opaline amber colour. When vision is permanently lost, it is generally owing to this change. Impairment or loss of vision is the earliest symptom; and there generally are intolerance of light, lachrymation, and a stinging or darting pain through the eye to the temple or nose. Sometimes the suffering is slight; but it is usually increased on exposure to strong light (JACOB).

152. *The Treatment* recommended by these two experienced writers is diametrically opposite. Dr. WALLACE found depletion and mercury insufficient for a cure: he therefore gave half a drachm, or a drachm, of bark in powder, three or four times a day; or the sulphate of quinine in two grain doses. Dr. REID also employed bark with success in this sequela of fever. Dr. JACOB, however, states, that bleeding locally or generally, purgatives and antimonials, blisters and opiate stupes, and mercurials with opium and belladonna, are the most efficacious means of cure. He adds, that the relief from mercury is so certain, that he has trusted to it almost exclusively, with the assistance of belladonna. He has generally found two grains of calomel, with a quarter of a grain of opium, or five grains of blue pill alone, three times a day, answer every purpose; tenderness of the gums coming on in eight or ten days. If the pain be severe, he combines hyoscyamus or belladonna with the dose taken at bedtime. He tried the sulphate of quinine in four cases for eight days; but finding no relief, he gave mercury, which effected a cure. The cases occurring after typhus fever, recorded by Mr. HEWSON, and which were similar to those described by Drs. WALLACE, REID, and JACOB, readily yielded to mercurial treatment.

IV. INFLAMMATION OF THE WHOLE EYE. SYN. — *Ophthalmitis Idiopathica*, BEER; *Ophthalmitis Universalis*, WELLER; *Inflammation of the Globe*, LAWRENCE; *Phlegmonoid Inflammation of the whole Ball.*

153. CHARACT. — *Severe deep-seated pain; increased internal redness and tumefaction; a sense of tension, and a feeling of the organ being too large for the orbit, and about to burst from it; early loss of sight, with discoloured iris, and contracted, immoveable pupil; swelling and immobility of the globe, with partial protrusion of it and the eyelids; and severe inflammatory fever.*

154. *A.* This severe disease has been well described by Mr. LAWRENCE. It consists of inflammation of the internal and external tissues, and is not of common occurrence. It is met with chiefly in very robust constitutions, and persons of a phlogistic diathesis and full habit of body. It is most frequent in the right eye, as is the case with ophthalmic inflammation generally. Mr. LAWRENCE states, that of 134 cases of ophthalmia commencing in one eye, 95 began in the right. General ophthalmitis is most commonly *caused* by severe injuries of the organ; by the explosion of gunpowder before the eye; by great heat and light striking upon it; and fragments of stone, iron, &c. propelled against it.

155. *a. Symptoms and Course.* — At the commencement, the characteristic injection of both the sclerotica and conjunctiva is evident; with a severe burning or throbbing pain, and a sense of bursting distension. The surface of the organ is stiff and dry; but copious lachrymation soon comes on, and is increased by exposure to light. The external redness increases; and the conjunctiva swells into a broad firm ring of chemosis around the cornea, which it partially overlaps. There are intolerance of light, dimness of vision, contracted pupil, impaired brilliancy of the iris, and acute sympathetic fever. This constitutes the *first stage* of the disease. — The motions of the globe and lids now become difficult and painful; and the pain more and more violent, extending to the brow, cheek, temple, and head. The previously blue or grey iris assumes a dull greenish hue; and the brown or black, a reddish tint. The eyeball swells and loses its power of motion; the cornea grows muddy, and, by degrees, opaque; but vision is generally lost before these changes supervene. The patient perceives luminous flashes or sparks in his eye, owing to disordered action in the retina; and the vascular distension of the internal tissues generally occasions a sense of bursting. The deep-seated swelling and external chemosis partially evert the inflamed eyelids, which thus resemble, especially the inferior, a red fleshy mass; and both the ball and lids are protruded, and immoveable. The *second stage* is now fully developed. — Sympathetic inflammatory fever always accompanies this severe disease. The local symptoms are preceded, or attended at their commencement, by chills or rigors, followed by headach, white tongue, thirst, hot and dry skin; and accelerated, hard, and full pulse. These are increased at night, and accompanied with watchfulness, and throbbing in the temple and eye.

156. *b. The Consequences*, or the *second stage*, according to WELLER, are suppuration and opacity of the cornea, &c. If the disease be not arrested, the pain becomes throbbing; delirium sometimes occurs at night; and chills or rigors

are felt, indicating impending suppuration. The cornea is first a dull white, and then yellow, and matter is formed. The throbbing and bursting pain continues, notwithstanding, for some days, until the cornea bursts externally, and gives exit to the matter; the coats of the eye collapsing, and the form or the organ being lost. When the progress of the disease has been checked by treatment, the cornea remains opaque, and the pupil is either closed or very much contracted, and the aperture filled by adventitious membrane; vision being either much impaired or entirely lost. Even when recovery takes place, with an open pupil and clear cornea, the retina has generally suffered so much as to cause some imperfection of vision (Lawrence).

157. *c. Diagnosis.*—This complaint is characterised by the simultaneous affection of both the internal and external tunics; and is distinguished from the *sympathetic* or *specific* inflammation above considered, by the following circumstances:—(*a*) Redness, pain, swelling, intolerance of light, lachrymal discharge, and impaired vision, are all equally and co-ordinately developed; but in the specific inflammations, one or other of these is always predominant over the rest, and accompanied by some peculiar local and constitutional affection. — (*b*) These symptoms commence at the same time in an equal degree, and continue very nearly so throughout; but in the other ophthalmiæ, this correspondence is remarked neither at their commencement nor during their progress. — (*c*) The course of the malady is regular and continued, and it always terminates in suppuration of the globe, if not arrested by treatment; whilst the others remit more or less, and only occasionally terminate in this manner. — (*d*) Phlegmonoid ophthalmitis is always attended by severe sympathetic fever; but the specific forms are generally without fever, even when most severe.

158. *d. Treatment.*—It is only in the *first stage* that we can expect to preserve the sight. In *the second stage*, this will rarely be accomplished. When vision is altogether lost in this period, the preservation of the form of the organ can only be hoped for. If symptoms of suppuration have appeared, the eye will be destroyed. In the first and second stages, the most active antiphlogistic measures, as directed in internal ophthalmia (§ 143.), must be practised: general blood-letting, cupping, leeches applied around the eye, and scarification of the protruded lids; with active cathartics; calomel and James's powder in full and repeated doses; turpentine given by the mouth, and in enemata with castor oil; and belladonna; constitute the chief remedies. If suppuration have occurred, the anterior chamber being full of matter, the evacuation of it by a free opening into the cornea, will give relief, and not increase the inevitable mischief.

159. *B. General Ophthalmitis consequent upon the absorption of purulent or morbid matters into the circulation*, may occur.— It has been noticed chiefly after phlebitis, by Mr. Arnott and Mr. Higgenbottam; and is most frequent in the puerperal state, as a consequence of uterine phlebitis. The local symptoms in the early stages are the same as in the idiopathic, but less violent, and more insidious and rapid, and always terminating in suppuration and sloughing of the cornea. The constitutional symptoms are very different, and are of a typhoid and adynamic type. All the cases that have hitherto been recorded, have terminated fatally.

160. *C. An Intermittent form of Ophthalmia* has been described by some writers, particularly Hoffmann, Curry (*Trans of Med. and Chirurg. Soc.* vol. iii. p. 348.), and Heuter (*Lancet*, No. 331. p. 473.); but I agree with Mr. Lawrence, in considering a truly intermitting form of inflammation of any of the tissues of this organ as not to have been made out. Exacerbations, relapses, or returns, of the disease, from persistence or recurrence of the causes, may have been mistaken for an intermittent form. Frequently recurring attacks of inflammation in some one or more of the tissues of the eye, especially of the conjunctiva, and in slight and chronic forms, are sometimes caused by the sympathetic irritation of inflamed or carious teeth. — Of this form of disease, which is not noticed by writers, I have seen two or three instances; the removal of the adjoining irritation curing that depending upon it.

161. I should now have proceeded to consider the *consecutive and malignant alterations of the tissues of the eye*; but these, in a practical point of view, fall mostly within the province of the surgeon, a strictly medical treatment having but little influence in removing them. The malignant diseases of this organ are the same as those observed in other viscera, and are considered under distinct and appropriate heads. The functional disorders are treated of in the articles Amaurosis, Palsy, and Sight.

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FAINTING. Syn. — Λειποψυχια, Hippocrates. Αποψυχια, Galen. *Syncope* (from συγκοπτω, *concido*); *Deliquium Animi*; *Defectio Animæ*, Celsus. *Defaillance*, Fr. *Die Ohnmacht*, Germ. *Swooning*.

Classif. — 2. *Class*, 2. *Order* (*Cullen*). 4. *Class*, 4. *Order* (*M. Good*). I. Class, III. Order (*Author*).

1. Defin. — *Temporary depression of the animal and vital actions, with pallor, cold perspiration, remarkably weak pulse, or absence of pulse at the wrist; respiration and sensation also being nearly abolished for a short time.*

2. The terms used by Hippocrates and Galen are synonymous with *Syncope*, a word of modern use. *Leipothymia* has been considered by later writers, particularly Morgagni, Dr.

Good, and Dr. Ash, either as the same as syncope, or as signifying a lesser grade of this affection. The definition which Sauvages has given, of *leipothymia*, assigns it a specific difference from syncope, or the usual form of swooning or fainting. He states it to be — "Subitanea et brevis virium dejectio, superstite pulsûs vigore, et cognoscendi facultate." I have had several opportunities of observing attentively the whole progress of this affection; and I admit the accuracy of this definition, with the exception of the continuance of consciousness, which is generally somewhat impaired, although not altogether lost. The pulse is unaltered from the state in which it was before or after the seizure, or not materially influenced; and in some cases I have found it so strong as to prescribe depletion; but the respiratory actions are nearly abolished. Leipothymia is, therefore, an affection of the animal and respiratory functions, that of the heart not being impaired. The slight or imperfect seizures often observed to precede fully developed *epilepsy*, or to occur between, or usher in, the severe attacks, and described in that article (§ 41. 52.), are examples of the leipothymia of Sauvages.

3. *Fainting* and *Swooning* are grades of the same affection, the latter being a more complete and prolonged state of the former. *Fainting* may recur after very short or irregular periods — the *Syncope recurrens* of Good. It is then often followed by palpitations of the heart.—*Swooning* is much less prone to recur, but is sometimes followed by severe reaction. Sauvages has divided syncope into as many varieties as there are principal causes inducing it.—Dr. Good has adopted a somewhat similar division. As, however, it varies chiefly in degree, from whatever cause it proceeds, no further distinction, than that which I have just made, need be assigned to it.

4. I. Description, &c.— Fainting is commonly preceded by languor, a sense of sinking at the epigastrium, anxiety, confusion of intellects, obscuration of vision, cold partial sweats, giddiness and ringing in the ears, pallid countenance and quivering of the lips, and coldness of the extremities. These may continue for some time, constituting what is usually called faintness, and disappear; or they pass into full fainting or swooning more or less rapidly. It is seldom that fainting occurs without these precursors; but when it is fully developed, respiration almost ceases, and consciousness is nearly or altogether lost. The action of the heart, however, still continues, but feebly; and, although the pulse disappears from the wrist, as in full swooning, it may still be felt in the carotids; or the heart will be heard to beat on auscultation. In some instances, relaxation of the sphincters, and discharge of the excretions, are said to have occurred. But this is rare in swooning, although it sometimes supervenes in leipothymia, in which the brain is rather oppressed with blood, than deprived of it; and in which the pulse retains its vigour. Sickness, or even vomiting, sometimes follows faintness, or accompanies recovery from fainting.

5. The sensations ushering in syncope are generally more or less distressing to the patient, and are sometimes described as accompanied by a feeling of death. Montaigne (*Essais*, liv. ii. cap. vi.) found them rather pleasurable than otherwise; and therefore infers, that those attending upon dissolution must be similar. Chamberet experienced the like feelings. The *duration* of the seizure varies from a few seconds to one or two hours; but commonly from half a minute to ten or fifteen. It has extended in some instances to several hours. Much longer periods have been mentioned by writers; but their actual occurrence is questionable.

6. *The Consequences or Terminations* of syncope are — 1st, A return of the functions, respiration becoming more sensible and often suspirious, and eructations or vomiting occasionally supervening; — 2d, Palpitations of the heart, or general vascular reaction; — 3d, Hysterical symptoms, or a fully formed hysterical paroxysm; — 4th, Convulsions, general or partial, with or without consciousness; but they are much more frequently consequent upon leipothymia than upon true syncope; — 5th, Partial or slight paralysis, or prolonged vertigo; — 6th, In cases connected with passive enlargement of the cavities of the heart, and attended by a very slow as well as a very weak pulse, coagulation of the fibrinous portion of the blood has taken place in these cavities, and after some time occasioned death; — 7th, Dissolution has occurred in extreme cases, owing either to the complete depression of cerebral and nervous power, and the consequent inaction of the heart; or to the asthenia and wasting of the parietes of this organ, in conjunction with nervous depression. The fifth and sixth of these are rare; instances, however, of the latter are adduced in the article Heart. The termination in dissolution is not so rare; and is chiefly observed in cases of great debility or exhaustion from extreme or protracted pain, or from parturition; and particularly when a sitting or erect posture has been suddenly assumed or too long retained in adynamic fevers, and after exhausting discharges or depletions. Some years since I saw swooning caused by strangulated femoral hernia, that passed into complete tetanus of many hours' duration.

7. II. Causes. — The causes of syncope are strictly *occasional*. I shall consider them with reference to their operation. — *a. The causes which act more immediately on the nervous system*, are chiefly various impressions made upon the organs of sense, and depressing moral emotions. The odour of various flowers, according to the idiosyncrasy, sometimes occasions it. Fabricius Hildanus has seen it produced by the smell of vinegar; and Marcellus Donatus, by soft music. The airs of their native land have induced it in persons subject to nostalgia. Various unpleasant sights, or objects of aversion, have caused it — as the sight of blood, of surgical operations, or of a corpse; also sudden terror, fear, anxiety, disappointment. The impression made by mephitic or infectious emanations upon the nerves of smell, frequently induce more or less of faintness. Concussions and injuries of the brain; blows upon the epigastrium; shocks of the whole frame; gyration, rotatory motions, and swinging; excessive or prolonged pain; pleasurable sensations carried to excess, particularly the sexual orgasm; the exhaustion consequent upon inordinate excitement, long fasting, and the abstraction of accustomed stimuli; likewise operate principally in this way.

8. *b. The causes which affect chiefly the vascular system*, are the advanced stages of diseases of the heart and pericardium, particularly passive dilatation of the cavities or softening of their parietes. In cases of this kind, a fatal termination often supervenes in the form of syncope, as remarked by Bonet, Lancisi, Senac, Morgagni, Meckel, and others. The most common of this class of causes is the loss of blood, particularly from arteries, whilst in a standing or sitting posture. Hoffmann met with an instance of syncope from bloodletting proving fatal, and numerous similar cases are on record. During the period preceding the stage of excitement in fevers, syncope may follow the loss of an ounce or two of blood; and yet the same patient may bear, a few hours afterwards, when reaction has become developed, the loss of two or three pounds without this effect being produced. Excessive discharges and evacuations occasion it, by diminishing the circulating current, by deriving from the brain, and by exhausting nervous and vital power. Various circumstances retarding or preventing the return of blood to the right side of the heart, will sometimes cause fainting. The sudden removal of prolonged pressure, as of dropsical effusions, and of the contents of the uterus in parturition, often occasions it; but whether the removal of pressure acts in this latter manner or not, or in favouring a sudden and overpowering reflux of blood to the heart, is difficult to determine. Something may also be owing to the consequent diminution of resistance to the heart's action, and change in the accustomed states of several viscera, and to the effects upon the abdominal ganglia. It is very doubtful, that the syncope, which sometimes occurs upon the removal of the ligature from the arm after bleeding, and upon stopping the evacuation, arises altogether from the loss of blood, as fainting often takes place in such circumstances, although no indications of its approach existed at the time when the flow was stopped. In this case at least, if not in others where pressure is removed from internal venous trunks, the suddenly increased return of blood overloads the right side of the heart, and overpowers its action for a time, until the load is removed either slowly, or more rapidly by restoring nervous energy. In this manner general or relative plethora may cause syncope, the moving power being insufficient for the body to be moved.

9. *c. There are certain causes of swooning which seem to act both upon the nervous system and upon the heart, or upon the latter through the medium of the organic system of nerves.* — These are — 1st. Agents from without that make their impression on the respiratory passages. Some of the first class of causes act also in this way; especially mephitic or infectious effluvia. Instances have occurred of persons having swooned upon exposure to the effluvium of pestilential diseases, and of death having soon afterwards taken place. Such an occurrence could not have arisen from the effect produced upon the brain solely, or even chiefly. Indeed, I believe that all agents which impress nerves of sensation, especially those of smell and taste, act more immediately and energetically upon the heart than is usually admitted. — 2d. Sudden and intense changes induced in various parts of the body may be sympathetically propagated to the brain and heart, or may coëtaneously affect them; as when syncope follows gangrene, or the passage of noxious matters into the circulation, or the ingestion of sedative or noxious matters, or supervenes upon affections of the stomach, or occurs after the invasion of fever, and before reaction comes on. In these cases, however, congestion of the large vessels and right side of the heart, owing to, and associated with, depressed power of the organic nervous system, is chiefly concerned in overpowering or weakening the heart's action, and lessening the supply of blood to the brain. — The increased function of remote organs, and the derivation of vital action from the brain or heart, or from both, as in impregnation and quickening in the female, and in various diseases of the abdominal organs, will sometimes induce fainting. The sudden transition from a recumbent to a sitting or an erect posture, in delicate or debilitated persons, is often followed by vertigo, quickly passing into swooning; and is obviously caused by the rapid return of blood from the head, and the diminished supply to this part, in conjunction with its sudden and overpowering reflux to the left side of the heart.

10. It is unnecessary to adduce every circumstance that occasionally causes fainting, as they may be referred to the above heads; and as there is scarcely an occurrence or external agent which will not, on some occasion or other, however rare, induce it, when acting energetically on susceptible constitutions. On many, however, of the occasions in which it has been said to occur by writers, leipothymia has been mistaken for, and confounded with, it. Thus Heberden, in stating that epileptics are liable to faint upon wakening in the morning, has mistaken this state for leipothymia, which is common in the horizontal posture, sensation and respiration being nearly abolished, but the pulse retaining its fulness and strength; whereas syncope rarely comes on, and generally disappears in this posture. In epileptic patients, leipothymia often occurs both when falling asleep and on wakening; but syncope principally on suddenly assuming the erect posture.

11. There are some occasional causes, the operation of which is not easily explained, such as warm baths, heated rooms, and overcrowded assemblies; sitting with the back to the fire, particularly at a meal; and great rarefaction of the atmosphere. These, probably, act chiefly on persons whose circulating fluid is deficient in quantity, by deriving it from the heart and brain. They more frequently, however, occasion leipothymia and apoplexy or convulsions, especially in the plethoric.

12. The occasional exciting causes seldom act excepting on *susceptible or predisposed constitutions*. These are — the debilitated by scanty nourishment, by acute diseases and profuse discharges; persons whose circulating fluid is deficient in quantity; the delicately constituted, especially females; and peculiar idiosyncrasies. Those who possess much sensibility and little moral courage or force of character — who have been effeminately brought up, indulged in childhood and youth, and unaccustomed to the contrarieties of life — are very subject to syncope. Some females, especially the hysterical, weak,

and excessively indulged, are remarkably liable to faint from the slightest mental or corporeal cause; and there is reason to believe that the liability is increased by repetition or the habit of fainting.

13. *Pathological Inferences.* — 1. In syncope, the heart's action never, perhaps, entirely ceases until it terminates in death. — 2. In fainting from hæmorrhage, cerebral influence, especially the voluntary powers and volition, is abolished before the heart's action is reduced to its lowest state; but, unless the swoon be complete, sensibility and consciousness are not entirely suspended. — 3. The like obtains in fainting from moral emotions and impressions made upon the senses; cerebral influence is first diminished, and instantly afterwards the action of the heart is weakened, the weakened vascular action still further impairing cerebral power, until fainting is the result. — 4. Several causes, both external and internal, or pathological, particularly those already specified (§ 9.), seem to act coëtaneously and coordinately upon the brain and heart, through the medium of the organic system of nerves; whilst thers of the same class of causes (§ 9.) seem o influence more immediately and especially he heart through the same channel. — 5. Cerain causes may suddenly derive the circulating uid to the external surface or other parts; and he sudden diminution of the quantity returned o the heart and propelled to the brain, may induce faintness or full syncope. — 6. The sudden eflux of blood to the right side of the heart, especially when it supervenes rapidly upon the states just specified, may occasion fainting, by overpowering the heart's action, and thereby diminishing the supply of blood to the brain. — 7. Fainting may arise from inflammation of the heart, or effusion into the pericardium. — 8. It may also occur from the imperfect action of the heart caused by deficient organic nervous power, particularly of the cardiac nerves, with or without dilatation of the cavities, and weakness or softness of the parietes of the organ. — 9. It may be occasioned by circumstances preventing the return of blood to the heart. — To either of these two last are to be imputed the fatal cases of syncope related by Mr. Chevalier and Mr. Worthington, in which the cavities of the heart were found empty and relaxed, and the large veins adjoining devoid of blood.

14. Indeed, *death* may supervene in any of the modes in which syncope is produced, especially when carried to the extreme. Thus I have seen, in wo instances, a moderate dose of the acetate of morphine occasion loss of voluntary motion, and scarcely perceptible pulse and respiration — the characteristic phenomena of swooning. A larger quantity might have caused death; its operation — extended from the stomach to the heart and brain — being the same, but so great as to put an end to the functions of these parts. Other causes, inducing any one of the pathological states now assigned, may act, in favourable circumstances, and in highly predisposed persons, so energetically, as to terminate altogether the vital actions; predisposition or pre-existent states of the frame, such as have been mentioned, being often as influential in producing the result, as the more direct cause.

15. III. Diagnosis. — Syncope may be confounded with *apoplexy*, with the seizures to which the term *leipothymia* is strictly applicable, with *asphyxy*, with certain states of *hysteria*, and with *death*. — (*a*) The strong, laboured, or stertorous breathing; and the full, strong pulse; sufficiently distinguish *apoplexy* (see that article, § 66.) from fainting. — *b.* In *leipothymia*, volition and voluntary motion are abolished, and consciousness nearly or altogether: but the pulse either is not affected, or is even fuller than usual; and it is more frequently the first stage of, or followed by, epileptic and apoplectic seizures, than true syncope. Frequently, also, leipothymia is intimately associated with epilepsy, the former being either the earlier manifestations or the lesser grade of the latter. — *c.* In *asphyxy*, the actions and functions of respiration are the first to cease; the circulation of venous blood continuing for some time, until, owing to the privation of pure atmospheric air, the passage of blood through the lungs becomes obstructed, as first shown by Dr. Williams (*Edin. Med. and Surg. Journ.* Oct. 1823.), when total arrest of the pulmonary circulation, abolition of the cerebral and nervous functions, and, lastly, *cessation* of the heart's action (see Asphyxy, § 14. *et seq.*), are the consequences. Respiration and circulation are here quite at an end; and the countenance and general surface are reddish, livid, tumid, or bloated; whereas in *syncope* the face and surface are pale and collapsed, and the respiratory functions and circulation still continue, although in a low and occasionally almost imperceptible state. In the former, there is remarkable congestion of the lungs and head: in the latter, the brain is generally insufficiently supplied with blood; and the circulation of the lungs, although languid, is seldom obstructed, and never altogether arrested, unless a termination in death supervenes. — *d.* Various manifestations of *hysteria* either very closely resemble fainting, or are in some way or other associated with it. The more remarkable phenomena of hysteria may follow, or precede, fainting, — most frequently the former; but the loss of motion and sensation often partakes more of the characters of leipothymia, than of swooning, the pulse at the wrist being but little affected. Pain under the left breast, borborygmi, and a sense of suffocation, which commonly precede the hysterical form of syncope, sufficiently mark its nature; and even when these are not present, other signs soon manifest themselves, especially convulsions, weeping, laughing, &c. (See Hysteria.) — *e.* Syncope is rarely so profound as to be mistaken for *death*; but Portal and Chamberet, with some writers on medical jurisprudence, concur in thinking that it may be both so complete and prolonged as to endanger premature interment in countries where the last rite is early performed. Whether or not the action of the heart, which cannot be altogether abolished even in such cases, may be detected by the stethoscope, I am unable to state; but it surely cannot continue many minutes without detection upon a strict scrutiny, unless death have taken place. The state of the cornea, which is soon covered with a film, or deprived of its delicate transparency, and afterwards collapsed; the appearances of the thorax upon examination; the signs yielded by auscultation; the condition of the body in respect of flexibility, &c.; and the

temperature under the armpits, &c.; will generally decide the question even in the most doubtful cases. Placing a mirror before the face, or down beneath the nostrils, and observing whether the former be moistened, or the latter moved, have been long popular means of ascertaining the certainty of death, as happily shown by SHAKSPEARE (*Lear*, act v. sc. 3., and *Henry the Fourth*, act iv. sc. 3.)

16. IV. TREATMENT. — Syncope is frequently not only its own cure, but often the means of removing the cause which induced it. — When occasioned by hæmorrhage, the languid state of the circulation permits the formation of coagula, which plug the vessels and arrest further discharge; and the loss of the voluntary powers causes the patient to fall in the very position which, of itself, generally restores the use of his faculties, by facilitating the transmission of blood to the brain. The *indications* are — *a*. To remove the cause of the affection; and, *b*. To recover the patient in the seizure.

17. *A*. For obvious reasons, the second intention often may be the first required, particularly when called to him in the attack. The patient should be placed in the horizontal position, and removed to an open and moderately cool air; and fragrant and cold water — lavender water, Cologne water, or simplee water — may be sprinkled on the face, or rubbed on the palms of the hands, &c. In more profound cases, frictions of the limbs, epigastrium, &c. may be assiduously practised in a well-ventilated chamber; and the usual stimuli — æther, camphor, ammonia, &c. — given internally, in moderate or appropriate quantity, as soon as the patient can swallow. The recumbent posture should always be continued until recovery is complete.

18. When syncope supervenes upon *bloodletting*, the recumbent posture should constitute the whole means of restoration; for unless the operation has been very injudiciously resorted to, this will be sufficient for recovery. The use of stimuli in this case will only increase the consequent reaction, and often aggravate the disease for which the depletion was employed. For syncope from *diseases of the heart*, a moderate and discriminating use of stimulants is often necessary; but they may be injurious if it arise from inflammation of the heart or pericardium. When it is caused by *hæmorrhage*, stimulants are very frequently hurtful, as they interfere with the consequent changes in the vessels, preventing a return of the hæmorrhage; but extreme cases and circumstances occasionally arise, rendering the use of stimuli indispensable.

19. If syncope occur *after parturition*, either from exhaustion of nervous power, or from hæmorrhage, internal and external stimuli ought not to be delayed. Swooning from hæmorrhage in the puerperal state always demands immediate and appropriate treatment, as it arises not only from the loss of blood, but also from exhaustion and the sudden removal of an accustomed pressure affecting more or less all the abdominal and thoracic viscera — from the combination of the three most powerful occasional causes of the affection. Besides, syncope supervening after the recumbent posture is assumed, is never devoid of danger; and the imperfect contraction of the uterus so generally connected with the production of hæmorrhage, will not be remedied by the continuance of this state.

20. *Bloodletting* has been considered by some writers necessary to the cure of certain forms of syncope, especially by those who have confounded leipothymia with it, which is often benefited by depletions. ZACUTUS LUSITANUS relates a case in which he practised it largely; but the fainting was there evidently connected with disease of the heart, — bloodletting being often necessary in such circumstances, although requiring much discrimination, both as to its adoption, and to the mode and extent of employing it. In the actual state of syncope it can hardly be resorted to without risk. The practice in such cases must depend upon the inferred nature of the heart's disease. I was some years ago called by a neighbouring practitioner to a patient suffering from recurring syncope, vomiting of all ingesta, and severe pain in the epigastrium, with anxiety, &c. The disease was viewed as acute gastritis, and appropriate treatment adopted; it terminated, nevertheless, fatally in a few hours. On dissection, evidence of intense inflammation of the pericardium, particularly the part reflected over the heart, was found.

21. *When vomiting* supervenes during syncope, a speedy removal of the affection is the consequence, unless the syncope be, as in the preceding case, a sign of a most acute and dangerous disease, wherein bloodletting should be resorted to. When fainting arises from the quantity or quality of the ingesta, the exhibition of an emetic is generally beneficial.

22. The question has been proposed by BRAUSER, whether bloodletting should be persevered in or not, when it almost immediately causes syncope without any evident cause? Such cases are not infrequent in practice; and I have met with the occurrence even where venæsection appeared most requisite, and the patient by no means fearful of its performance. In a case of this kind which lately occurred to me, copious local depletion was substituted with great benefit; but in a still more recent case, the patient recovered by means of internal treatment, without bleeding in any way. The question, therefore, cannot be answered in a positive manner one way or the other; but where syncope takes place, bleeding is not required in the great majority of cases, and it may be injurious. At a time when bloodletting was viewed as the chief remedy in fever, and directed to be performed as early as possible in the disease, I had opportunities of seeing it practised in the cold stage, or previous to the developement of reaction, of both the remittent and continued types; but it almost instantly, or before two or three ounces of blood had been withdrawn, produced syncope of a profound and serious kind, and proved manifestly hurtful. The results would have been very different had the operation been deferred to the stage of reaction: and hence, although instant syncope, or even faintness, upon bloodletting, is an indication of its injurious tendency, if persevered in at the time; yet a consequent state of action, general or local, may arise in a very short time, in which it will be borne to a very great extent without this affection resulting, and will prove most beneficial.

23. *B. The removal of the causes* of the affection, when these are of a constitutional or structural kind, must be attempted after recovery from the seizure. If it depend upon DEBILITY, the means advised in that article will be requisite; and in other circumstances, the treatment suitable to inferred pathological conditions should be practised, as pointed out in the places where such conditions are more especially and appropriately considered. — The *prevention* of a return of the affection will be most effectually secured by this procedure.

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FAUCES. See THROAT — *Diseases of the.*

FAVUS AND ACHOR. See PORRIGO and PUSTULES.

FEIGNING DISEASE. — CLASSIF. — DIAGNOSIS — SYMPTOMATOLOGY.

1. Disease may be — 1st, *Pretended* or *simulated*, the person being in a state of health; — 2dly, *Artificially excited*, disorder being actually produced; — 3dly, *Exaggerated* in the description and appearance given of it, the patient being indisposed; — and, 4thly, *Artificially and intentionally increased*, or aggravated during its course. In these *four modes*, disease may be said to be *feigned* or *simulated*.

2. The *objects* desired to be accomplished by those who undergo the inconvenience, suffering, and moral degradation of feigning disease, are — *a.* To escape from being levied into the public services; — *b.* To procure a discharge from the public service; — *c.* To obtain both a pension and a discharge; — *d.* To enjoy the ease and comfort bestowed on the sick, and to escape from hard work, or unpleasant employment, mental or corporeal; — *e.* To obtain objects of desire, or to procure compliance with wishes or caprices; — *f.* To avoid punishment; — *g.* To excite compassion or interest; — *h.* To deceive.

3. The *persons* who feign disease with one or more of these intentions are — *α.* Soldiers and sailors; the former being usually called *malingerers*, the latter *skulkers*; — *β.* Slaves and serfs; — *γ.* The lowest class of labourers, and mendicants; — *δ.* Members of benefit societies; — *ε.* Persons who have received accidental or intended injury, and desire to obtain increased compensation for it; — *ζ.* Prisoners for debt, or for civil or criminal offences; — *η.* Young persons of both sexes wishing to escape from the confinement of school and the labour of study, or longing for a return to their homes; — *θ.* The spoilt or indulged, who desire to excite interest, or to obtain a compliance with their desires; — *ι.* and lastly, Those who wish to accomplish objects of private or political ambition, or to gain particular ends. — Feigning disease has been resorted to with the last-mentioned view, very probably from the earliest times. AMNON the son of DAVID, ULYSSES, SOLON, the elder BRUTUS, the Roman CÆLIUS ("*Desit fingere Cælius podagram.*" — MARTIAL.), "HOTSPUR's father, old NORTHUMBERLAND," the Constable BOURBON, Pope JULIUS III., the Earl of ESSEX, and RALEIGH, grace this class of *malingerers*.

4. Disease may be so artfully feigned in one or other of the modes just stated (§ 1.), as to require the utmost discrimination and ingenuity to detect the imposture. It is obvious, as Dr. CHEYNE remarks, that the discovery of it will be most readily made by those who are the best physiologists and pathologists, and most accurately informed respecting the operation of medicinal agents. In doubtful cases, the practitioner should take into consideration the constitution, education, information, habits, and probable motives of the person; and examine more especially those symptoms which are counterfeited with the greatest difficulty, in respect not merely of their individual, but of their correlative, characters. The frequency and rhythm of the pulse, in connection with the temperature, colour, and humidity of the skin; the expression of the eye and face; and the fœtor, colour, and consistence of the excretions; should especially arrest attention. A morbid appearance may be communicated to the excretions, and to the tongue and mouth; but a morbid fœtor of the former, and various states of the latter, are counterfeited with great difficulty. The intelligent observer will infer much also from the manner of the simulator; from the consistency of the account given by him; and from the relation one symptom bears to another, in its seat, nature, or severity; and will be careful not to lead him to suspect that the reality of his ailments is for a moment doubted, until proofs of detection are complete. The circumstance of impostors always overacting their part, overloading their accounts with unnecessary details, complaining of their sufferings, and readily falling into the snare of enumerating incompatible symptoms when a leading question respecting them is put, should not be overlooked. They are seldom desirous of obtaining medical aid, or of submitting to the treatment directed; and, in every case, strict attention should be paid to the exhibition of the medicines ordered, which ought never to be left in the possession of a suspected person. In doubtful, and even in real, cases of feigning, painful or even severe measures should not be inflicted, as in most instances, and especially in the public services, the mind of the impostor is made up to endure even torture rather than *give in*.

5. The importance of this subject in private

practice is greater than is commonly imagined; as one or other mode of feigning is often resorted to in civil life, especially among indulged females, in order to obtain compliance with their wishes, or to excite interest, or for the pleasure of deceiving; and, in such cases, the practitioner may lower himself in the estimation of the person attempting to impose upon him, by not detecting the cheat. At the same time he should be careful not to treat a person as an impostor unless the evidence is complete; for he will thereby injure himself in practice, and, in the public services, endanger the lives of those whom he wrongfully accuses. During the late war, when many went into the public services but scantily stored with medical knowledge, instances were not uncommon of persons feigning disease with success; and of others being treated and punished as impostors, who were actually suffering the complaints they made. In proportion, however, to the general advancement in medical science, such occurrences will be more and more rare; and, in recent times, numercus aids have been furnished, in very able papers on the subject, to those who may stand in need of them. In the following account of feigning disease, an alphabetical arrangement is adopted; indeed, it is the only one which the subject admits of:—

6. **Abdominal Tumours** have been feigned by paddings worn in the dress; and by pushing the abdomen upwards in bed, or forwards when erect. Detection is easy in such cases, on examination of the naked person. When this is resisted, the inference is obvious.

7. **Abortion** is simulated by staining the linen and body with blood, procured either by puncture of a vein in one of the extremities, or from the lower animals. Detection is difficult. The state of the pulse, the appearance of the mammæ, and of the countenance, and an examination *per vaginam*, may lead to more or less suspicion, but furnish no proofs of its occurrence.

8. **Abstinence**, either total or partial, has been feigned in numerous instances. Many of the persons who have done so, have possessed the power of abstaining from food for a very long time; but deceit has been always practised, when total abstinence has been said to have been carried beyond a few days.—A woman was condemned for the murder of her husband in the 31st of Edward III. (*Med. & Phys. Journ.* vol. xxxi. p. 50.) She had the wisdom to fast in prison forty days, and was pardoned on account of her miraculous abstinence. Ann Moore, who gulled the British public for some years in this way, and who really possessed the power of fasting for an unusually long time—eight or nine days, or nearly the whole period that a person can live without food—is said to have made a fortune by the imposture. Very attentive watching and much trouble are required in the detection of it; and wherefore should they be undertaken?

9. **Blindness**—partial or total—is feigned chiefly by men in the public services, by mendicants, and by persons endeavouring to avoid conscription into the army or navy. *Amaurosis* is the common form assumed, but paralysis of the eyelids is also sometimes alleged. Amaurotic blindness, being characterised by a dilated and fixed pupil, may be detected by the absence of this sign, and by watching the patient without his knowledge. During the last wars, numerous French conscripts were exempted from service by simulating blindness, and using belladonna to dilate the pupil and render the iris inactive. When the simulator has had recourse to this means, even the reflected light of a mirror will not cause the contraction of the pupil.

10. **Cachexia Africana** was formerly produced by the West Indian slaves, in numerous instances, by voluntarily adopting a practice usually caused by disease. It is often connected with disorder of the stomach at its commencement; and in this case the practice of dirt-eating only aggravates the primary affection, or changes it into the true African cachexy. Whether the practice be the result of a morbid appetite, or adopted with the intention of affecting the health, or causing death, it may be detected by the exhibition of emetics, and on the examination of the stools, the egesta being washed. The only means which succeeded in preventing it, when resorted to with suicidal intention, was to cause the slaves to believe that decapitation would be performed on them after death, as they imagine that this operation prevents their return to their native country, and their migration to other states of existence.—(Williamson, in the West Indies; and myself in Africa.)

11. **Cancer** is said by Mahon, Fodéré, and Beck, to have been feigned by mendicants and others. A part of the spleen of an animal is glued on the part, with the smooth side to the skin, leaving on the outside the appearance of an ulcerated or diseased surface. Pierre Pigray adduces an instance in which this mode of deception was attempted. His account leads to the inference that it was formerly practised on some occasions for the purpose of performing miraculous cures. Attentive examination of the part, and observing whether general signs of cachexia be present, are sufficient for detection.

12. **Catalepsy** is not infrequently simulated by soldiers or sailors, and by hysterical and capricious females. It may generally be detected, partly by considering the circumstances in which it is observed, and the kind of persons who are affected, and partly by artifice. The use of powerful stimulants; letting fall a drop or two of a very hot or very cold fluid on the skin of the patient's neck; proposing the actual cautery whilst the pulse is being felt, and marking the effect; and suspending to the hand which has been stretched out a small weight attached to a string, which should be imperceptibly snipped, and observing whether or no the arm be suddenly thrown up, are the usual means of detection. The last method was resorted to by John Hunter, in St. George's Hospital.

13. **Concretions** of various kinds have been pretended to be passed from the bowels, urinary organs, vagina, and stomach, by soldiers and females. Cases of this kind are adduced by Dr. Livingston (*Edin. Med. Comment.* vol. iv. p. 452.), Dr. Thomson (*Annals of Philos.* vol. iv. p. 76.), and Mr. Dunlop (Beck's *Med. Jurisprudence*, p. 7.). The most superficial examination, and the rudest chemical experiments, will show the difference between the substances thus used for deception, and the ascertained nature of the morbid concretions occasionally passed from the bowels and urinary organs. One of the writers

in the *Cyclopædia of Practical Medicine* mentions a remarkable instance of deception practised by a young woman at Edinburgh, and continued from 1817 to 1830. She feigned, during that time, hepatitis, epilepsy, amaurosis, aphonia, deafness, paralysis, gravel, anasarca, hæmatemesis, convulsions, gastralgia, dyspnœa, retention of urine, vomiting of substances resembling liver, bone, &c., and at last concluded by excreting bone from the vagina. Bone was first detected in the vagina in 1824, whilst introducing the catheter, and large quantities were passed, or extracted, — some even from the bladder. She was received into the hospital in 1825, and the bones which she passed were believed for a time to be those of an extra-uterine fœtus. She was there detected by cutting off the supply, and discharged. She afterwards had recourse to the same practice, but at last varied it, and had an illegitimate child in 1828.

14. Deafness and Deaf-Dumbness are simulated by those who wish to escape from the army or navy, or from criminal trials, and by mendicants. They generally lose their hearing suddenly; whereas real deafness is gradual, or the consequence of severe illness. The expression of the countenance and a change in the pulse often betray the impostor when something of great importance is said in his hearing. But some are prepared for this, and are even unmoved by very sudden noises. Mr. Dunlop states, that a soldier feigned deafness so well, that firing a pistol at his ear produced no effect; but on the experiment being tried after he had been put to sleep by opium, he started out of bed. Those who feign *dumbness*, are generally unaware that if a person has acquired the use of speech, he never can become dumb, however deaf he may be. The really dumb acquire an expression of countenance and gestures which are assumed with great difficulty; and few have sufficient art and perseverance to counterfeit deafness and dumbness, so as to avoid detection for any length of time. Some have attempted even to cause deafness, by introducing solid bodies into the ear, or by exciting inflammation of it by irritating matters. Honey and various other substances have been employed so as to simulate *otorrhœa*. The organ and the discharge from it should therefore be carefully examined.

15. Delivery has been pretended, with an obvious intention, after artificial abdominal enlargement and sudden subsidence of the tumefaction. In this case, the external parts of generation are moistened by procured blood, and the child of another substituted as the female's own. This cheat can be detected only by examining *per vaginam*. Soon after real delivery, the vagina will be relaxed, as well as the os uteri; the latter tumified and tender, and the lochial discharge flowing. But these signs will become less evident, the longer the time that has elapsed; and, after nine or ten days from parturition, they cannot be depended upon; but the well-known state of the integuments of the abdomen, and the appearance of the mammæ, will aid detection.

16. Dropsy has been simulated by French conscripts, who have been said to have actually injected water into the cavity of the peritoneum, and thereby produced factitious ascites. — Anasarca of the extremities has been caused by ligatures artfully concealed; but the imposture will be detected upon strict examination of the naked body, and by the absence of a leucophlegmatic or cachectic appearances. Cushions fitted to the abdomen, and padded clothes, are the modes resorted to by mendicants; but these require no remark. Instances are mentioned by Mangetus, Sauvages, and others, of *chronic dropsy of the head* being simulated by mendicants, who have daily blown air under the scalp of children through a small perforation at the vertex, until the scalp became enormously distended.

17. Dysentery and Chronic Diarrhœa are often feigned by soldiers and sailors, particularly in warm climates; and are sometimes actually produced by their using irritating substances for the purpose. Mr. Copland Hutchison has seen even a fatal result follow such practices. He ascertained that vinegar and burnt cork were often used to cause the disease. Suppositories of soap, and irritating substances introduced into the rectum, have also been employed to cause mucous discharges (Cheyne); but drastic purgatives are more frequently taken in sufficient quantity for this purpose. The dysenteric evacuation is simulated by breaking down the fæcal evacuation in the urine, and mixing with it the blood procured by pricking the gums. The imposture is detected by the cleanness of the linen; by obliging the patient to use a night-chair, and by watching his proceedings.

18. Emaciation — partial or general. *General emaciation* and *debility* are sometimes occasioned with the view of avoiding some disagreeable service, or to be sent home from foreign service, or to procure change of climate. Abstinence from food and sleep, the frequent use of purgatives or diaphoretics, especially antimony, and excess in spirituous liquors, are the means commonly resorted to. Wasting of a limb is caused chiefly by mendicants, by means of continued compression; and the diagnosis between artificial and real wasting is often very difficult. Detection must depend upon a strict examination, and a variety of considerations thereby furnished to the duly qualified examiner.

19. Epilepsy is very frequently feigned by mendicants, by sailors and soldiers, and occasionally by females to serve particular ends. In such cases it is proper to notice whether the person falls to the ground without regard to the situation or place; whether the face be livid, the pupil fixed, the spasm and convulsions general, the pulse altered, the insensibility complete, the mouth distorted and frothy; and whether sopor follow the fit, passing into heaviness, vertigo, and exhaustion, as all or most of these symptoms are absent, or imperfectly evinced in the simulated disease. The opportune appearance of, and selected situation for, the feigned paroxysm, the partial or successive production of the muscular actions, the sensibility of the iris, the abrupt termination of the seizure, and the absence of injury to the tongue, should also be taken into account. Foaming at the mouth is sometimes imitated by means of soap kept in it; but it is generally overdone in this case. The real epileptic is desirous of concealing his infirmity; whilst the simulator talks of his disease, and never endeavours to avoid publicity. It is chiefly, however, by artifice that feigned epilepsy can be fully

detected. De Haen, observing the sensibility of the pupil in a girl who feigned epilepsy to avoid work, suspected the imposture, and desired the attendants to place her in an erect posture, and to chastise her severely if she fell. She confessed the cheat. A beggar in Paris, who often fell into fits in the streets, was placed on a truss of straw, ostensibly to prevent him from sustaining injury. When in the midst of the paroxysm, fire was set to each corner of his bed, and he sprang up and fled. Sauvages was called to a female who imitated the fit remarkably. He inquired whether, on the access of the paroxysm, she felt pain extending from her arm to her shoulder, and thence to the opposite thigh. She said that she did, and was detected. Mr. Copland Hutchison introduced some Scotch snuff up the nostrils of a man whom he suspected of feigning a fit. It induced a fit of sneezing, and epilepsy was not afterwards heard of. Dropping alcohol into the eye (Cheyne), the introduction of nauseating substances into the mouth, proposing very painful or dangerous means of restoration in the patient's hearing, the dread of the actual cautery, directing boiling water to be poured over the legs, and actually pouring very cold water, have severally been recommended. Dr. Cheyne states, that in the case of a soldier, a table was placed upon another, and the simulator laid, in the midst of his fit, on the former. Dread of the fall terminated the convulsions. In doubtful cases, particularly in the public services, the medical man should be cautious in giving an opinion, and should never sanction punishment. Dr. Cheyne and other experienced writers state, that they are "in possession of sufficient evidence to prove that real epilepsy has often been considered feigned;" and they might have added — punished accordingly. But these occurrences, however frequent in past times, are not likely to take place often in future.

20. Fæces. — Incontinence of fæces is sometimes feigned. It is detected by examining the sphincter ani, according to the recommendation of Dr. Cheyne; who directs that, if it should contract upon the finger, opium and solid food should be prescribed, and a watch set over the person. If he pass solid fæces in bed, he will be a fit subject for punishment.

21. Fainting and Swooning are simulated by mendicants, by hysterical or indulged females, and by sailors and soldiers in order to escape punishment; but the nearly or entirely absent pulse, the scarcely perceptible respiration, the collapse, coldness, and paleness of the countenance, and cold sweats, with coldness of the extremities, are not easily produced at will. Ligatures or pressure have been used to suppress the pulse, and washes applied to the face to produce paleness; the means of detection should therefore have reference to such artifices.

22. Fever is more frequently produced artificially, than feigned. Ague is the type selected when feigning is attempted. The exertions, however, necessary to simulate the rigors of the cold stage will generally be found to be productive of the sweating stage instead of the former. Cantharides, and various stimulants, are usually taken to induce febrile symptoms; and a temporary acceleration of pulse is often occasioned by both sailors and soldiers, just before the physician's visit, by striking the elbow against any hard substance. Some persons acquire a power of accelerating the heart's action at will. Emetics are sometimes also resorted to, to make the deception more complete; and the tongue is artificially coloured by chalk, pipe-clay, brick-dust, tobacco, brown soap, &c. When suspicion is excited, the pulse should be examined a second time on leaving the patient, and preferably in the carotids or temples; the state of the excretions being particularly attended to. Cases of feigned fever are generally ephemeral, and a day or two of close examination generally leads to detection.

23. Gastric Affections, especially *gastralgia* and attacks of *vomiting*, are sometimes simulated. The former is detected with great difficulty, and chiefly from collateral circumstances. *Vomiting* is generally produced by having recourse to the common emetics, or to tobacco, particularly the latter, on account of its depressing influence on the nervous system and circulation; and by pressure on the stomach (C. Hutchison). I met with an instance, some years ago, where it was induced at will, by the action of the abdominal muscles, without even the aid of irritating the fauces. In such cases, the state of the appetite and the appearance of the evacuations should be examined; for, unless where tobacco has been taken to disorder the stomach, the former is but little impaired. In the case of vomiting at will just mentioned, the person had no sooner emptied his stomach, than he proceeded to replenish it again with an appetite. Not only is vomiting produced, but further deception sometimes is attempted by introducing various foreign substances into the matters ejected. A singular case, in which a girl was said to have brought up the larvæ of insects and reptiles from her stomach, is recorded in the *Transactions of the Dublin College of Physicians*. It afterwards, however, was ascertained to have been a well-managed deception.

24. Hæmorrhoids are sometimes simulated; the appearance of the hæmorrhoidal tumours being imitated by means of small bladders filled or tinged with blood, and partially introduced into the rectum (Percy and Laurent). Simple discharge of blood from the anus is more easily feigned; and the deception is detected with greater difficulty.

25. Hæmorrhages from the *Stomach*, or from the *Lungs*, are often feigned. In order to imitate *Hæmoptysis*, cough is pretended, and the saliva coloured by pricking, scratching, or sucking the gums; or by holding Armenian bole, brick-dust, vermilion, &c. in the mouth. An attentive examination of the sputum, and of the physical and rational symptoms, will generally lead to detection. *Hæmatemesis* is often feigned by swallowing bullock's blood, and soon afterwards by inducing vomiting. If the quantity taken be considerable, vomiting will often follow without any aid. Instances of deception practised in this way are mentioned by Sauvages, Metzger, and Beck. A close investigation of the symptoms, and, if suspicion be occasioned, a strict surveillance, will generally prevent a continuance of the imposture.

26. Heart-Affections have been simulated, in order to escape from the public services. MM. Percy and Laurent state, that a ligature has

been found so firmly bound around the neck, as to cause a livid and swollen countenance, and disorder the heart's action. Dr. **Quarrier** and Mr. **Copland Hutchison** ascertained, that white hellebore was often used by sailors to produce this effect; vomiting, purging, syncope, tremors, and nervousness, followed by palpitations, being the usual consequences of a large dose of this substance. Mr. **Dunlop** states, that death was occasioned in one instance by the use of hellebore with this intention.

27. **Hepatic Disorders** are often feigned by soldiers in warm countries, particularly in India; and by officers and others desirous of returning to Europe. If any doubt of the reality of the complaint exist, the person should be undressed, and carefully examined by percussion and the stethoscope. The absence of enlargement in the region of the liver, the complexion, and appearance of the surface and limbs, and the state of the pulse and respiration, are the circumstances which should chiefly be considered. It ought not, however, to be overlooked, that most serious disease of the liver may exist without enlargement; and this viscus may be considerably enlarged, and even rise up into the right thorax, without being felt below the ribs. Hence the propriety of having recourse to percussion and auscultation in the investigation, especially when other proofs of disease are wanting.

28. **Hernia** and **Hydrocele** have been simulated by blowing air into the cellular membrane of the scrotum. Mr. C. **Hutchison** met with an instance of hernia being feigned, by elevating the testes to the external abdominal rings. Detection in cases of this kind is quite easy.

29. **Hysteria** is not infrequently feigned. Dr. **Dunglison** directs sternutatories to be employed; but the affection may be real, although they produce their usual effect. Detection is by no means easy, especially when an intelligent female simulates this complaint. In a case to which I was lately called, the moral circumstances and the symptoms induced me to infer deception; and I accordingly took my leave, by simply stating, in the patient's hearing, that, if recovery was not complete in a few minutes, the affusion of cold spring water over the head and neck would certainly have the desired effect. It should, however, be recollected, that females who are really hysterical are the most prone to feign disease; this affection and the desire to simulate others frequently arising from the same cause, namely, uterine irritation.

30. **Jaundice**, notwithstanding the difficulty of the attempt, has been successfully simulated, particularly in France, during the late war. Conscripts employed an infusion of turmeric to tinge the skin, muriatic acid to give the evacuations a clay-colour, and rhubarb to heighten the colour of the urine. But the white of the eye cannot be changed by art, although smoke has been tried for this purpose. Washing the surface and preventing access to the materials of deception are the chief means of detection.

31. **Insanity** in some one of its various forms —but most frequently mania, melancholy, and idiocy—is frequently feigned; and detection is by no means easy. There can be no doubt that, in the public services, pretenders often gained their ends; and that the really afflicted were sometimes treated as impostors. Nor can this be a matter of surprise, when the great difficulty of discrimination is considered. In the present day, madness is most commonly feigned with the view of escaping from the punishment due to crime; and the responsibility of the medical examiner is consequently great. He should, therefore, have every facility afforded him, and take sufficient time to the investigation, that he may arrive at a correct conclusion. He should endeavour to obtain from the individual a full account of himself; mark its consistency, and place an intelligent watch over him. The expression of the countenance, and of the eye; the gestures and manner; the state of the tongue, the appetite, and the evacuations; and especially the duration, continuance, or frequency of sleep; ought to be carefully observed. Certain expressions of countenance and gestures are so peculiar to the insane, that the experienced observer will infer much from them. Pretenders generally overact their parts; assume the more violent or disgusting forms of mania; do not maintain the deception when they believe themselves unobserved; recommence it in the society of others; and possess not the power of prolonged abstinence from sleep and food so generally observed in the truly insane. Sound sleep soon overpowers the pretender, whereas the insane are remarkably watchful; sleeplessness to a distressing degree often preceding the disease, and always attending it throughout, for much longer periods than can ever be endured by a person in health.

32. The insane, during remissions, are desirous of being considered free from the malady, and often assiduously endeavour to conceal whatever may betray them; but simulators seldom carry their deception thus far. The real malady usually commences with slight disorder of the common modes of thinking and acting; and advances slowly through some hallucination, until at last it is either fully developed, or is suddenly exasperated. The feigned disease, on the contrary, presents not this course; is not preceded by sleepless or restless nights, and by a continued consideration of one topic; but appears at first in its full violence. The existence or non-existence of the causes of insanity, of previous attacks, of pre-existing eccentricity of manner or thought, of hereditary tendency, of antecedent affections of the brain, of injuries of the head, &c., the character of the individual, and the motives for feigning, will also be considered by the physician. Care should be taken not to infer deception, because the motives for it are apparently strong; for the circumstances constituting the motives may be the causes of the real malady. The costive state of the bowels; the large doses of medicine necessary to move them; the comparative insensibility of the stomach to tartarized antimony; the generally more frequent pulse, and the sudden and extreme irritation on any contradiction, observable in the maniacally insane; should not be overlooked, as they hardly admit of being feigned. Their disregard of the decencies, comforts, and affections of life, ought also to be taken into account; for, although these signs are often also simulated, deception in respect of them is seldom carried so far as in the real malady. A person even of pure character, when truly insane, will often use the grossest

language, practice the greatest indecencies and brutalities, and evince the bitterest dislike of, and malice to, his friends; but simulators exhibit those symptoms only when they believe themselves watched, or before others. Dr. **Haslam** remarks, that the *melancholic states* of insanity are feigned with greater difficulty than the maniacal; the one presiding principle, the ruling delusion, the unfounded aversions and causeless attachments, the peculiar look, the solemn dignity, and the associations characteristic of the former, can never be simulated so as to deceive the experienced observer. *Idiocy* is most easily feigned; yet there are always a hesitation and reflection observable in the discourse of the pretender; his disordered ideas not succeeding each other with the same rapidity as those of a person whose understanding has been really destroyed. The simulator will also, according to Dr. **Marc**, repeat the same ideas, and often the same words, in order to prove his madness, that he is requested to repeat, whereas the truly insane will wander incoherently from what he is desired to utter. In this form of insanity, the patient is always pusillanimous and submissive, unless during impetuous excesses, which only sometimes occur; and memory and conception are both defective.

33. It may sometimes be proper, if suspicion exists, to mention some severe remedy, or to threaten punishment. The really insane never heed these; but those who feign, will often discover by the change in the pulse, or by looks or actions, the emotions thereby induced. **Zacchias** states, that a physician ordered, in the hearing of a person whom he suspected of deception, that he should be severely whipped; inferring that the external irritation might be useful if the disease was real, or too severe a test if feigned. The threat was sufficient. **Fodéré**, on leaving a female who had long succeeded in simulating insanity, said to the keeper, within hearing of the patient, "To-morrow I shall again visit her; but if she continue to howl, if she be not dressed, and her chamber not put in order, you must apply a red hot iron to her neck." This was sufficient. The very treatment most conducive to the recovery of the really insane, is the most intolerable, if persisted in, to the simulator; who is often all at once cured upon hearing of his being about to be sent to an asylum, or of a continued and rigorous recourse to solitary confinement, low diet, and repeated counter-irritation.

34. **Lameness** is often feigned by sailors, soldiers, mendicants, and convicts, by pretending contractions of the muscles, deformity, the effects of fractures, and by introducing sharp bodies under the skin. For pretended *contractions* of muscles or joints, a tourniquet may be placed above the joint, and so closely drawn as to render the muscles incapable of acting, when the joint will become moveable. The emaciation of the limb in these cases is no proof of their reality, as it necessarily proceeds from disuse of the limb. — Previous *fractures* of bones is often alleged; but the cheat is readily detected on minute examination. — *Malformation*, particularly curvatures of the spine, elevation of one shoulder, inversion of the feet, and shortness or distortion of a limb, are sometimes simulated. There can be little difficulty in detection, on a careful examination of the naked body. Pretended distortion of a limb may be ascertained by the use of the tourniquet, or by straightening it, whilst the simulator's attention is withdrawn from it, as was done by Mr. C. **Hutchison** in a case which occurred to him. Instances have been met with of females who caused serious swellings and abscesses by introducing a number of needles into the parts.

35. **Neuralgic, Rheumatic,** and other **Pains** are very frequently simulated; and detection is very difficult, as it is next to impossible to prove the absence of pain. Inconsistencies in the patient's account of his case, and contradictions into which he may be readily led by an artful examination, are the chief means of detection. Pain is seldom very severe or prolonged, without being attended by certain symptoms, according to its situation. If it affect the joints, swelling, redness, stiffness, &c. are usually the result; if it occur in any part of the abdominal cavity, the functions of digestion, assimilation, or excretion will be disordered; if it affect the thoracic organs, circulation or respiration will be deranged; if it occur in the head, loss of sleep will, at least, be the consequence. The inference should depend much upon the kind of pain complained of, upon its continuance or recurrence, and the nature of the phenomena attending it. If violent pain is stated to be present, and the patient, notwithstanding, has a good appetite, sleeps well, and does not lose flesh, we may doubt its reality. The effects of remedies should also be taken into the account, as well as the patient's desire of, or objection to, those which are of a severe kind. But the most severe pains may long exist, even in external parts, without affecting their appearance; and be referred to internal organs, without materially deranging the functions. Several instances of this kind have come within my own observation. These have been usually called neuralgic; and have often disappeared for a time, either during treatment, or without the use of any means. Many of the reputed cures of these would have taken place without any remedy whatever; but, to whatever cause the recovery is attributable, the return of the pain in some form or degree is generally observed, although of this as little as possible is said by narrators of extraordinary cures; and sometimes a return of the complaint is the least unfavourable occurrence,—a more dangerous or even fatal malady taking its place, especially in the rheumatic and gouty diathesis.

36. Cases have occurred, which have caused suspicions of feigning, and yet the results have shown most serious internal disease. A female, some years since, consulted a number of physicians respecting a most violent pain in the left side and loins, extending upwards to the left mamma. One considered it neuralgic, another hysterical, a third uterine irritation; a fourth deception, probably connected with hysteria; and, lastly, it was attributed to spinal irritation. The appetite continued good, the urine appeared healthy, and there was no emaciation. After many years of suffering, the lady died; and there were found (what, indeed, might have been expected) a great number of calculi in the uriniferous ducts and pelvis of the left kidney. — A celebrated preacher and theological writer long complained in a similar manner. The urine was abundant, and of a good colour, and hence dis-

ease of the kidney was not suspected by the numerous eminent men whom he consulted; but this organ was, nevertheless, found after death, filled with calculi. I have met with two or three instances of the most severe pain, recurring at irregular intervals, in a particular joint — in the left shoulder joint in one case, and in the right knee in another — without any apparent local or constitutional disturbance; the tongue being clean, the bowels regular, the appetite good, and the flesh and strength undiminished. An ointment, with a large proportion of veratria, was employed for some time in one of these cases, without benefit. The most successful means in both, were such as improved the digestive and excreting functions. These cases, in circumstances admitting of the least suspicion, might have been considered as feigned.

37. I have no doubt that formerly, when the pathology of the spinal cord and its membranes was less attended to than now, many very severe affections, occasioned by changes in this quarter, were viewed as fictitious. — I lately attended an intelligent tradesman, advanced in life, who long complained of severe pains in the thorax, darting through both sides, and often backwards to between the shoulders. They were occasionally most violent, and fixed themselves for a time in one place, and then in another, of this cavity. The functions of circulation and excretion were unaffected, but the respiratory actions were sometimes disturbed. One day he was unable to get out of bed; and another he came down to his parlour. His complaints were considered chronic pleurisy, adhesions of the pleura, rheumatism of the thoracic muscles, &c. When first called to him, I examined the thorax by auscultation and percussion. The sounds furnished by both were perfectly healthy. The liver was thought to rise rather high; and the stools were deficient in bile. Chronic disease of the liver was, therefore, suspected. Upon extending the examination to the spine, two of the spinous processes of the upper dorsal vertebræ were found very prominent, and pressure in this situation caused great pain. The treatment was directed accordingly, and amendment took place. These cases evince the importance of a very minute and extended examination, in ascertaining the cause of pain, and, consequently, of proving its reality. When severe pain is complained of by females in any external or internal part, an opinion as to its reality or nature should not be given until the spine is carefully examined, and the state of the uterine functions inquired into. The existence or non-existence of tenderness, pain, or fulness in the hypogastric, iliac, and sacral regions, indicating disease of the uterus or ovaria, ought also to be ascertained; for if the least sign of disorder in any of these situations be detected, we ought not to infer deception, although it must be admitted that exaggeration, and even deception, may be practised nevertheless.

38. OPHTHALMIA was not infrequently produced by soldiers and conscripts during the last war, by means of corrosive sublimate, powdered alum, quicklime, acids, salt, tobacco, and various acrid powders and mechanical irritants. The extreme rapidity of the inflammation, especially as respects its invasion of the conjunctiva oculi and cornea, and the circumstance of the right eye only being affected, should excite suspicions. The chronic forms of ophthalmia were also excited and kept up by extracting the eyelashes and applying irritants to the edges of the eyelids. When entire seclusion of the suspected patient cannot be obtained, as in the navy, the recommendation of Mr. C. HUTCHISON to use the strait waistcoat should be adopted.

39. PALSY and SHAKING PALSY are not often feigned. If, with the loss of motion, or the continued agitation of a limb or one half the body, the general health appears to be good, and the excretions natural, a watch should be set upon the patient, and his actions observed when he thinks himself unnoticed. The cold affusion, electric shocks, moxas, and the actual cautery, will often have a wonderful effect in suspicious cases. Even the threat of having recourse to these means has been sufficient.— In cases of simulated paralysis, detection may be easily accomplished by causing sleep by opium, and then tickling, irritating, or pinching the motionless extremity. If the disease be feigned, the limb will be retracted or withdrawn; and, upon first wakening, it will often be used before the patient recollects himself.

40. POLYPUS *of the Nose* has been often imitated, according to MM. PERCY and LAURENT, by French conscripts, who have succeeded by introducing the testes of cocks, or the kidneys of hares or rabbits, into the nostrils, and retaining them there by means of sponge to which they had been fastened.

41. PREGNANCY is often pretended, to gratify the wishes of a husband or relations, to increase interest, to extort money from a paramour, to deprive a legal heir, to delay the execution of punishment, and to avoid labour. A careful examination of the areolæ of the mammæ, of the umbilicus, and of the *os uteri*, will generally lead to detection, at least in the more advanced months. (See PREGNANCY.)

42. PULMONARY DISEASES are not often feigned; but I have met with instances — two in females — in which slight symptoms have been exaggerated into the appearance of dangerous disease, particularly in the description of them, in order to accomplish particular ends. In such cases, the patient has a frequent and short respiration, and a hacking cough, with little or no expectoration; complains of the pain on coughing or taking a full inspiration, and of night sweats; evidently desires to be considered very ill, but is averse from medicine, as he considers it of no use; and even resorts to various means to produce emaciation, particularly vinegar, the oxides of copper, cream of tartar, tartaric acid, &c. The state of the pulse; the sounds produced by auscultation and percussion; the apparent despondency, instead of the continued and unwearied hopes of the patient, characterising the real disease; the marked reluctance to have recourse to issues, setons, or counter-irritants; and an enquiry into the wishes of the patient as to regimen, &c., are the chief means of detection. In private practice, the physician should endeavour to ascertain whether or no the treatment directed is strictly followed, particularly the insertion of issues, setons, &c.; for if these be not adopted after a confident recommendation of them, strong suspicions of deception should

be entertained, and he should immediately withdraw.

43. **Rectum.**—*Prolapsus and Fistula of the Rectum* have both been simulated by conscripts and persons desirous of escaping from the public services. **Ambrose Paré**, **Percy**, and **Laurent** met with instances, in which a portion of sheep's gut, or the urinary bladder, filled with blood, had been partially introduced up the rectum in order to imitate *prolapsus*. *Fistula* has been actually produced by making an incision near the verge of the anus, and introducing into it an acrid tent, particularly the root of white hellebore (**Dunglison**).

44. **Rheumatism** and **Lumbago** are often feigned by soldiers and sailors. Where they are complained of, without swelling of joints, or acceleration of pulse in the evening, or increased heat of the affected part, wasting of the limb, disorder of the digestive and biliary organs, or loss of the appetite and looks, suspicion should be excited. Dr. **Cheyne** remarks, that those who feign this disease, "give a glowing account of their sufferings, alleging that they have entirely lost the use of the part affected, which seldom happens in genuine rheumatism. There is, for the most part, no adequate cause assigned for the complaint; no relief from remedial treatment acknowledged; and, while real rheumatic affections are aggravated by damp, the impostor complains equally at all times." (See § 35.)

45. **Sight.**—Defects of this sense are frequently feigned. *Short-sight* may not only be pretended, but it may actually be occasioned by the use of concave glasses, in order to avoid military service. Those who are truly near-sighted, frown or knit their brows habitually, when looking at objects beyond the range of distinct vision, and the *crow-feet* wrinkles at the outer corners of their eyes become early marked. MM. **Fodéré**, **Percy**, and **Laurent** advise that persons claiming exemption on this account should be caused to read with concave glasses, the book being held at a proper distance, and without them, the book being put close to the eyes; if they cannot read distinctly in both cases, the imperfection is feigned. — *Night-blindness*, or intermittent blindness (hemeralopia, nyctalopia), is often simulated by sailors and soldiers serving in warm climates, where the affection is common; and it is detected with difficulty. The deception is practised in order to avoid night duty; and has been put a stop to by associating a blind man with one who can see, in the various works carried on during night, and when the sentries are doubled. (**Cheyne**.)

46. **Somnolency**, or **Sopor**, has been feigned with the utmost pertinacity, in order to obtain a discharge from the public services, or to answer purposes of revenge, as in the instances recorded by Dr. **Hennen** and Mr. **Dease**. As cases of sopor sometimes occur, care should be taken to distinguish between the real and simulated. The former is seldom, or perhaps never, unconnected with some cause of exhaustion operating chiefly on the nervous system, or without antecedent signs of mental and physical debility, particularly defect of memory, hesitation of speech, remarkable languor, &c. I lately attended, with Mr. **Bushell**, a gentleman about sixty years of age, who continued for many weeks in a state of sopor, interrupted only by being talked to loudly, or by taking food. When thus roused, he yawned, answered slowly, and instantly fell into a quiet sleep, unattended by any unnatural respiratory sound. He recovered slowly by the use of tonics and stimulants, and the occasional exhibition of stomachic purgatives. No cause but exhaustion of nervous and cerebral power could be assigned for the disease. Such cases, however, most frequently follow injuries of the head, attended by pressure on the brain, or the slow developement of tumours within the cranium. Dr. G. **Smith** mentions the case of a soldier who feigned a state of insensibility, and resisted every kind of treatment; but on proposing, in his hearing, to apply red-hot iron, his pulse rose, and amendment rapidly followed. A singular case of feigned sopor is detailed in the *Edinburgh Annual Register* (vol. iv. part ii. p. 159.). A soldier, 18 years of age, confined for desertion, lay, apparently insensible, from the end of April to the 8th of July, 1811. Electric shocks, the application of snuff to the nostrils, pins thrust under his finger-nails, and other stimulants, failed to rouse him. The sopor being thought the consequence of injury, the scalp was divided in order to ascertain the existence of depression, and the bone even scraped! yet no complaint was made. The case was viewed as hopeless, and the man dismissed. Two days after his discharge, he was seen cutting wood some miles from home. But wherefore should a depression of the cranium be hunted out by dividing and drawing back the scalp, and scraping the bone? One would expect that some tolerable signs of its existence should have presented themselves before such serious measures were resorted to. Can we be surprised at detection failing in such hands?

47. **Tympanitic** and **Emphysematous Affections** have been simulated, by introducing air into the digestive canal, and by inflating the cellular tissue, in the manner already stated (§ 28). MM. **Percy** and **Laurent** mention the case of a conscript who simulated an immense tympany by swallowing air; and Dr. **Cheyne** states, that this affection was apparently caused by a number of men in the 84th regiment. The pulse, tongue, and excretions were natural; but pain in the region of the liver, and over the abdomen, which was distended and tympanitic, with insatiable thirst, were complained of. Deception being suspected, they were required to take a cupful of a solution of the sulphate of soda in weak tobacco water, every four hours, until it operated. Recovery was speedily effected by means of this detestable medicine; but sixteen men had succeeded in procuring their discharge before this treatment was adopted. Dr. G. **Smith** states, that wonderful cures were often effected in military hospitals by a medicine composed of salts, aloes, and assafœtida, given frequently in small quantities, so as to keep the taste in the mouth. The substances used to produce this tympany seem not to have been fully ascertained. It was ascribed to the use of large quantities of chalk and vinegar.

48. **Tumefied Leg** is excited by means of an artfully concealed ligature, and keeping the extremity in a hanging posture. The writers on this subject in the *Cyclopædia of Practical Medi-*

cine state, that a case of enormous enlargement of the thigh and leg, resembling elephantiasis, was sent home from India to be discharged. A ligature was discovered, and, upon its removal, the swelling gradually subsided.—The detection and prevention of such cases cannot be difficult.

49. ULCERS artificially caused were remarkably frequent in both navy and army, during the last war. They were generally produced upon the legs, by various caustics or irritants, by friction with sand, by quicklime mixed with soap, by compression with metallic or other bodies, and by mineral acids. Arsenic, corrosive sublimate, tobacco, &c. have also been used for this purpose. Mr. C. HUTCHISON found a halfpenny between the muscles of a leg, which he removed in consequence of extensive caries of the tibia following artificially formed ulcers. Intentional ulcerations are distinguished from the real, by their borders being less callous, their surfaces more superficial, and less painful, and their disposition to heal, when secured against tampering, much greater, owing to their not originating in, or accompanying, constitutional disorder, as in the case of real ulcers.—In order to prevent this species of deception, Mr. C. HUTCHISON had recourse to a wooden box, in which he locked up the whole limb; all other means, as marked or sealed bandages, &c., having been found insufficient against the ingenuity of malingerers.

50. The URINE presents various disorders in respect of its characters and of its excretion, which have been artificially produced or feigned by persons desirous of escaping from the public services, and by hysterical females.—*Incontinence of Urine* was often simulated by sailors and soldiers. The circumstance of this disorder occurring frequently in this class of persons, who are mostly young, or in the vigour of life, should excite suspicions of its reality. The simulator generally chooses the circumstances and place suitable to his purposes in allowing the urine to escape. LAURENT and PERCY state that the *glans penis* is always pale and shrivelled in real incontinence, and that the urine never comes away in a stream. M. FODÉRÉ finding that this complaint was becoming epidemic in a regiment, and that blistering the perinæum and other means did not cure it, directed the penis of every patient to be tied, and the knot sealed, none but the person guarding them being allowed to remove the ligature. The penis was observed from time to time, to ascertain whether or no distension above the ligature existed, and whether, when it was removed in order to urinate, the discharge took place *guttatim*, as in real incontinence, or in a stream. The expedient succeeded, and the epidemic vanished. (Vol. ii. p. 481.) PERCY and LAURENT prescribed twenty lashes to the loins, with the avowed object of exciting the weakened organs. It was unnecessary to direct it to a second case. An army surgeon directed a cold plunge-bath twice a day with equal success; and Mr. HUTCHISON, Mr. COMYNS, and Dr. HENNEN caused a strong opiate to be given at night, and the length of time the urine was retained during sleep to be watched; for, in real incontinence, the urine passes away after a short time under all circumstances. The patient may also be caused to undress and stand before the medical man at the time when he states that his urine usually passes off. In cases of feigning, the abdominal muscles will be seen contracting in order to expel it.

51. *Bloody Urine* has been simulated by the ingestion of beet-root, madder, the extract of logwood, the fruit of the prickly pear, the Indian fig, &c. But blood is more frequently mixed with the urine. PERCY and LAURENT state, that conscripts have injected blood into the bladder, in order to imitate hæmaturia. This disease has even been occasioned by having recourse to cantharides. A boy in Staffordshire, in 1617, having accused a woman of bewitching him, feigned various maladies; and, amongst others, the excretion of *black urine*. The wisdom of our ancestors condemned the woman to be burnt, as was usual in such cases; but the Bishop of the diocese, suspecting imposture, caused the boy to be watched, when he was detected dipping cotton in ink, and afterwards introducing it within the prepuce, in order to give the urine which he publicly voided its dark colour. (*Mem. of Literature*, vol. iv. p. 357.)

52. The excretion of *Gravel*, and of other substances, has likewise been feigned. In all such cases, as well as the foregoing, the person should be made to urinate in the presence of the physician. The real existence of gravel is ascertained beyond doubt, by close inspection and chemical analysis.—*Strictures* have also been feigned; but the passage of a bougie will always ascertain their reality in the hands of an expert surgeon. —*Suppression and Retention of Urine* have been pretended; but most frequently by convicts, and hysterical females. The introduction of the catheter, and a strict watch, will generally show the state of the case.

53. UTERINE DISEASES have been feigned and exaggerated, and I believe more frequently than is commonly supposed. It was attempted in one case in which I was some years ago consulted; but the object becoming apparent, I withdrew. This kind of simulation is sometimes adopted with an evident motive, as dislike of a husband, &c.; but in other cases the object is not so apparent. Dr. THOMSON, of Edinburgh, mentions an instance of a female in a respectable station, who pretended to pass vesicular bodies resembling hydatids from the vagina. They were ascertained to be prepared from the intestines of a pig, and were made to resemble a string of beads.

54. VARICOSE VEINS have been caused by ligatures or pressure made in the course of the larger trunks. They may also be aggravated, when already present, in a similar way. Attentive examination, and the means advised for ulcers (§ 49.) will generally detect the deception, and prevent it.

55. WOUNDS have been both pretended, and inflicted intentionally. The feigning of wounds has been sometimes practised to avoid the danger of battle, or to be mentioned in despatches. Means which may occasion the appearance of a contusion, as abrading or discolouring the surface, are chiefly resorted to. Detection will depend upon attendant circumstances and the acuteness of the surgeon. Mutilations, or intentional wounds, are more commonly resorted to, in order to avoid conscription into the public services, or to obtain pensions or a discharge. They are sometimes also practised by slaves,

mendicants, and revengeful persons. And wounds and injuries involuntarily received have been aggravated, and their healing interfered with, to answer particular purposes. Detection in many instances is difficult, but it will be necessary to consider the possibility of the patient having inflicted the wound himself, its nature and extent, its relation to the alleged cause, to the probable object desired to be accomplished, and all the circumstances connected with it, before a conclusion should be arrived at. Persons in the public services, it should be remembered, occasionally assist each other in causing mutilations, and in aggravating injuries; so that the moral as well as the physical relations of the subject should be carefully weighed in all cases.

56. I have given the sum of our knowledge as to the means of distinguishing real from feigned disease, and of preventing the consequences of successful deception. I have endeavoured to avoid extraneous matters; and have not introduced amusing instances of simulation, as my limits must be more usefully occupied. The importance of the subject is especially great to the naval and military medical officer; but it is not less so to the civil practitioner; and the success of both in detecting imposture, will mainly depend upon their science, practical knowledge, and ingenuity. With a tolerable store of each, they will seldom be placed in great difficulty, or be obliged to resort to more painful means of detection, than the disease would warrant, were it real.

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FEVER. **Syn.** — *Πυρετος* (from *πυρ*, *fire*); *Πυρεξια*, *Πυρεξις*. Pyrexia, Pyrexis; Febris (from ferbeo, or februo, *I cleanse*). *Fièvre*, Fr. *Fieber*, Ger. *Febbre*, Ital.

Classif. — 1. *Class*, Febrile Diseases; 1. *Order* (*Cullen*). — 3. *Class*, Diseases of Sanguineous Function; 1. *Order* (*Good*). III. Class, II. Order (*Author*, in *Preface*).

1. **Defin.** — *Painful lassitude, with debility of the corporeal and mental faculties, alteration of the animal heat and of the secreting functions, accelerated circulation, and increased thirst.*

2. The human frame is liable to sudden and powerful impressions from external causes, to the nature or intensity of which it is unaccustomed, and to changes throughout its functions, proceeding from imperfect or impeded actions of some excreting viscus. The derangements thus occasioned, are remarkably varied both in degree and in kind; and they constantly induce further changes, terminating either in restoration to health or in the destruction of the individual. They have been usually named and classed, according to certain distinctions assumed from their chief causes, or from their most prominent features, or from the modes in which their principal characters are grouped. As, however, the various species of change or disorder, thus supervening, insensibly glide into each other; and as some symptoms disappear, and others spring up, from different intensities and combinations of remote causes, from the states of the internal organs at the time when the morbid impression was made, and from the ever-varying influences to which the body is afterwards subjected; so it must follow that distinctions, which are thus based, will become unsafe guides in practice. The manifestations of disease possess no unalterable features; and therefore descriptions of them are to be received with due latitude, and the modes and means of removing them accommodated to individual and ever-varying conditions. From these considerations, it cannot be a matter of surprise, that such diverse opinions have existed as to the nature of those derangements which have generally received the name of *fever*; and that so much discussion has taken place respecting the differences which exist between them and other disorders, with which, although arising locally, the whole frame more or less sympathises. Nor can we wonder that, owing to the frequent difficulty of distinguishing between fevers and the disorders which thus originate, all differences between them have been denied, and that the former have been actually considered as strictly local diseases. I shall have frequent occasion, in the sequel, to notice the grounds on which this opinion is founded.

3. The intimate connection existing between all diseases, which, either at their commencement, or in their course, exhibit febrile symptoms, might have been less a source of error, if the phenomena characterising them had been traced more accurately to their origin, and with a stricter reference to their causes, than they generally have been; and if succeeding and consecutive alterations had been recognised chiefly as effects of the previous changes. If such a course of investigation had been followed, deranged actions, arising almost simultaneously throughout the system, would not so frequently have been mistaken for those which are referrible to a single organ or part; nor would derangements of the former kind have been imputed to such a source. There is no doubt that a certain class of causes will produce both local and general ailment, in different individuals, according to circumstances peculiar to each; or even in the same persons, at different periods, owing to his state, or predisposition, at

the time of their operation. But, still the more remarkable phenomena of these separate diseases proceed in a very different order, and very generally in so marked a manner, as to be easily distinguished by the close observer. The most frequently exciting causes of disorder, viz. mental distress, atmospherical vicissitudes, exposure to cold, moisture, &c., shall, according to the state of the individual at the time, produce an attack of general disease, unaccompanied by predominant affection of any particular organ; and the disorder shall commence and terminate without any complication. In a second individual, a more or less evident determination of the malady, or even inflammation, shall appear in the advanced course of the general disease, or even during convalescence. In a third, the local disorder shall be coëtaneous, and more or less co-ordinate with the general affection, or even outstrip it in violence during its course. And in a fourth person, local disease alone shall be primarily caused; on which, as it increases, and as inflammation becomes more fully developed, symptomatic fever, or the general derangement, shall supervene. These different states of diseased action follow the same cause, according to the disposition, susceptibility, or states of the system at the time. One person, according to this proposition, may have the constitutional derangement complicated with *rheumatic*, *catarrhal*, *bilious*, *nervous*, *gastric*, or *dysenteric* affection; the general disorder being attended from some early stage of its course, or from the commencement, by a heightened disease of a particular organ, or structure, and thereby constituting varieties of fever, which have been thus denominated and described by Stoll, De Haen, Reil, Frank, Hildenbrand, and others, and have occurred in epidemic forms on various occasions. Another person may have the nervous, the gastric, or the dysenteric characters superinduced in the progress of the disease, owing to external causes continuing in, or coming into operation, or to improper treatment: and a third may experience, in consequence of the pre-existing state of a particular organ or texture, an attack of inflammation, from a similar set of causes to those which produce idiopathic fever. If, therefore, the species of disease which arise from one class of causes are thus varied, owing to the prèdisposition of certain organs, or to the susceptibility of the whole system, their number must necessarily be further increased, and their characters very materially changed, when the additional influences of marshy exhalations, epidemic constitutions, or specific infections and contagions, come into operation. Diseased actions become not only more varied and extended by such additional causes, acting either singly or in conjunction, but also much more complicated and violent.

4. These inferences may be legitimately deduced, from an extensive survey of some of the circumstances connected with acute diseases. Their relation with such derangements as have obtained the appellation febrile, is still more intimate than with those which, strictly local at their commencement, induce consecutively general disorder. It is necessary, however, to the proper consideration of the pathology of fever, that due regard be paid to the nature and extent of its causes, and of modifying or determining influences, as far as they can be ascertained; and that a strict reference be had to the effects observed to follow the application of both classes of agents, under opposite or varying circumstances. It will also be requisite, while such an inquiry is being prosecuted, that none of the early and intermediate changes be omitted. Such omissions have but too often vitiated our speculations on the nature of disease, and more especially of fever; for, instead of recognising the early changes and states, particularly those which more directly arise from external agents, consecutive and gross effects only have more generally been seized upon, and assigned as the cause of disease. Let it not be supposed that inquiries, such as have just been recommended, are productive of no advantage in practice. The scientific practitioner will consider the most effectual means of preventing, controlling, or removing disordered actions, to be indicated by a most careful scrutiny into their nature and extent, and by a judicious inquiry into early aberrations from the healthy condition. He will view the primary derangements, in the relation they hold with their remote or occasional causes, on the one hand, and with consecutive or ultimate lesions on the other; and will thus trace each individual link of the chain of causation throughout.

5. If it be asked, What has the treatment of fever gained by our speculations as to its nature? I would answer, almost every thing. I will show this in a more demonstrative manner in the sequel, by adducing the opinions which have formerly been held upon the subject, with the practice to which they have led. But, independently of the practical results of the inquiry, there are other solid and not less alluring inducements which will operate on the inquisitive and well-tutored mind. An individual possessing a mind so constituted, feels a laudable zeal in examining into the nature of a class of disorders, which concerns not only the existence of a single individual, but influences also the prosperity of nations; and, who entertaining even a moderate idea of the responsibility which the exercise of his profession involves, can enter upon its practical discharges, in respect of this class of diseases especially, without feeling some desire of extending his knowledge of their nature, in order that the course he pursues may be both rational and successful?

6. I. General View of Fever.—Fevers are the most prevalent of all diseases, especially in some countries and localities; and their causes frequently cannot be avoided nor counteracted by human foresight or science. They are more especially prevalent among, and injurious to, the human species, as the history of epidemic, pestilential, and other fevers fully prove; and as evinced by those infectious fevers which often occur in camps, and follow the rears of armies during warfare, and which are sometimes much more destructive than the most hard-fought battles.—Epidemic fevers are not, however, confined to the human species; the causes in which they originate, and the influence which promotes their extension, frequently affecting also the lower animals, — a circumstance of importance in our speculations respecting the origin and nature of this very important class of maladies.

7. i. Characters of Fever.—It is impossible

to give a *definition* of fever altogether applicable to the various forms and states it occasionally exhibits. To convey, therefore, a proper idea of what constitutes *idiopathic fever*, especially, a description instead of a definition of it is necessary; and, for this purpose, those phenomena which are the most constantly present should be selected: their presence individually, although in various degrees, constituting its essential characters; and enabling the physician, from the manner in which each presents itself, and is associated with subordinate or contingent phenomena, not merely to recognise the different varieties and conditions of fever, but also to distinguish it from diseases intimately related to it. If one, and especially if more, of these constant and essential characters be absent, idiopathic or essential fever is not present. An intimate view of its various phenomena can detect comparatively few which exist always in every form of the disease, and in some part of its course. These are — 1st, Spontaneous and painful lassitude; — 2d, Weakness of the corporeal and mental faculties; — 3d, Alterations of the secretions; — 4th, Altered animal heat; — 5th, Quickened circulation; — and, 6th, Increased thirst.

8. *a. Lassitude*, although obviously the result of a morbid impression made upon the nervous system, is generally viewed as spontaneous, the patient often not being able to refer it to a particular cause; and it is usually attended by a painful or irksome sensation in the back and limbs. It is present in every form, especially in some of the stages of fever, and is always one of the earliest and most constant symptoms. It is wanting in many of the diseases which resemble fever; and is manifestly referrible to the depressed state of nervous energy, more particularly as respects the organic nervous system.

9. *b. Weakness of the corporeal and mental Faculties* is, in many respects, a mode of the foregoing; or rather, both are associated effects of the more immediate impression made upon the system by the exciting causes of fever. This debility, as well as the lassitude, often precedes the evolution of the disease; and always attends it, but in various grades, throughout. It is especially evinced in the muscular organs; and less so in the mental faculties, particularly at the commencement. But, although these latter are not much affected as respects some manifestations, others are more evidently weakened. The powers of attention, comparison, &c. are most debilitated, and imagination least so. There are commonly a painful or confused feeling referred to the head, and a peculiar sensation with pain in the loins and limbs; these sensations being the more intense, the severer and more dangerous the disease, and sometimes amounting to an almost entire annihilation of the muscular and cerebral manifestations. These changes never reach above a slight degree in symptomatic fever, or in other diseases, unless when the brain is overwhelmed by effusion of fluid; and then the attendant symptoms, and procession of morbid phenomena, are very different.

10. *c. Lesions of the secreting and exhaling Functions* are amongst the earliest, the most constant, and most important phenomena of fever. The *exhalations* from the lungs and skin are evidently the earliest and the most affected; although the extent of the lesion cannot be readily ascertained and duly appreciated: and it is not improbable that the more energetic causes of fever make their impression on the frame through the medium of the respiratory functions; terrestrial exhalations and infectious emanations floating in the air, and inspired along with it, affecting the nervous influence of the lungs and associated viscera, and impeding the changes which the blood undergoes during respiration. — Besides these, the salivary, the gastric, the hepatic, the intestinal, and the urinary secretions are more or less altered, as respects either quantity or quality; the alterations being somewhat different in different types and states of fever. — The early and remarkable lesions of the secreting functions, and the generally imperfect actions of the excreting organs, especially in the early stages, are important, not merely as they form a part of the circle of morbid actions characterising the disease, but as they especially lead to most of the ulterior changes and complications observed in its advanced course. They evidently depend, at their commencement, upon deficient organic nervous power, occasioning at first imperfect or scanty secretion and excretion; and, at later periods, upon the morbid or vitiated state of the blood, the secretions and excretions then frequently becoming free and copious, but altered from their healthy characters. In symptomatic fevers, the secreting and excreting functions are but slightly disordered, and seldom to the extent of vitiating the circulation.

11. *d. Alterations of Animal Heat.*—The temperature of the body is variously altered in different stages of fever. On the invasion and period of exhaustion, particularly the former, it is often below the natural standard; whilst it is generally above natural, during the period of excitement; this symptom chiefly depending upon the state of vital and nervous energy, upon the changes effected by respiration on the blood, and the resulting condition of vascular action. It is not, however, a mere increase or diminution of heat which is observed, but a peculiar or morbid alteration of it that hardly admits of description. This morbid sensation attending that produced by the change of temperature, and which the physician duly appreciates, varies somewhat in different fevers, is partly also dependent upon suppression of the cutaneous exhalation, and the state of the circulating fluids, and is most remarkable in the more dangerous and malignant forms.

12. *e. Quickened Circulation* has been considered by writers as one of the most essential symptoms of fever; and by some as the chief phenomenon; their definition of fever being increased frequency of the circulation, with lesion of the functions. But this definition would embrace equally all the diseases in which quickened circulation occurs. It should be recollected, that in some stages, particularly in malignant fevers, acceleration of the circulation is not constantly present; yet it is seldom altogether absent from the commencement. The rapidity of the circulation is, however, often of less importance, than other states of the vascular system, and the condition of the blood itself.

13. *f. Thirst* is seldom wanting in fevers, during all their course, although occasionally absent, particularly in their advanced stages, and

in cases attended by congestion of the vessels of the head. It is observed in other diseases; but it most constantly accompanies fever.—*The appetites* also are more or less affected. The *appetite for food* is diminished or entirely abolished. In rare cases, a craving for food has been observed in an advanced stage of fever, but not throughout its whole course. The appetite for the sex is also abolished until convalescence has commenced, when it re-appears, and is sometimes one of the earliest signs of amendment. These symptoms probably depend upon the same cause — upon depressed organic nervous influence, and consequent deficiency of the secretions.

14. ii. General Description.—The word *Fever* is used in a double sense: it is applied—1st, to that state of constitutional disturbance, in which the above symptoms are primary, essential, or idiopathic; and, 2dly, to the general disorder consequent upon, or symptomatic of, some local disease. In the latter, the febrile symptoms consist chiefly of increased heat and accelerated circulation; and without these the patient is said to be without fever. But when fever occurs primarily — is a disease *sui generis* — these two symptoms are seldom the most prominent, and are always associated with others, especially those already noticed, which may be much more manifest than they, and which are either altogether wanting in symptomatic fever, or not similarly associated, or only occasionally present. This distinction is necessary, particularly as respects the treatment, and should never be overlooked. Its importance will be more apparent in the sequel. I shall first describe fever as a disease *sui generis*; and next, as a *symptom* of inflammation, or some other disease of a particular organ or tissue.

15. Idiopathic Fever presents, during its whole progress, characteristic symptoms, not consisting merely of increased frequency of circulation and augmented heat, which are sometimes wanting in certain stages of the disease, but of other morbid phenomena that are equally important, that vary in degree and in modes of association with one another, and that superinduce other phenomena, thereby giving rise to the different forms and states in which the disease occurs; — *it commences with debility and lassitude, which are followed by chills or rigors; it is generally composed of several invasions or exacerbations; it implicates the whole of the vital endowments and faculties, the fluids, and the entire organisation; it is acute and dangerous in its course, with lesion of the circulation, with alteration of the animal heat and of the secretions, and with diminution of vital power; and it is versatile as to its symptoms and type, with efforts at sudden changes or crises.*

16. 1st. *Fever begins with lassitude and debility, generally followed by chills or rigors.*—It originates in causes which affect the vital energies of the system, and occasion debility and lassitude as the earliest and most remarkable changes. These are generally attended by an insuperable feeling of fatigue upon the least corporeal or mental exertion, by stupidity, loss of nervous and mental energy, by irritability, moroseness, or impatience, and by heaviness of the eyes. Upon these supervene various uneasy sensations; as, anxiety at the præcordia, occasioning frequent full or laboured inspirations; a peculiar and general uneasiness and restlessness; a feeling of cold, particularly along the spine, and differing from the real or usual sensation; horripilations, involuntary shudderings, and tremors or rigors. The debility giving rise to the unconquerable sense of lassitude and fatigue generally precedes the chills for some indefinite time, and accompanies them or continues after them. Chills or rigors often return and alternate with flushes, and other incipient disturbances, for a variable period.

17. 2d. *Fever is very frequently composed of several invasions or exacerbations*, one paroxysm disposing to others; as in agues and remittents. But even in continued fevers a similar circumstance very often obtains, as evinced by the evening exacerbations, and the aggravation of the symptoms on alternate days. Some writers, and more particularly Hildenbrand, consider that, as in remittents, wherein a new invasion supervenes before the previous paroxysm had subsided, so in continued fevers, one fit runs into another.— "Continuæ ergo febres, si non omnes, saltem pleræque, præsertim criticæ, è plurimis paroxysmis febrilibus, quorum unus alterum subintrat, compositæ sunt."

18. 3d. *Fever is a disease of all the vital endowments, functions and faculties, of the fluids, and of the whole organisation.*—If we trace the progress of fever, from the operation of its causes, through successive changes, we shall find that the vital power, which is supreme over the physical properties and functions of our different structures, is deeply affected throughout all its subordinate manifestations — as the *sensibilities* of the nervous systems, the *irritability* of involuntary and voluntary muscular fibres, the *organic contractility* of membranous parts. Hence proceed lesions: — (*a*) *Of the organic functions* — of the respiratory actions and functions, of circulation and of the circulating fluids; of secretion and excretion, of digestion, assimilation, sanguifaction, and nutrition; of the appetites, both natural and acquired, &c. — (*b*) *Of the cerebro-spinal and animal faculties* — of the functions of sense and voluntary motion, and of the powers of mind: the expression of the countenance and the attitudes are changed; the senses either perform their parts imperfectly, or the mind takes an insufficient cognisance of their reports; the attention is wavering and quickly fatigued; the intellectual powers and states are languid, feeble, or otherwise disturbed; the judgment is perverted by internal and involuntary impressions and conceptions; and ultimately all the mental endowments become exhausted and disordered, by prolonged wakefulness, or overwhelmed by a continued sopor. — (*c*) *Of the fluids and whole organisation.* — The fluids and soft solids undergo changes in their appearances, form, and properties. The *blood* is evidently altered in various ways at different periods of the disease. Its serum is often at first in considerable quantity, and its crassamentum loose; but afterwards the latter generally becomes more firm or cupped; and ultimately again loose, or imperfectly separated from the serum. In many cases, it is still more remarkably altered, as shown in the article Blood (§ 78. *et seq.*), both in colour and consistence. The *secretions*, which are at first chiefly diminished in quantity, ultimately are changed in quality. They become more offensive, of a darker colour,

and more irritating and septic to the tissues with which they come in contact. — The *soft solids* are to a certain extent affected, owing to the changes previously induced in the powers of life and in the circulating fluids, as respects the *form*, *appearance*, and *properties* of all their parts. The cutaneous surface loses its lively tint, is changed in colour, or assumes a dirty, dusky, or earthy hue. The integuments become loose or turgid, harsh or burning; the muscles and cellular parts suffer a diminution of their consistence, and subsequently of their bulk; and the *physical*, as well as the *vital*, *properties* of all the tissues, especially their cohesion and elasticity, are very much impaired. Ultimately, the soft solids present a more flabby, dusky, brownish, or livid hue, and are softer and more lacerable than natural. Thus the eyes, lips, mouth, the countenance and whole physiognomy, the skin, the flesh, the habit of body, and the postures of the patient, exhibit the universality of disease. From these facts, *fever may be defined pathologically*, or with reference to the vital and organic changes, to be *an acute affection of all the functions, and of all the fluids and soft solids of the frame*.

19. 4th. *Fever proceeds with lesions of the circulation, of the secretions, and of the animal temperature; and with depression of vital power.* — The *pulse* is generally accelerated in some one stage or other. When it rises not above, or sinks below, the natural frequency, the cause may either be congestion of the vessels of the head, or the morbid state of the blood, or the influence of the supine posture on certain constitutions. In these cases the pulse often becomes much more frequent when the trunk of the body is raised to nearly an erect position, or even when the head is elevated (§ 12.). The *secretions* I have already stated (§ 18.) to be early and remarkably changed. The extent and consequences of the alteration will be especially considered hereafter. The *temperature* is altered during some period in all fevers. Instances, however, occur, in which increased temperature does not supervene on the cold stage: there are also cases in which coldness soon follows upon more or less of heat; and others in which the alteration either way is very slight. Still some change may be felt, generally in degree, but also in respect of other sensations connected with it, excited in the patient and in the observer. In some cases, especially early in the disease, the patient's feelings may be those of cold, whilst the surface is actually warmer than natural. The *depression of vital power* is evinced from the commencement, in all the functions; and does not the less exist, because vascular excitement or reaction becomes great or excessive during a part of the disease. Although vascular action is increased for a time in most fevers, yet vital power or resistance is lowered nevertheless, especially in other systems and organs, and is afterwards further exhausted in proportion as vascular action has run high, and it ultimately becomes remarkably lowered with the contamination of the fluids and of the soft solids; impaired power augmenting the changes of these, which, in their turn, increase the depression, and often even accelerate the extinction of life.

20. 5th. *Fever is acute and dangerous in its course.* — A single attack of fever scarcely ever continues beyond thirty days. When it is observed to remain longer, it may generally be considered symptomatic of superinduced inflammation, or of altered structure, or a relapse. Intermittents, however, are often of much longer duration, but each paroxysm may be considered as a distinct attack. Remittents, also, sometimes continue longer; but seldom or never, unless associated with visceral disease, which prolongs the febrile action, or converts it into a symptomatic fever, retaining more or less of the remittent, or passing into the continued, type. The *danger* of fever results from its nature, and varies with its type, form, and violence; for it is liable to sudden vicissitudes in its progress, and is prone to produce changes of structure having a fatal tendency. Even the most mild form of fever may suddenly change its character from internal or external causes, or from abortive or irregular efforts at a crisis, or from an injudicious regimen or treatment, and put on a most dangerous form; or, owing to predisposition or pre-existing disease of a part, give rise to fatal disorganisation in some important or vital organ.

21. 6th. *Fever is mutable in its characters.* — It is but one disease, *or genus*, comprising several species, and subordinate varieties — numerous and ever-varying forms and states resulting from the nature, the combination, and the intensity of the causes, acting upon peculiarities of constitution and predisposition. Hence we cannot be surprised to find fever *mutable* in many of its characteristic phenomena — to observe one species or variety closely approximate others — and even to meet with instances of one type, or form, suddenly or unexpectedly changing into another, in some period of its progress. Thus it is not unusual to see a simple tertian change to a quotidian or double tertian; or an intermittent pass into a remittent, or this latter into a continued form. Occasionally the disease alters from mild to severe, or from nervous to malignant. It sometimes is simple through a great part of its course, without any one organ suffering a predominating disturbance, and yet it suddenly becomes very dangerously complicated, and thereby assumes very different features.

22. 7th. *Fever evinces a tendency to sudden changes or crises*, owing to the conservative influence of vital resistance and reaction. These are generally of a salutary nature, when not rendered abortive by some external or internal cause, by the injudicious interference of art, or by pre-existent lesions of an important viscus. When they are fully evolved under the conservative influence of life, so as to lead to the salutary termination of the disease, they have usually received the name of CRISES. They are observed not only in continued fevers, but still more remarkably in the paroxysms of an ague, each of which, when once commenced, will proceed until the powers of life terminate it by a critical change. Idiopathic fevers have frequently been denominated *critical*, as distinguishing them from symptomatic fevers, which less frequently experience this mode of termination, and generally in a less decisive manner. When salutary processes supervene, and are developed so as to terminate the disease, a more rapid and perfect return to health is experienced, than under other circumstances. It would seem that the evacuations by which favourable changes are brought about, are in

some respects a depuratory effort of nature, more especially as those evacuations generally occur through the medium of organs which eliminate hurtful materials from the circulating fluid. Hence, one of the safest modes of practice is that which keeps these salutary processes in view, avoiding whatever may prevent them, and promoting their evolution; attending at the same time to the preservation of the powers of life, and warding off danger from weakened, over-excited, or oppressed organs.

23. When we take into consideration the conservative influence of the vital energy, the salutary changes brought about by it, and the circumstance that every method of cure, or every agent, cannot act in a similar manner in all cases — and that, even during the most injudicious treatment, certain of the agents are calculated to meet the exigencies of some cases, either in supporting the powers of life, or in favouring or determining some critical evacuation — the reason will readily appear, why recovery often takes place in fever from the most opposite means, or when left entirely to nature; and we shall easily understand wherefore all do not die who are improperly treated, and how nature often not only overcomes the disease, but also the effects of injurious agents prescribed for it. Of the means which are employed in the treatment of fevers, there are not any which become more dangerous from inappropriate use, than the extreme measures frequently resorted to — namely, large depletions and active stimulants. The former may destroy, in a few hours, cases which nature or opposite measures might have preserved, and the latter may over-excite, and inflame to disorganisation, viscera which require to be unloaded, or to have their actions moderated.

24. It not infrequently, however, happens that the critical efforts are imperfect owing to exhausted vital power, or insufficient from the nature and severity of the disease, or misdirected or irregularly exerted in consequence of some controlling or determining influence; and hence they become sources of increased disorder, or superinduce structural change. Such results are sometimes favoured by over-active, inefficient, or inappropriate means of cure; and very often by organic lesions having taken place in so great a degree, and so early in the disease, that the salutary efforts attempted cannot subdue them, but merely tend in some instances to their aggravation and danger.

25. The *event* in fevers is *directly* produced by critical changes, and indirectly by the assistance of art: it is *favourable*, if the powers of life remain unsubdued and act without obstruction; it is *unfavourable*, if they languish or are overwhelmed. So much are we indebted to the conservative efforts of life exerted throughout the frame in the cure of fevers, that more is often to be ascribed to this source than to the interference of art; and I may add, in the words of Professor HILDENBRAND, "Inde enim pendet, quod miseri ac inepti medici famam, quam buccis inflatis non accipere, sed verecundi naturæ magistræ reddere deberent, in febribus sanandis sibi conficiunt. Inde pendet quod omnis sectæ medici, ac obpositarum medendi rationum adsectæ, de felici eventu in febrium tractatione glorientur. Inde demum pendet, quod quævis theoriarum ad febres curandas adplicata, sanatorum ægrorum practica exempla offerre valeat." (Vol. i. p. 53.)

26. SYMPTOMATIC FEVER. — Fever may be a concomitant, or an effect of another disease, which would still remain were it possible to remove the attendant fever; but which being removed, the concomitant fever would cease. In as far as it consists of accelerated circulation, fever may be associated with the majority of diseases; but it is still merely a single symptom, wherefore other phenomena should be present before even symptomatic fever ought to be said to exist. Whatever irritates or stimulates the circulating system to a stronger or more frequent action, or inflames a particular part, is productive of symptomatic fever. Its cause exists within the frame, and more rarely it acts from without; as irritation or inflammation of particular tissues; the presence of foreign bodies, or of calculi, worms, or hurtful ingesta; the absorption of hurtful or acrid matters, or of contaminating secretions; surgical operations, external injuries, and violent exertion. Fever proceeding from these sources has been termed *inflammatory*, *irritative*, *fever from irritation*, *fever of the vascular system*, *symptomatic inflammatory fever*, *symptomatic fever*, *chronic fever*, *hectic fever*, according to the peculiar irritation, or local disease, on which it attends.

27. Fever is *associated* with other diseases in a twofold manner:—1st. *Essentially*, forming what are called *febrile diseases* or *symptomatic fevers* strictly speaking; as in *tabes purulenta*, in which it is merely a symptom, but one which is uniformly present. 2d. *Accidentally* or *contingently*, not naturally and constantly, but merely from the association of some occasional disturbance or complication, as in amenorrhœa, chlorosis, dropsy, rheumatalgia, &c.; or as a consequence of treatment. In symptomatic fevers, the constitutional affection is neither so severe, nor so generally and equally extended to all the functions, nor so entirely implicates the fluids and soft solids, as in idiopathic fever. Hence they are more readily traced to their origin — to the irritation in which they arise. The functions which chiefly manifest disturbance in their progress are those of circulation and secretion — the latter often very slightly. Others are also occasionally disturbed, as those of the skin and of the nervous system, but generally in an indirect and slight manner. Consequently the chief characters of symptomatic fevers are quickened pulse, heat of skin, disorder of its transpiration, and thirst. The excretions, muscular power, and the faculties of mind, are but little altered. The pulse retains greater tone and sharpness, and the general surface more animation, than in idiopathic fever. The external physiognomy, the posture, the extreme prostration of muscular power, the profound alterations of the vital endowments of the fluids and of the organisation itself, characterising the latter, are either altogether absent, or present in a very slight degree merely, unless when morbid matters are conveyed into the circulation during the course of certain symptomatic fevers, and thereby vitiate both it and the soft solids, disordering also the different secretions and excretions. Such occurrences sometimes take place, and have fallen repeatedly under my observation, particularly when inflammation attacks the internal surface of

vessels, or when purulent or sanious matters are taken up and conveyed into the blood, as in certain puerperal and other diseases. The vitiation of the circulation thus produced, and the effects upon the nervous system and other structures, are such as to give rise to a state of disease altogether similar to some of the worst forms of idiopathic fever.

28. The *duration* of symptomatic fevers depends entirely upon the nature of their causes, and the permanence of the original affection from which they proceed. Sometimes they are short, or even ephemeral, the irritation which occasioned them being removed by the actions which it induced: in other cases, their continuance is often very long. But the character of the phenomena experiences but little alteration, and they seldom undergo much change in their type. They are not, however, devoid of efforts at a critical evacuation; but these are more frequently inefficient and abortive, than in idiopathic fevers, owing more to their being insufficient to remove the primary malady than to defective vital energy. They are, however, occasionally relieved or even removed by spontaneous hæmorrhages, vomitings, diarrhœa, copious perspirations, and critical secretions of urine. Unfavourable terminations frequently also take place owing to congestions, obstructions, or disorganisations in some vital organ, arresting its functions. The *treatment* of symptomatic fevers is necessarily directed less to the particular phenomena they present, and more to their origin, than that of idiopathic fever. It is generally founded upon the intention to remove the cause; and, when this cannot be accomplished, to render it less injurious.

29. II. The Diagnosis of Fever. — From the description which has been given of the pathognomonic symptoms of *idiopathic fever*, and of the general characters of *symptomatic fevers*, the differences between both, and between the former and other diseases, will be evident. The distinctions just stated between idiopathic and symptomatic fever equally exist between the former and *inflammation*; this latter being one of the chief causes of symptomatic fever. Inflammation, in its primary and phlegmonoid form, attacks not only a single tissue or part, but also in a manner indicating its locality; the resulting constitutional affection differing in its mode of supervention and in its characters (§ 7. *et seq.*), from fever, as above described. It should, however, be recollected that inflammation frequently supervenes in parts or organs at some period of the course of idiopathic fever, or even at its commencement; and indeed the fevers of some seasons, or epidemics, are very generally thus *complicated*. In these cases, however, the inflammation does not present the characters it assumes in the previously healthy frame, but those it puts on when occurring in a very unhealthy or cachectic habit of body; it being engrafted, when supervening in the course of idiopathic fever, upon a morbid condition of the constitution as respects the vital endowments, the fluids, and the soft solids. Hence, when once excited, particularly in membranous or cellular parts, inflammation rapidly extends or passes into disorganisation, owing to the remaining tone of the vessels, and to the already reduced vital resistance being rapidly exhausted by the generally as well as locally increased vascular action. It presents, in such circumstances, many of the characters possessed by erysipelatous inflammation, and very nearly approximates to it; but is frequently still more dangerous, insidious, and rapid in its progress to fatal disorganisation.

30. Fever differs from diseases usually denominated *cachectic*, inasmuch as in them the external habit and appearance of the soft solids are principally affected, and the powers of life much less than in fever. They supervene gradually and imperceptibly, and proceed slowly, without much, or even any, acceleration of pulse, or increase of temperature. They present not the complete prostration of muscular power, the versatility of character, the mutability or disposition to change, and the efforts at vital reaction, which distinguish fever; and nature does little towards removing them, whilst art effects much.

31. Fever differs from disorders termed *nervous*, in the latter being altogether referrible to the cerebro-spinal nervous system, or parts intimately connected with it, whilst other systems and organs are either unaffected or not proportionately affected. They present but little change of the circulation, or of animal heat, or of the secretions, or of the intrinsic condition of muscular power, or of the soft solids in general. They are, moreover, generally chronic; they follow no determinate course, are cured with difficulty, and yet are seldom removed by the unaided efforts of nature. Other diseases, as those which are local or attended with increased discharges, are at once distinguishable from fevers by their essential or pathognomonic symptoms.

32. III. Of the General Course of Fever. — Fever commonly runs a determinate course, unless death occur so early as to prevent it. In order to give precision to our knowledge of the usual progress of the disease, and to enable us to employ the means of cure with a stricter reference to existing pathological conditions, several stages or periods have usually been pointed out, according to the changes observed in its course. Writers have differed materially as to the number of stages into which fever should be divided, and as to the terms by which they should be designated. As respects eruptive fevers, no difficulty need exist as to either. I shall pursue, therefore, that arrangement which my observation of the progress of fever has convinced me to be correct, and which is applicable to continued and periodic fevers equally with those which are eruptive. — Fever consists — 1st. Of the *formative* or precursory stage; — 2d. Of the period of *invasion*; — 3d. Of *excitement or reaction*, comprising (*a*) *incremental* excitement, and (*b*) *stationary* excitement; — 4th. Of the stage of *crises*; — 5th. Of *decrement*, or decline; — and, 6th. Of the period of *convalescence*.

33. *A. The Formative or Precursory Stage*; *Stadium Opportunitatis*, Hildenbrand; *Stadium Prodromorum*, Reiche, Helling, and Richter; *The latent Period*, of Dr. Marsh; *The Stage of Incubation*, of French writers; *The dormant Period*, of English authors. — Although the precursory symptoms of fever have been fully enumerated by Celsus (*De Med.* lib. ii. cap. 2.), they were overlooked by writers until the middle of the last century, when Tissot, Reiche, and Helling, directed attention to them. Fordyce, and other more recent authors on fever in this country, have left them entirely unnoticed. In my papers on fever published between 1819

and 1828, and in my lectures delivered from 1823 to 1827, particular notice was directed to the subject, and these symptoms were described as constituting a most important stage of the disease, inasmuch as in it the nature of fever would be most advantageously studied, and either its subsequent course remarkably meliorated, or its further progress prevented, by appropriate and energetic treatment. (*Lond. Med. Repos.* vol. xxviii. p. 238.; and other *Refer. in Bibliog.*)

34. The phenomena described above, as characteristic of idiopathic fever, never proceed immediately from the remote causes. The impression made by them occasions a succession of changes before those which really constitute fever supervene. These early changes, being productive of those which constitute the developed disease, may aptly be called *formative*; and the symptoms by which they are indicated, *precursory*. The exciting causes of fever seem to act primarily upon the nervous system of organic life, thereby producing changes in the vital manifestations of the frame, which gradually increase until they arrive at a certain pitch, and terminate in one of the modes hereafter to be noticed. The more intense the exciting causes, the predisposition being equal, the shorter will be the duration of this period, and the sooner will the lesions constituting fever be brought about (§ 15.). — (*a*) The earliest effect which is made manifest after exposure to the more energetic causes of fever, as infectious effluvia or noxious exhalations, is a feeling of constriction or oppression in the chest or at the præcordia, attended by frequent sighing, gaping, forced and lengthened inspirations, and by a sense of uneasy depression, or nausea, evincing the morbid impression made upon the nervous system through the respiratory organs. The pulse is weak, slow, irregular, sometimes remittent or reduplicating, and readily accelerated by slight exertion. — (*b*) The natural and acquired appetites and desires are diminished; nausea is readily excited by food; and the bowels are either costive or easily acted upon by purgatives; *Venus silet*, and all the *organic functions* are impaired. — (*c*) The patient feels debilitated and fatigued; complains of headach, vertigo, or confusion of ideas; is morose, low-spirited, sluggish, indolent, or incapable of exertion and of directing his attention long to any object; he readily perspires, and his breathing becomes short and quick, on the least exertion; his sleep is unsound and unrefreshing, and he awakens with a sense of lassitude or with pains in his back and limbs, — in short, all the *cerebro-spinal functions* are weakened or disordered. — (*d*) The external expression and appearance are somewhat altered. The countenance and skin are unusually pale, sallow, or unhealthy; more rarely red. The eyes are languid, and deficient in brilliancy. The breath is fœtid or cool; and the tongue often loaded. The urine is sometimes pale and copious; and the cutaneous surface dry, cool, and harsh. These symptoms vary in severity, and often are so slight as to escape particular attention. They frequently are insufficient to induce the patient to confine himself. — (*e*) The *duration* of this stage is various in different fevers — from twenty-four hours, as in plague and some cases of typhus, to several weeks, as in ague; but it is generally from three to fourteen days. The severer and the shorter this period is, the more acute and the more rapid will be the subsequent progress of the disease, and *vice versâ*: there are, however, exceptions to this. Fever may be cut short in this stage by active and judicious means; but not afterwards, unless occasionally in slight cases. — (*f*) The *pathological conditions* characterising this stage, are, depression of vital power throughout the frame, with slight internal congestion, particularly of the lungs, liver, &c.; with imperfect change of the blood in the lungs, and with diminished secretion and excretion.

35. B. *Stage of Invasion; Principium vel Initium Febris*, Auct. var. — (*a*) *The cold stage*, of writers — is attended by debility, lassitude, painful uneasiness, or sinking at the epigastrium, a sensation resembling cold running down the back, with formication or chills extending over the limbs and general surface. The pulse is constricted, small, weak, or accelerated; the respiration is slow, irregular, or suspirious, and attended by anxiety at the præcordia, and occasionally by a slight dry cough. On these supervene gaping, sighing, pandiculation; a sense of weight, pain, or constriction in the head; giddiness, moroseness, depression of spirits, and disorder of the senses; lividity of the lips and nails; pallor of the skin; the cutis anserina, and shudderings, rigors, or shiverings, followed by or alternating with irregular flushes. After the rigors cease, a sense of chilliness often continues for some time, although the skin has become hot. These symptoms present various grades and modifications in the different types of fever: in some the feeling of cold is actually attended by reduction of the temperature; and in others the heat is not materially, if at all, diminished, or it is even increased. The former is most commonly seen in the cold stage of periodic fevers, the latter in the invasion of continued fevers. In all, however, the cutaneous transpiration is altogether arrested, and the skin is harsh and dry. The pulmonary exhalation is also diminished, and the breath is cold. Copious discharges of pale urine often take place, evidently arising out of the arrest of the exhalation from the skin and lungs. Loss of the appetites, costiveness, thirst, and occasionally sickness and vomiting, are likewise present. — (*b*) The *duration* of this period may be very short; or it may be for many hours, alternating with slight flushes. The shorter and more intense it is, and the severer the rigors, the shorter and severer will be the consequent vascular reaction, and the more nearly approaching the inflammatory type; and the longer its duration, the more prolonged will be the fever. The imperfect evolution of this stage, or its slight occurrence, particularly when it is not attended by rigors, very generally indicates a severe malignant or typhoid state of disease. In some of the most dangerous cases of fever, I have seen this stage so slight, as to be confounded with the preceding one. This period having supervened, the disease cannot readily be cut short by bloodletting, emetics, &c.; although in the slighter cases, and more inflammatory type, these means have succeeded in some instances. — (*c*) The *pathological states* of the first period are increased in this, particularly the general depression of vital endowment; the impeded functions of the lungs

liver, &c.; the interrupted exhalation and secretion, excepting the urinary secretion; and the imperfect depuration and arterialisation of the blood. But the lowered vital powers become more centralised; and the congestion of the large vessels, especially those of the thoracic and abdominal viscera, greater, — conditions which terminate themselves, by inducing rigors, shivering, vomiting, and reaction of the vascular system, with the subordinate phenomena of the next stage.

36. *C. Period of Excitement.* — *a. Incremental excitement* or *re-action* — *incrementum vel augmentum morbi.* — (*a*) This stage commences with the disappearance of certain of the foregoing signs, with the increase of those that remain, and with the supervention of others. Fever in its more literal sense now begins, and manifests its specific form. The gaping, pandiculation, formication, and rigors disappear; and the stricture and collapse of the countenance and general surface are followed by increased warmth and turgescence. The chilliness, however, continues for a short time. Pulmonary transpiration returns in some degree; respiration becomes full, frequent, and sometimes laboured, and the breath hot. The urine is now diminished, high-coloured, limpid and clear, and its discharge is often attended by scalding. The muscular debility, feeling of fatigue or lassitude, the pains in the head, loins, and limbs, the thirst, and the anxiety at the præcordia, are all increased. The countenance becomes turgid; the eyes shining, but with an expression of languor; the cheeks flushed, and the cutaneous surface hot, burning, and turgescent. The appetites are now entirely abolished; the tongue is loaded or furred, or both; the pulse is free, full, and accelerated; often strong, and vibrating in the neck; but varies remarkably in tone with the particular variety of the disease. There are also a sense of weight, fulness, and aching of the head, with giddiness, confusion of ideas, and sometimes with mental indifference, which short and disturbed slumbers seem to aggravate; a morbid susceptibility or disorder of the senses; and occasionally moroseness, restlessness, or jactitation. These symptoms generally increase, often presenting in the continued type slight remissions in the morning, with exacerbations in the afternoon and evening, which are most severe on alternate days; and, during the progress of this stage, delirium often supervenes, especially when it reaches its height. — (*b*) The *duration* of incremental reaction or excitement varies with the type and form of the disease — from an hour or two, as in ague, to two or three days, as in continued fevers. It is generally shortest in the most severe and violent attacks; but it never extends beyond seven days. — (*c*) It consists, *pathologically*, of reaction of the vital powers, expressed chiefly in the vascular system, frequently with a preponderance or determination towards particular organs — of the efforts of life to overcome the more immediate effects of the exciting causes, especially the internal congestions, and the superinduced changes in the blood.

37. During this stage, *determination* to particular organs or textures frequently occurs, and thus the fever becomes *complicated*, or resembles idiopathic *inflammation* the more closely, the less severely the vital power and the circulating fluids are impaired or vitiated. Such determinations or consecutive inflammations are observed principally in the *encephalon, spinal chord, lungs, liver, stomach,* and *bowels;* they are caused chiefly by the predisposition, previous diseases, and existing states, of these viscera; and by climate, season, habits, and occupations, and the circumstances of the individual; whatever disorders, irritates, weakens, or causes habitual determination, or increased momentum of the circulation to either of these organs, thus complicating the fever. Hence the *cerebral complication* is most common in the studious; the *gastric* and *hepatic*, in those addicted to the pleasures of the table or to intemperance, and in hot climates, or during warm seasons; the *pulmonary*, in cold countries and seasons, and in persons much exposed to the open air; and the *intestinal* or dysenteric, in the ill-fed, in persons using unwholesome water or living upon innutritious and watery food, and in low and moist situations. The *prevailing epidemic* constitution has also a most powerful influence; the complications, as well as the particular form and type, of fever, depending upon it, and the nature of the exciting, concurring, and determining causes.

38. *β. Stationary re-action* — *stadium coctionis* of the humoralists — consists of the persistance of the above symptoms, with slight modifications, and frequently with increased affection of particular organs. — (*a*) During its progress, restlessness continues, with watchfulness; delirium is often constant, or appears for the first time; nervous power is gradually and almost imperceptibly exhausted; the pulse generally loses tone, and becomes more accelerated; the tongue is deeply furred and loaded, and often also parched, and mucous sordes collect about the teeth. Respiration is quick, or moaning, and the breath is foul, heavy, offensive, sickly, and loaded with vapour; the urine is still scanty, high-coloured, and clear; the bowels are either costive or irregular, and the stools morbid and offensive; the countenance becomes pale, heavy, collapsed, and of a sallow or unhealthy hue — sometimes muddy or lurid; the eyes are suffused, watery, heavy, and occasionally injected; the skin continues hot, pungent, or burning, and it afterwards either evinces a disposition to transpiration, or becomes damp and clammy; or it is the seat of petechiæ, or of eruptions, which, in the exanthematous fevers, appear at an early part of this stage; the prostration of muscular power is increased, and is often so great that the patient cannot retain his position on one side, but falls into the supine posture; adipose matter is subsequently absorbed, and the body lives upon itself; and, if the patient be not delirious, he complains of severe pains, or of a bruised sensation, or of soreness in his limbs, back, and loins, with confusion, vertigo, or pain in his head.

39. (*b*) The symptoms vary remarkably in this stage with the type and form the fever assumes — with the complications above alluded to — with those which may supervene during the advanced progress of this period — with the more latent changes in the mucous surfaces, or in parenchymatous structures — and with various influences and circumstances occurring during the disease. In some varieties of the continued type of fever, the whole of this period proceeds with little or no

evening exacerbation, whilst, in others, exacerbations are very manifest; but this depends much upon the prevailing epidemic constitution. In general, fever caused by infection, and complicated with serious visceral disease, or characterised by severe affection of the fluids and soft solids, is strictly continued; whilst that produced by terrestrial emanations assumes somewhat of the remittent form, although presenting much of the continued type.—(*c*) The *duration* of this state of vascular reaction is shortest in agues, in which it does not exceed a very few hours; and, in continued fevers, it is brief in proportion to the severity of the disease. It rarely, even in the more protracted cases, exceeds fourteen days.—(*d*) The *pathological states* of the early part of this stage continue in great measure in this part of it; but vascular action exceeds vital power, which is gradually lowered; and the circulating and secreted fluids and the solids themselves become vitiated as already stated, and as will be more particularly shown in the sequel.

40. *D.* The *period of Crisis — Stadium Criseos —Judicium Febris.* — Crisis in fevers is a sudden change taking place at a particular period of the disease, and terminating it. A crisis is brought about chiefly by the efforts of nature, or, in other words, by the febrile action itself inducing changes in the functions and organs, productive of a salutary effect. Although it often takes place by the unaided efforts of life, it is frequently assisted by art, and should not therefore be preferred before art judiciously employed. The *critical days* are the 2d, 3d, 4th, and 5th (quotidian period); the 7th, 9th, and 11th (the tertian period); the 14th, 17th, and 20th (the quartan period). After the 20th, crises are obscure, and seldom occur till the 27th or 28th. Salutary changes are observed chiefly on the above, unfavourable changes on the intervening days; but death may happen on any day. A very cold climate or season, or either extreme of temperature, the impure air of an hospital, the continued operation of the causes, the complications, great vitiation of the fluids and solids, an active treatment, interfere with, retard, or prevent crises. If the exacerbations be well marked, and vital energy not very much reduced, a favourable crisis may be more confidently expected. Crises are sometimes *indecisive*, or consist of several abortive attempts before the end is attained, especially when the powers of life are much lowered. When several critical efforts are required, each succeeding one renders the task more easy for the next, until the disease is gradually subdued. (See CRISIS, and *Critical Evacuations.*)

41. *E. Period of Decline — Decrementum — Declinatio.* — Sometimes the decline is prompt and rapid, especially after a marked crisis (see art. CRISIS); at other times it is gradual and slow, particularly when only slight and imperfect crises have occurred, or when the disease terminates in resolution without any very manifest critical evacuation. In the former case, the decline passes quickly into convalescence; in the latter, this stage is often characterised by slight exacerbations, called by some writers posthumous crises, which are apt to be misunderstood. In the fevers of this country, which frequently decline gradually, or in the second of these modes, the symptoms indicative of vital disturbance generally subside in the order in which they appeared. Organic nervous influence and the dependent functions are the first to be restored; the respiratory, secreting, and excreting actions become natural; the perspiration more general, free, and, if it have previously been offensive, clammy, or partial, more natural and genial; the tongue begins to clean on the sides and point, and is more moistened by commencing return of the secretions poured into the mouth; coma and delirium subside; and the patient regains his power over the alvine excretions, if it has been lost; the sensorial faculties and sleep reappear, and the latter becomes more refreshing; the locomotive powers are freer and more energetic, the patient being enabled to turn upon his side, the sense of soreness and lassitude being diminished; the appetites and desires return, and the excretions are gradually re-established. The action of the heart is the last to subside to its natural frequency, and generally continues long afterwards to be readily excited by slight stimuli. The urine is abundant, and deposits a copious sediment; the bowels become free, the motions consistent and feculent, and the skin gradually assumes a clear and healthy appearance; but emaciation increases rapidly, or now is more apparent; absorption, more especially of the less animalised and less highly organised parts or molecules, proceeding rapidly as soon as vascular reaction subsides.

42. *F. Convalescence—Stadium Refectionis— Convalescentia.* — I agree with RICHTER and HILDENBRAND in considering this as a stage of fever. The propriety of this view is obvious, especially as regards the future health of the patient. It is, however, altogether distinct from the malady, inasmuch as it does not present any of the constituent phenomena, which still continued to exist in the stage of decline, but merely those of debility consequent upon acute disease. During its early progress, the bulk of the body still continues to diminish, or does not increase until it is far advanced; all the symptoms entirely disappear; the appetites, desires, digestive functions, the secretions and excretions, are re-established, but are apt to be disordered, and therefore require supervision; the cuticle and sometimes the nails are exfoliated, and the hair falls out. Irritability and sensibility often are increased; and tinnitus aurium is sometimes troublesome; but these subside as health is restored.—*Relapses* are apt to occur in this period, especially from premature exposure or indulgences, or from disorder of the digestive organs; but they more rarely follow when fever arises from infection or from a specific contagion, though other diseases may be thereby occasioned.

43. IV. OF THE TYPES AND FORMS OF FEVER. — i. These are determined by the following *circumstances:* —*a.* By the *previous health*, the temperament, and habit of body, and vital energy of the patient; — *b.* By the state of the vascular system, particularly as to the existence of fulness or deficiency of blood; — *c.* By the *specific* kind of *miasm* or *cause* exciting fever; — *d.* By other causes, predisposing, exciting, concurring, and determining; and by the intensity of their action; — *e.* By the *external* and *internal* — the *physical* and *moral* — *influences*, to which the patient is subjected, from the period at which

the morbid impression was made upon the frame; —*f*. By the *internal congestions, determinations,* or *inflammations* superinduced in its early course; —*g*. By the *intensity of the morbid impression* made upon the vital endowments, especially of the organic and cerebro-spinal nervous systems;— *h*. By the degree to which vital power is suppressed or lowered throughout the frame; — *i*. By *vitiation of the circulating fluids* and soft solids; — and, *k*. By the treatment and regimen during the commencement and early progress of the fever. These circumstances both determine the particular type, the form, and the complications of fever, and change one type or form into another.

44. ii. The *Types and Forms*, which usually present themselves as the result of the remote and efficient causes, and as influenced by the above circumstances, are — *A*. The INTERMITTENT, — *a*. of a *quotidian*, — *b*. of a *tertian*, — *c*. of a *quartan*, type; either of which may be — α. *simple*, — β. *double* or *reduplicating*, or *irregular*, — and, γ. *complicated* — 1st, with abdominal visceral disease, — 2dly, with cerebro-spinal affection, — 3dly, with alterations of the fluids and soft solids, — and, 4thly, with visceral lesion and with change of the fluids and solids — the pernicious or malignant agues of some parts, particularly in warm climates. — *B*. The REMITTENT: — *a*. *Simple*, — *b*. *bilious*, — *c*. *inflammatory*, — *d*. *bilio-inflammatory*, — *e*. *adynamic* or *malignant*, — *f*. *gastro-adynamic*, — *g*. *typho-adynamic*, or associated with severe cerebral affection, — *h*. *complicated* — α. with *pulmonary disease* — β. with disease of the spleen, — γ. with disease of the large bowels, — *i*. *slight* and *chronic*, — *C*. The CONTINUED: — *a*. *Ardent fever*, — α. diary fever, — β. bilious, inflammatory fever; — *b*. *Synochoid*, — α. simple, — β. complicated, with predominant affection — 1st, of the stomach and liver — *mild gastric fever*, of authors; — 2dly, of the intestinal mucous surface — *mucous fever*, — 3dly, of the cerebro-spinal system — *nervous fever*; — *c*. *Adynamic fever*, — α. simple, — β. complicated with predominant affection — 1st, of the gastro-intestinal mucous surface — *adynamic*, of French writers, — 2dly, of the lungs and bronchi, — 3dly, of the cerebro-spinal nervous system — *ataxic*, of PINEL, — 4thly, of the mucous surfaces and brain — *typhus*, of writers; — 5thly, of these surfaces, brain and skin, with petechiæ — *petechial typhus*, or with efflorescence — exanthematic typhus (HILDENBRAND), — 6thly, of the vascular system and circulating fluids — *malignant or putrid fever*, — 7thly, of the fluids and solids, and of the gastro-intestinal mucous surface, with yellow skin — *epidemic yellow fever*; — 8thly, of the fluids and solids, and of the lymphatic glands — *plague* and *pestilential fever*, — 9thly, of the vascular system and blood, and of the lungs and gastro-intestinal mucous surface, with spasms — *pestilential cholera*. — *D*. EXANTHEMATOUS FEVERS: — *a*. *Scarlet fever*, — α. mild or benign, — β. synochoid scarlatina, — (*a*) simple, — (*b*) complicated; — γ. adynamic scarlatina — (*a*) simple — (*b*) complicated, — the complications in both varieties being with inflammation of the throat, or of the gastro-intestinal mucous surface, or of the membranes of the brain, or of the respiratory surfaces, or with any two or three of them; — *b*. *Measles*, — α. mild, — β. synochoid measles, — (*a*) simple — (*b*) complicated, — γ. adynamic measles — (*a*) simple — (*b*) complicated — the complications being nearly as above; — *c*. *Small-pox*, — α. mild, — β. synochal — (*a*) simple — (*b*) complicated, — β. adynamic or confluent — (*a*) simple — (*b*) complicated — the complications being nearly as above; — *d*. *Erysipelas* may be similarly divided. — *E*. PUERPERAL FEVERS: — *a*. *Inflammatory*, — α. inflammation of the uterus — β. of the ovaria and tubes — γ. of the peritoneum — δ. of any two or all of them; — *b*. *Synochoid puerperal fever*, — α. complicated with inflammation of the peritoneum — β. with inflammation of the uterine veins, &c. — γ. with inflammation of the uterus and appendages; — *c*. *Adynamic puerperal fever*, — α. simple — β. complicated with predominant affection — (*a*) of the blood — (*b*) of the fluids and peritoneum — (*c*) of the fluids, serous surfaces, and soft solids generally — (*d*) of the uterus, or of the uterus and appendages — (*e*) of the internal surface of the uterine vessels, substance of the uterus, &c.

45. iii. *Of the Conversion of Type, Form, &c.* — The above types, forms, and states, not only may result from some one or more of the above circumstances (§ 43.), but they also may be variously changed and modified by them, during the course of the disease — a simple state of fever becoming more intense or complicated, according to determining influences — the intermittent type becoming irregular or complicated, or passing into a simple, severe, or complicated remittent, and this latter into the continued type, frequently with predominant affection, either of the nervous or vascular system, or of some important viscus, or of both. This change of a slighter into a severer disease, and of simpler states into those which are more complicated, commonly arises from the circumstances just stated (§ 43.), and more especially from those concurring and determining *causes* about to be enumerated (§ 64, 65.); and is much more frequent than an alteration from a severe to a slighter form of fever, as that of a continued to a remittent, or of the latter to an intermittent type, which, however, sometimes occurs.

46. V. TERMINATIONS. — *Fevers terminate* — 1st, in a return to health; — 2dly, in some other disease; — and, 3dly, in death. *A*. *A termination in health* is favoured — *a*. by a previously sound constitution, and a spare habit of body; — *b*. by the absence of great intensity of the remote causes, and by their nature; those which are slight, or which proceed from endemic sources, or act singly, being less noxious than those arising from living animal bodies crowded together, or from the sick, or from various associations of animal effluvia, and of other causes; — *c*. by the absence of unfavourable influences and accidents, physical or moral, during the progress of the disease, — *d*. by a complete removal from the continued operation of the exciting, and even of the predisposing, causes during the treatment, and by the advantages of wholesome air and judicious management; — *e*. by the easy circumstances and equable mind of the patient; — and, *f*. by the occurrence of a crisis. The *modes* by which fevers terminate in health, are — 1st, by crisis, to the production of which art can only indirectly tend, but still tends very powerfully in some cases; — 2dly, by a resolution of the disease, without any critical discharge. This is the most

frequent mode observed in the fevers of this climate; and results, in a great measure, from the treatment adopted for them, particularly in their early stages, which generally interferes with, or prevents the occurrence of, the natural evacuations constituting *crises* (see this article). It is chiefly when artificial evacuations have not been pushed far, that crises manifest themselves.

47. *B. Terminations in other diseases* are owing — *a*. to previous disease, or the condition of particular viscera at the time of attack; — *b*. to the severity and concurrence of the causes, and the intensity of the disease; — *c*. to local determinations supervening during the progress of fever, giving rise to complications; — *d*. to improper treatment, as a too heating regimen, the continued use of cathartics, or the adoption of such as are too irritating; — *e*. to incomplete or imperfect crises; — *f*. to the too early or too liberal use of stimulants or tonics during the disease, or during convalescence; — *g*. to the continued operation of the causes during treatment; — *h*. to the occurrence of new, determining, or superadded causes, as crowding of the sick, bad ventilation, mental perturbations, in the progress of the malady; — and, *i*. to neglect, and to a blind confidence in the efforts of life. *The diseases* which may be thus superinduced, are — α. inflammations of particular organs; — β. engorgements, obstructions, and enlargements of glandular viscera, particularly the spleen or liver; — γ. effusion of serous fluids into shut cavities, as into the peritoneal and pleural sacs; — δ. partial or general anasarca; — ε. ulceration or abrasion of mucous surfaces — chronic diarrhœa and dysentery; — ζ. hæmorrhage from mucous membranes; — η. inflammation of some part of the vascular system; — ϑ. apoplectic, paralytic, or epileptic seizures; — ι. mania and insanity in some one of its forms.

48. *C. A termination in death* is favoured — *a*. by constitutional vice, excessive vascular fulness, and a bad habit of body; — *b*. by the intensity of the cause and of the disease; — *c*. by the continued operation of the chief causes; — *d*. by the nature of the complication; — *e*. by neglect or improper treatment; — *f*. by unfavourable crises; — and, *h*. by the other circumstances just mentioned (§ 47.) as productive of consecutive diseases. — This *result* cannot be imputed to any single change. Two or even more of the following are evidently concerned in its production: — α. Extreme suppression of organic, nervous, or vital power; — β. Lesions of organs arresting their functions, and impeding those actions necessary to continuance of life; — γ. Vitiation of the fluids, changing the condition of, or destroying, nervous influence and the rest of the vital manifestations; — δ. Exhaustion of vital power, and alterations of the intimate organisation of the viscera, as in malignant fevers; — ε. Organic injury sustained by the nervous system, especially its larger masses; — ζ. Diminished or exhausted irritability of the heart, the patient expiring as in fatal syncope; — η. Suffocation from effusion into the bronchi; — ϑ. Congestion of the lungs, heart, and large vessels, to an extent beyond the vital power of these parts to overcome; — and, ι. Deficiency of blood so considerable as to destroy the relative conditions of the contained fluid and containing vessels; for when the tonicity, the organic contractility, of the latter is much impaired, as in the advanced stages of adynamic fevers, and the amount of circulating fluid is also greatly lessened, the vessels will be unable to accommodate themselves to their contents, and the consequences must necessarily be most dangerous, if not speedily fatal.

49. VI. OF THE APPEARANCES AFTER DEATH. — *A*. — *a*. Cases have been met with, wherein the most careful examination has failed to detect any lesion, or strictly morbid appearance, in any of the general systems, or individual textures, or in the fluids contained in the large vessels. It must be admitted, therefore, that changes may take place in the nervous system, or in the blood, sufficient to cause the most acute disease, or even to subvert life, without being so gross as to be demonstrable to our senses; but allowing this, the fact now stated is important, inasmuch as it most materially affects the question as to the nature of fever. — *b*. Other cases have been observed — and much more frequently than the foregoing — in which the morbid appearances were not commensurate with the intensity of the symptoms referrible to their seats, and were quite insufficient to account for a fatal issue. — *c*. Frequently also, lesions of parts have been discovered, which were not indicated by symptoms, or by the usual symptoms, or very slightly and imperfectly; those changes having been more or less, or even entirely, latent during life, although their nature evinced their existence and progress during the advanced stages of the disease. This circumstance may have arisen from an oppressed or exhausted state of the brain; or from the changes in the circulating fluid impairing sensibility; or, as Dr. ALISON suggests, in his very able and lucid exposition of the Pathology of Fever, from an enfeebled state of the circulation at the time when these local affections take place.

50. *B. As to the nature of the changes observed*, opinions are somewhat different. — Many writers have viewed them as purely inflammatory; others as consequences of irritation, or of inflammatory irritation; this condition being viewed by them as a lesser grade or modification of inflammation. It is important to entertain precise ideas as to their nature; and to mark the circumstances in which they differ from those changes indisputably resulting from pure inflammation, particularly as occurring in a previously healthy constitution. — 1st. The lesions observed in fevers rarely present effusions of lymph or pus, especially in the adynamic and typhoid fevers, — consequences commonly following true inflammation; and the cases in which these effusions have been detected, have been instances of local inflammation supervening in the course of the more sthenic or inflammatory forms of fever. — 2dly. The lesions or inflammatory appearances have been more superficial, diffused, and attended with a darker discolouration, and greater softening of the affected and adjoining parts, than in idiopathic inflammation. — 3dly. The appearances thus characterised, differ the more from inflammation, the lower the type of fever and the more vitiated the circulating fluids. — 4thly. They more nearly resemble erysipelatous inflammation, than any other. — 5thly. They are met with in certain tissues more frequently than in others; and, excepting deficient

cohesion and discolouration, are commonly limited to these tissues.

51. *C.* The *organs most frequently altered in structure*, are, the digestive mucous surface, the liver, the spleen, the bronchial surface, the lungs, and the brain and its membranes. But the frequency of the alterations of each differs widely in different fevers; the first and last of these textures being upon the whole most frequently and seriously changed. — *a. The digestive mucous surface* is very generally affected in some fevers, particularly in certain that are endemic, as in the fevers of Paris, and in warm or marshy countries. The alterations of it are often insidious, latent, or much greater than the symptoms indicated; and they differ from the appearances commonly resulting from common inflammation, in the dark discolouration attending them, in their being confined to spots or patches, and in the less frequent effusion of lymph. —They consist — 1st, of livid or brownish red patches, covered by a dark reddish mucus; — 2dly, of softening, tumefaction, or thickening of the discoloured spots: — 3dly, of infiltration of the submucous tissue with dark or sanious fluids resembling small ecchymoses or internal petechiæ; — 4thly, more rarely of effusions of small portions of lymph in spots scattered over the membrane; — 5thly, of abrasions, sloughings, and ulcerations of this tissue, either sparingly scattered, or aggregated, — the latter most frequently in the lower ilium, or near the termination of the ilium. These changes are most common in the parts of the membrane occupied with Peyer's and Brunner's glands, but they also occur in the mucous membrane itself. Their frequency in different parts of the canal in fevers is the same as stated in the article Digestive Canal (§ 36.). — These lesions are seldom seen alone. They are most frequently accompanied with changes in the mesenteric glands and in the encephalon, and are obviously advanced consequences of the general disease; as they are observed chiefly in the more protracted cases. They are the common causes of the intestinal hæmorrhages, of the severe pains, and the sinking, sometimes occurring in the latter stages.

52. *C. Alterations of the liver and spleen* are much less frequent in this country, than in warm climates, and the countries of the south of Europe. — *a.* The change in the liver consists chiefly of congestion, injection of its vessels, softening, and enlargement. — *b.* The *bile* seldom presents a healthy appearance, either in the gall-bladder or in the hepatic ducts. — *c.* The affection of the *spleen* is most common after the periodic fevers of miasmatous localities; and consists chiefly of great enlargement, softening, and even gangrene. — *d.* The *pancreas* and *kidneys* are not often altered in structure, and the *peritoneum* still more rarely, excepting in puerperal fevers, and after perforation of the digestive canal.

53. *D.* The *lesions of the respiratory and circulating organs* are frequently very important. — *a.* The *fauces* and *larynx* sometimes are covered by an aphthous exudation, or are œdematous, infiltrated, tumefied, and softened: but the larynx is seldom affected to the extent of impeding respiration, unless in eruptive fevers. — *b.* The *bronchial mucous membrane* is often injected in patches, of a dark red or livid hue, somewhat thickened and softened, and covered by a discoloured, viscid, and frothy mucus. — *c.* The *pulmonary parenchyma* is occasionally œdematous, or condensed by infiltration of a dark fluid, and at the same time somewhat softened. The changes in the bronchial surface and in the substance of the lungs often co-exist; and are also attended by gravitation of the fluids to the more depending parts of these organs; and by exudation of the more serous portions, — alterations which are not alone consequent upon death, but which often precede it, and constitute the "*Peripneumonie des Agonisans*" of Laennec. The changes, moreover, in the respiratory organs, particularly in the typhoid states of fevers, are often attended with lesions within the cranium and in the digestive mucous surface. — *d. Gangrene* of the lungs occurs only when inflammation of them supervenes in the course of fever; and the same remark is applicable to alterations of the *pleura* or *pericardium*. Inflammation of these latter textures sometimes takes place during convalescence, owing to premature exposure, and during the decline of fevers, particularly eruptive fevers. — *e.* The *heart* is sometimes softened, and its substance discoloured, particularly in adynamic or malignant fevers; and occasionally a sanguineous serum is found in the pericardium. — *f.* The blood in the cavities of the heart and large vessels is often also more or less changed. (See art. Blood, § 128.)

54. *E.* The *lesions within the head* most frequently consist of a morbid increase of the serous exhalation from the encephalic membranes, especially in the ventricles, and beneath the arachnoid; but the amount of the effusion is seldom very considerable. The blood-vessels within the cranium, especially of the pia mater and substance of the brain, are frequently turgid with a dark or fluid blood. Slight extravasations of blood are also rarely observed. These appearances have frequently little or no relation to the coma existing in the latter stages; and the same may be stated as to the changes in consistence which are sometimes seen in the substance of the brain, — these changes, however, being neither uniform nor frequent. — The *dura mater* is rarely affected.

55. *F.* Lesions are not so common in the *spinal chord* as within the head; but such as occur there are similar to these just stated. No uniform connection has been established between the morbid appearances in this situation and the pain in the back and loins, or other affections of the voluntary muscles, although some pathologists believe that these symptoms depend upon congestion or effusion within the spine.

56. Upon the whole, the changes observed in particular parts are chiefly advanced consequences of the disease, the most violent or malignant states of fever often being evinced rather in the altered colour, elasticity, and cohesion of the tissues, than in grosser lesions; these latter being most commonly superinduced on the former. It is important, however, to distinguish them from lesions which have existed before the occurrence of fever. The blood and all the secreted fluids are evidently more or less diseased; although it is difficult to show in what the change of these consists. (See Blood, § 115. and 128.)

57. VII. The Prognosis of *Fevers* is of the utmost importance as respects a knowledge of the changes taking place in their course, and of the

signs and tendency of these changes, as well as the reputation of the physician.—It is often difficult, owing to the mutability of the disease, and to the liability to err in appreciating those signs by which changes of the functions and of the organisation are indicated, particularly when the chief manifestations of life, as sensibility and organic contractility, are more or less impaired or perverted during the course of fever. The prognosis depends, generally, upon the following circumstances: — *a*. The nature and intensity of the predisposing exciting and concurring *causes*; — *b*. The character of the prevailing epidemic, or epidemic constitution; — *c*. The type, form, and state of the disease; — *d*. The states of the various functions, and of nervous and vital energy; — *e*. The congruity of the symptoms, and various contingent phenomena; — *f*. The influences, treatment, and regimen to which the patient is subjected;— and, *g*. The *critical* or other changes which may take place.

58. *A*.—*a*. The *predisposition* caused by debility, acute sensibility, or a plethoric and cachectic habit of body; a previously morbid, or congested state of the internal viscera, particularly of the liver, bowels, and spleen; and advanced age; increase the danger from fever. Some *epidemics*, however, most frequently attack the young and robust, and prove even more fatal to them. But, although *sporadic fever* may be also common in this class of patients, it is less dangerous in them than in the foregoing. — *b*. The *exciting agents*, particularly specific animal miasms; their concentrated form; the concurrence of several causes, either contemporaneously or in quick succession; their prolonged action, or continuance during the disease; and certain of the circumstances inducing unfavourable terminations (§ 48.); render the prognosis much more serious. Some importance should also be attached to the character of the prevailing epidemic, as respects its open or insidious form, and the effects following a treatment appropriate to the usual states of the disease.

59. *B*.—*a*. The intermittent *type* is less serious than the remittent, and this latter than the continued; but the more the fever is inclined to change, to become irregular, or to pass into one of a graver character, the more serious it is. The more complete the intermission, or the remission, so much less is the danger; and the more disposed continued fevers are to evince a remitting form, the more favourable is the circumstance. The longer fever has continued, the more difficult will be the cure; and relapses are more unfavourable than first attacks.— *b*. The inflammatory and sthenic *species* are much more generally favourable than the adynamic forms. — *c*. The *simpler* the fever, the more certainly will recovery take place; and the more *complicated*, the greater is the danger. The adynamic *form*, with *predominant affection*, of an important internal organ, especially the intestinal mucous surface, or the brain, or the lungs, is accordingly amongst the most dangerous; more especially if the vascular system and circulating fluids, or the soft solids, also become vitiated.

60. *C*. The *more that the organic nervous influence* is suppressed, diminished, or disordered throughout the different viscera, the more unfavourable should be the prognosis; the functions of the viscera, the state of the fluids and secretions, and the appearance of the soft solids, evincing the extent of the disorder and of the danger. — A weak, small, and quick pulse; a dark, dry, and contracted tongue; profuse, offensive, viscid, and unnatural perspirations; watery, fœtid, flaky, membraniform, and unhealthy stools; discoloured, scanty, and brown urine; livid or discoloured nails, fingers, eyelids, lips, and nose, independently of the cold stage; a discoloured, dark, and dry mouth and throat; and an offensive and penetrating odour proceeding from the patient; — are dangerous symptoms. A pulse of 120 or upwards, unless in the puerperal state, is unfavourable, and so much the more so as it is above this number. A brown or black coating, and deep, reddish fissures, or a dark or livid colour of the tongue; stridor of the teeth; a movement of the lips and lower jaw as if eating; firm closure of the jaws and lips; extreme anxiety at the præcordia; tumefaction, tenderness, or pain of the epigastrium, hypochondria, or abdomen generally; tympanitic or flatulent distension of the abdomen; copious or repeated discharges of blood by stool; a sudden irruption of the catamenia, and an equally sudden disappearance of them; a moaning, weak, quick, abdominal, or gasping respiration; coldness or rawness of the expired air; hiccup; excessive increase, or diminution, or irregular distribution, and otherwise morbid state, of the animal heat; sunk features; rapid emaciation; great difficulty or impossibility of acting upon the skin by sinapisms or blisters; an earthy, or deadened, unnatural, lurid appearance of the external surface; yellowishness of, or petechiæ and livid or purple blotches on, the skin; and dark mucous sordes on the lips or gums, or sanious discharges from the latter or from the nose; —are very unfavourable circumstances.

61. *D*. The unfavourable symptoms, more directly depending upon the *cerebro-spinal nervous system*, are — *a*. extreme pain of the head; excessive sensibility or depression of spirits; tumid or red countenance, injected watery eyes, contracted brows, &c., quickly passing into delirium, sopor, or coma; prolonged watchfulness, or early somnolency or torpor; convulsive movements, trismus or spasms of parts, great restlessness, and continued tossings; despair of recovery; and a presentiment or feeling that death will ensue: — *b*. And still more unfavourable are, early mental indifference, particularly to the issue of the disease; insensibility or sopor; profound coma, and difficulty of being roused; relaxation of the sphincters, and unconscious evacuations; excessive loss of muscular power; inability to retain any other than the supine posture, especially early in the disease, and in connection with extreme pain in the back and loins; falling down towards the foot of the bed; a position of the limbs and body, depending upon their gravity, and different from that usually preferred by the patient; inability to assume a posture different from that in which he is placed; picking with the fingers at the bedclothes; subsultus of the tendons; catching after objects in the air; alternate dilatations and contractions of the nostrils during respiration; loss of voice or speech; trembling of the tongue, or inability to protrude it; an open mouth or relaxation of the lower jaw; difficulty of deglutition; and dilatation and insensibility of the pupil.

62. *E. Unusual or incongruous symptoms* also denote danger, especially if the patient is more depressed by, or sinks faster under, the disease, than its apparent severity should warrant. The presence of severe symptoms, of which he makes little or no complaint, is much more dangerous than restlessness and anxiety when the symptoms are not so severe. Unquenchable thirst, the tongue being moist, and febrile heat moderate, the absence of thirst, the tongue and mouth being dry, and the temperature high; and remarkable craving for food before remission of the symptoms, the tongue remaining dry, &c.;—are unfavourable symptoms; the first indicating dangerous lesions of the stomach and liver, the second oppression of the brain, and the third inflammatory action of its substance, with extreme debility.— An early collapse of the countenance, or a pale lurid hue of it, with rapid emaciation, indicates a very dangerous form of fever, with vitiation of the circulating fluids. The more complete the change in the expressions, appearance, and habits of the patient, during the early stages of the disease, the greater the danger. A remarkable acuteness of the senses of hearing and sight is more unfavourable than an opposite condition. Changeableness of the urine, especially if it becomes limpid and scanty, from being copious and turbid, or ceases to deposit a sediment; an unnatural sound on deglutition; a marked or unusual sinking, or protrusion of the eye; a diminution or an enlargement of the objects seen, or double vision; openness of the eyes during sleep, or sopor; the patient supposing himself in a different bed or house to his own; and his urging a removal to his friends, or to a church, or to the altar;—all denote danger.

63. *F.* The more mild, open, and uncomplicated the disease, or devoid of any of the above unfavourable signs, the more certain will be recovery. The *occurrence of crises* at due periods, and their spontaneous and full evolution, are also very auspicious. But if the critical evacuations are imperfect, or if the exacerbations, or aggravation of particular symptoms, usually preceding them, only are observed — the efforts being thus abortive — or if the disease afterwards become more severe, danger should be apprehended; especially if the tongue be drier, the secretions more disordered or suppressed, and organic nervous power further diminished after such attempts. (See art. CRISIS.)

64. VIII. CAUSES.—i. REMOTE.—*A. The predisposing causes* are not the same in all fevers; for there is a certain susceptibility of frame, which favours the action of the exciting causes of epidemic and of certain specifically infectious fevers, independent of the states that predispose to the sporadic occurrence of fever. There seems also to be a certain innate susceptibility to the infection of eruptive and yellow fevers, that is destroyed by an attack of the disease, the same infection not producing its specific effects a second time; and this susceptibility, particularly when yellow fever is epidemic, is generally connected with high irritability of the muscular system, vascular plethora, and a robust state of the frame. — The most influential of the predisposing causes are — dread of the disease; change from a cold to a warm climate; peculiar idiosyncrasy; acute sensibility and irritability; the excessive use of food, especially animal food, and of spirits, wines, and malt liquors; moist states of the air and diminished electricity; prevailing winds from the south and east; fatigue and exhaustion of mind or body, from whatever cause; accumulations of bile on the biliary apparatus, and morbid colluvies in the prima via; insufficient and unwholesome food; a close and moist atmosphere; whatever lowers the moral and vital energies; and the general predisposing causes adduced in the article DISEASE (§ 30—38.).

65. *B. The exciting causes* are the preceding, particularly when several act contemporaneously, or with much intensity; as a moist, warm, and stagnant air, rapidly carrying off by induction the positive electricity of the frame; a saburral state of the prima via; accumulations of vitiated bile; and mental or bodily exhaustion; miasmata, terrestrial exhalations, and foreign gases floating in the air; emanations from decaying vegetable matter; the exhalations from crowds of persons or animals in a confined space and stagnant air, as in transports, camps, crowded barracks, prisons, &c.; the effluvia arising from putrid or decaying animal matter, particularly when concentrated, or mixed with the emanations from decomposed vegetable matters; the miasms generated by copious secretions and discharges from the sick, as in crowded wards of hospitals, particularly lying-in hospitals, close, crowded, and low apartments, &c.; effluvia specifically infectious, as those of typhus and scarlatina; the force of imagination, or the impression produced on the mind by the sight of a person in the disease; fear, dread, or terror, and any of the depressing passions acting long and energetically; remarkable exertion of mind and body, and consequent fatigue of either or both; defect of the natural or accustomed stimuli, as of food, drink, tobacco, opium, &c. Certain of the causes, as infectious effluvia, miasms, &c., are especially active, and may therefore be said to be the *specific, efficient*, or *essential agents* of the disease; whilst others, as fatigue, cold, defect of stimuli, and certain of the predisposing causes, may act merely concurrently, or consecutively, as respects the principal exciting agent, or in such a manner as to determine or aid its effects. I would refer the reader to what is advanced respecting the specific and determining agents and influences in the articles on the *Causation of* DISEASE (§ 55—63.), on ENDEMIC INFLUENCES, and on INFECTION.

66. ii. OF THE PROXIMATE CAUSE, *or those Changes more immediately consequent on the exciting or efficient Agents of Fever. — A. Opinions of the ancients, and of former writers.* — Fevers have been considered as essential or distinct diseases from the earliest records of medicine; and the extent of the ravages then produced by them may be inferred from the circumstance of a separate divinity having been assigned to them in the Grecian and Roman mythology. The Greeks invoked their divinity by the appropriate name Πυρετὸς; the Romans by the appellation *Febris* (PLINY, l. ii. cap. 7.; et ÆLIAN, *Var. Hist.* l. xii. cap. 11. p. 566.). The latter even erected temples for her worship on the Palatine Mount, in the Via Longa (*Vico Longo*), and in the place of the Monument of Marius (VALERIUS MAXIMUS, l. ii. cap. 5. p. 55.). — The popular

dread which gave rise to such a medium or mode of deprecation* not only marks the destructive prevalence of fevers in these countries, but also indicates the noxious effects of the Pontine Marshes in the time of the Roman republic.

67. The earliest opinion of the ancient Greeks respecting the immediate cause of fever appears to have been that of ANAXAGORAS (PLUTARCH, *in Vitâ* PERICLIS, p. 155.: etiam ARISTOTLE, *De Gener. Anim.* l. iii. cap. 6.) — the contemporary of HIPPOCRATES. He attributed all acute diseases to an abundance of bile. ARISTOTLE (*De Part. Animal.* l. iv. c. 2.) combated this doctrine; but it became prevalent nevertheless. HIPPOCRATES, instead of entering into speculations which the want of data and first principles rendered futile, set a better example, by directing attention to the varying phenomena of the disease, and to their relation with the vicissitudes of season, &c. PLATO (TIMÆUS, p. 497.; et GALEN, *De Dogmat. Hipp. et Plat.* l. viii. p. 324.) considered that fevers, and, indeed, all diseases, arose from a disproportion of the different physical elements which enter into the composition of the body. Continued fevers, he supposed to arise from superfluity of fire; a quotidian from abundance of air; a tertian from predominance of water; and a quartan from that of earth. This is, perhaps, the first attempt at explaining the types of fever. It appears to have had but little influence, notwithstanding its universal adoption, in changing the modes of practice already recommended by HIPPOCRATES.

68. The *dogmatists* (GALEN, *de Nat. Hum.* p. 279.) of the following age, in conformity with their doctrine, conceived fever to proceed from the abundance of bile, its quantity determining the type of the disease. The *maximum*, in their opinion, produced continued fever of an ardent character; a less quantity, quotidians; and the *minimum*, quartans. PRAXAGORAS (RUFFUS, lib. i. chap. 33. p. 109.) of Cos, one of the most faithful followers of Hippocrates, adopted a similar theory, and endeavoured also to account for the cold stage of the disease, by supposing its source to exist in the vena cava. This opinion possesses some features of the more modern doctrine of congestion, which no doubt exists, both in the vena cava and other large veins, during the cold stage, as a part of the series constituting the diseased actions which obtain the name of fever. ERASISTRATUS was the first who contended for a connection between fever and inflammation (GALEN, *Comment. II. in L. de Nat. Human.* p. 27.). He conceived these morbid states to consist in a transfusion of the blood into the arteries, disturbing the spirit they contain, and giving it an irregular direction. The former he believed to arise from the presence of blood in the large arteries; the latter, from a congestion (*παρέμπτωσις*) of this fluid in the capillaries (*Ibid. de Venæsect. adv. Erasist.* p. 2.). He was equally averse from bleeding and purging, which had been long and generally in use in the treatment of these maladies; and in conformity, as he supposed, with his theory, recommended spare diet, emetics, lavements, warm baths, frictions, &c. (*Ibid.* p. 15, 16.)

69. ASCLEPIADES, the founder of the *Methodic School*, adopted a great part of the doctrine of ERASISTRATUS respecting the fundamental corpuscles; and the *pneuma* or spirit of the dogmatists. He explained the heat which takes place in fever, by the motion of these corpuscles; and accounted for sensation, pain, &c. by a similar hypothesis (CŒLIUS AURELIANUS, l. i. c. 15. pp. 46. 48. 57.). According to him, fever consists in an increase of heat, and of the pulse (*Ibid.* l. ii. c. 33. p. 151.). The other phenomena of fever and of inflammation, he considered to proceed from a disproportion between the particles and their pores. The elementary corpuscles, he supposed to pass from the lungs into the heart and arteries, and to produce occasionally, during their volatilization from the body, an obstruction in the channels through which they circulate; the larger causing the most obstinate obstruction, and, consecutively, the most violent fevers; and the lesser, slighter attacks. The type of the disease was explained after the same manner. The longer the intervals between the febrile accession, the more subtile the atoms were supposed to be which had become impacted in the vascular pores (*Idem, Acut.* l. i. c. 13. p. 42.). ASCLEPIADES conceived that nature could do nothing of herself in removing this state, and that all must be attempted by the physician. CELSUS (lib. iii. c. 8. p. 469.) informs us, that "Asclepiades officium medici esse dicit, ut tuto, ut celeriter, ut jucundè curet." Agreeably to this maxim, he prescribed gentle medicines, and dietetic means, instead of the violent remedies of the empirics (CŒL. AUREL. *Acut.* l. i. c. 14. p. 44.). Enemata, bloodletting, dry cupping, frictions, gestation, exercise, bathing, and, more rarely, emetics, were the agents which he recommended. (PLINY, lib. xxvi. c. 3. p. 392.; CŒL. AUREL. l. c. et lib. iii. c. 8. p. 215.)

70. SORANUS (CŒL. AUREL. *Acut.* l. ii. c. 33. p. 153.) conceived fevers to consist in an absolute relaxation of the vessels and their pores. CASSIUS, the Eclectic (CASSII *Iatrosophistæ, Naturales et Medicinales Quæstiones*, ed. CONR. GESSNER TIGUR. 1562.), was of opinion, conformably with the chief doctrine of the Methodics, that they arise in consequence of a different arrangement taking place in the primary and invisible corpuscles; while he adopted the hypothesis of the more ancient dogmatist, by considering the increase in the temperature to be the result of friction between these particles, disengaging their integral heat. The views of fever adopted by the Eclectics, led to few modes of practice which had not been previously employed. HERODOTUS (ORIBASIUS, *Collect.* l. vi. cap. 28. p. 228. *et passim*), the disciple of AGATHINUS, who embraced more of the pneumatic system than of any other, placed great confidence in warm bathing and in sudorifics. These he considered to be serviceable, by fortifying the *pneuma* or spirit, and assisting it to expel heterogeneous particles. He attempted, also, to determine, with more precision, the time and circumstances in which bleeding, as recommended by HIPPOCRATES, ought to be prescribed.

71. GALEN (*De differ. Feb.* lib. i. *passim*) attri-

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* The following is from a votive tablet to the goddess:—

Febri . divæ . Febri .
sanctæ . Febri . magnæ .
Camilla . Amata . pro .
filio . male . affecto . p .

TOMMASINI, in GRÆVIUS, Thesaur. Roman. Antiq. t. xii. p. 867.

buted the varieties of fever to a degeneration or putrefaction of the humours, and to a certain change in the pneuma, developing an unnatural degree of heat. He supposed the heart and arteries to participate consecutively in this derangement, and to produce the subsequent phenomena. Continued fevers, according to him, had their chief source in an alteration of the pneuma, and of the humours; quotidians in a degeneration of the mucus; tertians in a similar change of the yellow bile; and quartans in a putrefaction of the black bile, which he considered the most slowly moved, and to require the longest period for the production of the paroxysm. The doctrine of Galen continued to be almost implicitly and universally adopted for many ages; and even down to modern times, it has had its partisans. The writers in medicine who flourished during the decay of the Roman empire, and the Arabian physicians, introduced but few modifications of his theory.

72. AËTIUS (*Tetrabibl. II.* serm. ii. cap. 54. *et passim*) and PALLADIUS explained the phenomena of fever in a nearly similar manner to GALEN. The former paid particular attention to the good effects arising from cool apartments, and ventilation, during treatment; and employed the therapeutical means recommended by HIPPOCRATES and GALEN. While PALLADIUS (*De Febribus*, cap. 9. p. 30.) admitted the opinion respecting the degeneration of the humours, he considered the disease to arise, also, from other causes — such as external or internal irritations, engorgement or suppression of the secretions and transpirations, and putrefaction of the blood itself.

73. During the seventh and eighth centuries, the Arabians attributed fevers to superabundance of impure or thick blood, which they conceived to be connected with a similar state of the bile, and other humours. They pretended, although not very appropriately, to dilute the former by purging, and to evacuate the latter by bleeding. AARON of Alexandria, and RHASES (*Contin.* lib. xvii. cap. 6. sect. 360. *et passim*), introduced no change into the humoral pathology. They, however, determined with more accuracy the types of continued fever; and paid greater attention to their production, especially in an epidemic form, by the influence of seasons and of certain states of the atmosphere, than had been bestowed upon the subject since the time of Hippocrates. ALI (*Abulfarg. Hist. Dynast.* p. 326.), surnamed the Wise, a physician of the tenth century, deserves notice, more from his recommendation of emetics, as prophylactics against that state of the humours which he supposed to be productive of fever, and on account of his employment of bleeding in intermittents, than from any innovation which he made in the received theory. AVICENNA (SPRENGEL, *Hist. Med.* vol. ii. p. 358.) appears to have introduced the greatest change in the doctrine of GALEN of any of the Arabian writers. He attributed the phenomena of fever, and other acute diseases, more to a superabundance of the different humours, than to a degeneration of their constitution. GILBERT *, an English physician, in the middle of the thirteenth century, entertained the opinion, that as the changes which supervene in the humours are infinite, so the phenomena of fevers may be equally various. He defined fever to be a greater heat than natural, developed by the heart, and propagated by means of the arteries throughout the body, which deranges the other functions in its course, and promotes the further degeneration of the humours which first gave it origin. He admitted, that the heat of the body was not materially increased in many cases, and not at all in others; and that his definition was consequently incomplete. He, however, endeavoured to get rid of the difficulty by involving it in a cloud of scholastic subtleties.

74. ARNALD of Villanova (*Breviar.* lib. i. cap. 26. p. 1121. *et passim*) introduced astrology into the doctrine of fever, by attributing derangements of the humours to the influence of the heavenly bodies. MENGHO BIANCHELI (*De Omni Gen. Febr. et Ægritud.* Venet. 1536, fol. — *a rare work*), an Italian physician of the fifteenth century, gave a similar definition and theory of fevers to that already given by GILBERT. MICHEL SAVONAROLA (*Practica Canonica de Febribus*, cap. ix. f. 36.), a professor at Ferrara, about the same period, deserves mention on account of the view which he took of the influence of climate in modifying the pathology and phenomena of fever. There are few other authors who wrote during the middle ages, deserving of notice. All of them either more or less implicitly adopted the doctrine of Galen, or mixed it up with a farrago of scholastic subtleties and astronomical suppositions.

75. The removal of the trammels of the schools, and the revival of medical science in Europe, may be dated from the writings of J. FERNELIUS (*Opera Pathologica, &c.* sec. iv.). This eminent author and H. AUGENIUS (*De Febribus*, sec. ii. c. 4. p. 50.) were the first to impute the proximate cause of fever to changes in the living solids. They denied that the fluids constituted any part of the organisation, and consequently inferred that their influence in the production of the disease could not be primary. They very justly, however, admitted their consecutive derangement. FELIX PLATER (*Praxis Medica*, vol. ii. c. 2. p. 39.), one of the first writers who, since the revival of learning, turned attention to the true source of medical science — accurate and intimate observation — stated that, when the sensibility of a part is disordered by an excessive increase of its animal heat, the result is fever, the type of which he conceived to depend upon the particular fluid which is affected. He believed that, when the fluids contained in the vessels of the mesentery are disordered, fever assumes an intermittent type; and that the further the part whose sensibility is affected, is removed from the heart, the longer is the fever in being produced. Enough,

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* GILBERTI *Anglici Compendium Medicinæ, tam Morborum Universalium, quam Particularium, non solum Medicis, sed et Chyrurgicis utilissimum*, edit. MICH. VENET. DE CAPELLA, 1510, 4to. This production of our countryman is curious, on account not only of its medical but also of its metaphysical and dialectic character. The following proposition, which he states, and immediately endeavours to solve, considered in relation to the time at which it was written, deserves transcription, and evinces also the metaphysical partialities of the author. "Wherefore is the vegetating or vital principle destroyed at death, and not the intellectual? Because the vegetating or vital principle is derived from matter, and may be regarded as its simple product. Consequently it must necessarily cease to exist with the derangement and destruction of the materials which produce it The intellectual principle, on the contrary, is not a simple form; it possesses different attributes, not derived from the materials of the body, and therefore must endure after death." (Fol. 245, 246.)

however, has been stated to show that his facts are more valuable than his doctrine.

76. Thomas Campanella[*], the celebrated Italian metaphysician and pathologist of the sixteenth century, discarding the opinions of Aristotle, conceived that the vital spirit, which is produced from the most subtile of the animal humours, and is nourished by the blood, is concerned in the production of all diseases, although itself undergoes no change, being only irritated or excited by the aëriform matters and flatuosities contained in, or proceeding from, the fluids. He considered that, as respects its nature, fever can scarcely be called a disease, since it results from the reaction or the efforts of the vital spirit to resist vitiation and putrefaction of the fluids, and thus to preserve life. He attributed the crisis and critical days to lunar influence, and explained the action of remedies on the principle of their exciting or reducing the temperature of the body. Van Helmont (*De Febribus*, c. 16. p. 783.) ascribed fever to the influence of the archeus or vital principle.—Although the foundation of the doctrine, which afterwards became so generally adopted, owing to the form it assumed in the hands of Hoffmann, Cullen, and others, was laid by these writers, another theory was soon afterwards promulgated. Owing to the increasing enthusiasm with which chemistry then began to be cultivated, the *chemical pathology* first proposed by Paracelsus (*Op. Omnia Med. Chemico-Chirurg.* 4to. Basil. 1589.), and supported by Sylvius (*Op. Med.* 4to. Amst. 1679.), Willis (*Oper. Omnia*, 4to. Geneva, 1680.), Kerger, Borelli (*De Motu Animal.* pars i. et ii.), Wedel (*Physiol. Med. et Pathol.* 4to. Jenæ, 1679.), and others, obtained a very general support; and although all the phenomena of these diseases were not explained by some according to the principles of this school, yet its doctrines were conveniently adduced to account for various states of disorder.

77. It is unnecessary to notice the dreamings of Fludd, Digby, Maxwell, Greatrake, and others, of the sect of the Rosicrucians, which appeared early in the seventeenth century, as to the nature of fever. It is impossible to cast even a glance at the ravings of this sect, without entertaining ideas the most humiliating of human nature and intellect. Yet they found followers in Europe, particularly in Germany, as late as the middle of the eighteenth century; and, even now, emanations of their doctrine may be traced in some of the reveries which have recently been promulgated in that enquiring country. Leaving opinions calculated only to excite the most humiliating suggestions respecting the extent of human knowledge, and equally abasing reflexions on the state of medical science in this country at that epoch, we arrive at a period presenting opinions more in accordance with calm and unbiassed reason than those immediately preceding.

78. The writings of Sydenham (*Opera Omnia.* Leyd. 1742, 8vo. *best edition*) tended to dissipate the "thick-coming fancies" of the humoral and chemical pathologists; and, although tinctured by the chemical hypothesis, he nevertheless directed attention to the operations of nature. Baglivi (*Op. Omnia*, Ven. 1716, 4to.), at a later period, trod nearly in the same path as Sydenham; and, like him, attended to the prevailing character of epidemics, and viewed their phenomena in connection with the seasons and atmospherical vicissitudes. Stahl (*Theoria Med. Vera*, 4to. Matæ, 1737.), the disciple of Wedel, forsaking the doctrines of his master, adopted a theory in many respects similar to that proposed by Van Helmont (*Op. Omnia.* Amst. 4to. 1664.) and Campanella. The psychico-chemical, or bio-chemical, hypothesis of Stahl subsequently received the support of Sauvages (*Nosol. Method.* 2 vols. 4to. Amst. 1768.), who, in addition to the efforts of the anima, the increased motion of the fluids, and augmented secretion and excretion of the salino-sulphureous particles, added the doctrine of Boerhaave, of accelerated circulation to remove a mechanical obstacle.

79. Although recent opinions as to the proximate cause of fever may be traced partly to Fernelius and others, yet it is to Hoffmann (*De Generat. Febr.* Halæ, 1715.), the cotemporary of Stahl, that we are indebted for some excellent ideas. He placed the chief source of motion in the nervous system, and considered that certain affections of nervous influence induce a general spasm of the extreme vessels, driving the blood from the capillaries into the large vessels, the heart and large arteries thus becoming irritated. A nearly similar hypothesis was soon afterwards framed by Boerhaave (*Prælect. Acad.* 2 vols. Goet. 1744.) from opinions entertained at different periods, more particularly from some of those promulgated by Hoffmann. Boerhaave, adopting no single nor general principle, to which alone he referred the different manifestations of fever, kept his attention more especially fixed upon the relation subsisting between the exciting causes, and the actions they induce in the system, explaining at the same time the latter conformably with the pathological doctrines of the time. He considered that a quicker and a stronger action of the heart was induced, during fever, by an accession of the influence of the brain and the cerebellum, in order to overcome the resistance offered by the smaller vessels; and that fever was therefore an exertion of life to avert death. Cullen (*First Lines of Pract. of Phys.* vol. i. p. 42.) illustrated, in a much more satisfactory manner, the doctrine of the living solid, as first proposed by Fernelius, and so ably extended, and, indeed, established, by Hoffmann. The application of it to the theory of fever, which had been made by these and other writers, was more precisely explained by Cullen, and more conformably with many of the phenomena. The opinions of this very acute and philosophical physician held a stricter reference to the early changes than had been generally entertained. The causes of fever he supposed to act by debilitating the nervous energy, inducing diminished influence of the brain, and consecutive atony of the superficial capillaries, accompanied with spasm; reaction of the heart and larger arteries supervening in consequence of this state. This doctrine was farther illustrated and modified by Currie (*Medi-*

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[*] Born in 1568, and imprisoned for his metaphysical opinions from 1599 to 1629, when he was set at liberty by Pope Urban VII. He afterwards went to Paris, where he died in 1639. (Tiraboschi, *Storia*, &c. t. vii. p. 140.; Campanella, *Metaphys.* l. ii. p. 39.; et *Medecin.* l. i. c. i. art. 1—4. 8vo. Leyd. 1635.)

cal Reports, &c. Lond. 1805, *passim*), Gregory (*Lectures, &c.*), and W. Philip (*On the Nature of Fever.* Edin. 1807, p. 89.), the last of whom ascribed febrile reaction to a contest between the capillary and larger vessels; and it was most conducive to the employment of emetics at the commencement, and of diaphoretics through the course of the disease. Amongst the other neuropathologists, Selle (*Rud. Pyretologiæ Methodicæ.* Berol. 1768, 8vo.) and Tode (*De Febrium Indole.* Hafn. 1769.) deserve notice. The former imputed fever to a peculiar condition induced in the nervous system in general; the latter referred it to a certain irritation in the common sensorium. Schäffer (*Versuche*, ii. p. 44. *et seq.*) and Thorer (*De Actione Systematis Nervosi in Feb.* Gott. 1774, p. 257.) ascribed it to a similar state of the nerves.

80. The experiments and arguments of Haller having tended to establish irritability as a principle inherent in the muscular fibre, and independent of the cerebro-nervous system, furnished materials for doctrines founded upon such views. Several modifications of these successively appeared. Stoll (*Aphor. de Febribus*, p. 208.; et *Rat. Med.* vol. i. et ii. Vindob. 1768, 8vo.) considered fever to be morbidly increased irritability of the heart; J. C. Juncker (*De Spasmo Febrili Dissert.* Hal. 1769.) viewed it as augmented irritability of the heart and arteries, the nervous influence being, at the same time, diminished; Elsner (*Varius Febris Status, Regium.* 1789, Dœring. I. p. 110.) imagined it to be an irregular distribution of the irritability in consequence of certain internal stimuli; and Dober (*De Febre.* Wirceb. 1795, p. 17.) ascribed it to a similar condition of this principle, the irritability of involuntary organs being heightened, and that of the voluntary lessened. Other pathologists called in the vital influence, in a more particular manner than had heretofore been done, in order to explain the phenomenon under consideration. Kramp (*Fieberlehre nach Mechanischen Grundsützen.* Heidelb. 1794.; et *De Vi vitali Arteriarum Diatribo.* Argent. 1786, p. 411.) referred fevers to an increase of the vital force of the vessels, beyond that which is requisite to the natural circulation of their fluids. Fordyce (*Dissert. on Fever, passim*) imputed them to efforts made to overcome obstacles opposing a free and healthy circulation; and Reil (*Memorab. Clinic. &c.* fasc. iv. p. 107.) conceived them to result from an exalted state of the vital influence affecting chiefly the heart and blood-vessels. Along with this state of the vital energy, he supposed its disposition and qualities to be changed in the different kinds of contagious fevers; and hence the alterations which supervene in the constitution of the secretions, &c. Sprengel (Galen's *Fieberlehre.* Bresl. 1788, 8vo.) and C. F. Hufeland (*System der Pract. Heilk.* Jen. 1802.) acknowledged, as the proximate cause of fever, a morbid reaction of the vital influence, which they imagined to take place throughout the system.

81. The doctrine of Brown (*Elementa Medicinæ.* Edin. 1780, 8vo.) was remarkable chiefly for the manner in which the vital phenomena were explained by it. In this respect, also, the opinions of his contemporary Darwin (*Zoonomia*, vol. iv. p. 333.) were no less distinguished, although greatly inferior to those of Brown in point of originality, simplicity, and philosophical sagacity. Brown considered life to be preserved by the operation of the exciting fluids on the excitable solids, and health to be the result of their equable and reciprocal action. This action he considered to be deranged by the causes productive of disease. Fever he supposed to be an asthenic state of the system, arising either from the abstraction of the natural stimuli, or from the causes of the disease having directly or indirectly exhausted the excitability. The notions of Darwin were merely more involved modifications and illustrations in different terms of the same theory. From these have arisen the new Italian doctrine, which attributes an opposite state of the system to fever from that imputed to it by Brown. The opinions concerning the nature of disease, and the action of remedies, introduced by Rasori (*Della Febre Petecchiale di Genova; Del Metodo di Curare, &c. del Prof.* G. Tommasini. Bologna, 1821, &c. &c.), have produced so great a revolution in the principles of his master, as to entitle him to the honour of being considered as the founder of a new school.

82. The ideas of the humoral pathologists have been lately revived in Germany by Ch. L. Hoffmann (Hildenbrand, *Institutiones Medicæ*, vol. i. p. 93.), Wedekind (*Nachrichten über das Franzüsische, &c.* Leips. 1797, 8vo.), and Herzig (*De Febribus in Genere*, Colon. 1790, 8vo.). They suppose some change analogous to putrefaction to supervene in the blood, which, irritating the vessels, produces fever. At a still later period, the opinions of the bio-chemists have been attempted to be restored. J. C. Stark and G. F. Parrot (Hildenbrand, l. c.; and Hufeland's *Journal, passim*) attributed the proximate cause of the disease to an excitation and disturbance of the calorific process, and to the abundance of carbon in the blood. G. C. Reich (*Von Fieber und dessen Behandlung.* Berl. 1800, 8vo.) assigned a defect of oxygen in the organisation as the cause; J. C. Bährens (*Uber Fieber und Saulzsüure.* Leip. 1802.) imputed too great an abundance of this substance to the system during fever; and J. C. Harles (*Neue Untersuch. über das Fieber.* Leip. 1803.) referred the whole phenomena to the agency of electricity.

83. Although fever and local inflammation may arise simultaneously from concurrent predisposing and exciting causes, or from epidemic influence, yet the identity of both diseases did not become an article of pathological belief, until towards the close of the last century. Riverius (*Prax. Med.* sec. xvii. c. 2.), indeed, had very justly stated, that acute and malignant fevers very rarely run their course without inflammation of some viscus: but he remarks, in a manner worthy his high reputation, that the superinduced inflammation is different from that which is primary or idiopathic. Other writers had conceived, from the predominance and character of certain symptoms occurring in the progress of fever, that inflammatory action is no infrequent attendant upon it. Coiter, of Groningen, was surprised when he found no inflammatory appearances within the head, in cases where the cerebral symptoms were very remarkable;—and Willis long afterwards supposed fever to be an inflammation of the spirits (*spirituum phlogosis*). Dr. Grandvilliers is, however, the first writer, who

has distinctly ascribed fever to inflammation of the brain, he having remarked, in 1757, this organ especially affected in an epidemic characterised by malignant symptoms; and Dr. Wendelstadt, in his description of an epidemic that prevailed in 1794 and 1795 in Wetzlar, attended by delirium in some cases, by catarrh or pneumonia in others, or by both delirium and pneumonia, considered inflammation of the brain to have occurred from the commencement. Still the existence of essential fever cannot be said to have been called in question, until the appearance of the works of Ploucquet (*Exposit. Nosolog. Typhi.* Tubing. 1800.) and Clutterbuck (*Inquiry into the Seat and Nature of Fever.* Lond. 1802.), in which this disease is ascribed to inflammation of the substance of the brain. This doctrine was soon afterwards controverted by Dr. Beddoes (*Researches concern. Fever as connected with Inflam. &c.* 8vo.); but Marcus, of Bohemia, forsaking the pathology of Brown, became a convert to it, and its most zealous supporter (*Ephemer. der Heilk.* b. i. st. 2. &c. 1809.); and other writers of inferior note espoused the doctrine both in Marcus's *Ephemerides* and in Horn's *Archives.*

84. Shortly afterwards, another theory of fever made its appearance; and in France, at least, attracted considerable attention, owing to the copious writings of Broussais and of his pupils. This pathologist maintained that the mucous membrane of the digestive canal is the primary seat of fever, and presents the most general and unequivocal lesions after death; affections of other organs being merely consequent upon, or sympathetic of, disease of this part. Although several writers, especially Rahn (*Briefwechsel, &c.* p. 250. Zurich, 1787.), and Beddoes (*Op. cit.* p. 63.), considered the gastric system most frequently affected in fevers, it was reserved for Broussais to conclude that "all the essential fevers of authors are to be ascribed to gastro-enteritis, simple or complicated." (*Exam. des Doct. Med. &c.* t. i. p. 34.)

85. These two theories are the most important of those which have had reference to the local origin and seat of fever. They are manifestly founded on narrow views of the deranged actions consequent upon prolonged mental depression and anxiety — upon change of climate, season, and weather — upon the operations of endemic agents and epidemic influences — upon the action of various infectious miasms — according as each or several of them may affect persons differently predisposed, by temperament or diathesis — by habit of body and constitutional energy — by the state of the secreting and excreting viscera — and by the circumstances in which they are placed. They appear also to be deduced from mistaken conceptions of the actual sequence of the disordered actions characterising the various species of fever — sporadic, endemic, epidemic, infectious, &c. — however they may be associated or complicated with more or less local disease, either at their commencement, or in their progress.

86. The opinions which have recently been most adopted on the Continent, especially in Germany, are those which were taught by J. P. Frank (*De Curandis Hom. Morbis, &c.* t. i. p. 34.) and V. N. ab Hildenbrand (*Institut. Pract. Med.* t. i. p. 96.). The former of these writers confesses that he despairs of conveying any exact idea, or even of coming to any satisfactory conclusion, respecting the proximate cause of fever. He thinks, however, that fever may be viewed as resulting from irritation induced by an unaccustomed stimulus, the powers of life reacting, or making efforts at reaction, in order to remove it. Hildenbrand states nearly the same proposition in different words, in concluding that the cause of fever is to be found in a morbidly increased reaction of the vital forces, owing to the irritation of a morbific stimulus. He further remarks — 1st, That all fevers are caused by an absolute or relative irritation, and consequently that they are all at their commencement irritative; — 2dly, That the reaction of fever never follows mere debility, although it is attended by debility; and that the debility of the vital powers is always secondary and the effect of the morbid irritation, or, adventitious as in the progress of the disease. — Admitting that it is difficult to explain — although I think it quite possible — how reaction of the vital forces can take place in the system in consequence of a cause primarily producing debility, more especially in the part where the impression is primarily made; still it is evident that all the causes of fever are not positive stimuli or irritants in their primary action, and consequently that their immediate effects on the surface to which they are applied are not exciting. Indeed, we have no evidence that the effects which are proximately consequent upon their application, are similar to those which uniformly result from those stimuli, with the action of which we are acquainted. Stimulating effects undoubtedly follow, remotely, in a majority of instances, but they supervene in consequence of intermediate operations taking place in the system itself.

87. The opinions of Dr. Jackson are not materially different from those of Hildenbrand. He considers the material cause of fever to be of an irritative kind; — that it enters the body by the absorbents of the first passages, proceeding into the circulation; and that it produces the febrile act by irritating the extreme series of organic capillaries, thereby occasioning subversion of the existing mode of action, and giving rise to changed or unnatural forms of action, through which the different secretions and functions are diminished, increased, or modified, in various ways and degrees.

88. I am not aware that any opinion has been promulgated different from those now briefly stated, up to the period when my own views as to the pathology of fever were published. Dr. Armstrong was the most copious and recent writer on fever at that period; but, after an attentive perusal of his work on typhus, and of his published lectures, I am unable to ascertain what his views are, or wherein they differ from those generally entertained at the time, especially from those previously published by Dr. Jackson, excepting that he particularly insists upon congestion, as an important pathological state of some forms of the disease; — but in this he merely followed Stahl, Juncker, R. Sprengel, Jackson, and some other older as well as contemporary Continental writers. Upon the whole, his views, both pathological and practical, are so contradictory and vacillating, that a reference cannot be made to them with any degree of confidence.

89. IX. Pathological States — i. The Early

CHANGES IN FEVER.[*] In approaching the pathology of fever, there are certain circumstances to be kept in view: — *a*. That the chief causes, particularly malaria and animal effluvia, exert a noxious or poisonous influence upon the economy: — *b*. That these agents, usually tainting the surrounding atmosphere, when acting injuriously on the frame, pass along with it into the lungs during respiration; — the extensive surface there exposed to the tainted air; the organic properties, relations, and functions of this surface; the constant renewal of the air brought in contact with it, &c., favouring the action of these agents in this quarter in preference to any other with which they can have any communication: — *c*. The uncertain period that elapses between the time at which the morbid impression is made, and that at which it developes the fully formed malady; this period being usually of several days' duration, often much longer, and occasionally very much shorter or almost instantaneous, especially when the cause is intense and the predisposition strong: — *d*. The general character of symptoms constituting the formative and invading stages (§ 33. 35.): — *e*. The state of function or vital manifestation throughout the frame, and the evident changes in the fluids and solids, in the various periods of the malady: — *f*. The complications and local determinations which supervene in the course of fever, and the periods at which they present themselves: — *g*. The external appearances and nature of the lesions observed after death, the seat of these lesions, their number and extent, and the relation they bear to the symptoms during life: — *h*. The obvious differences between the structural changes and those usually consequent upon common inflammation: — and, *i*. The frequent absence of any lesion sufficient to account either for the symptoms or for death.

90. *Existing opinions* as to the nature of fever, particularly as respects the changes immediately following the exciting causes, may be reduced to the following: — 1st. That fever arises from inflammation, seated, according to some, in the brain, and, to others, in the digestive mucous surface, but sometimes also reflected upon the brain: — 2d. That it depends upon congestion of the large vessels and internal viscera: — 3d. That it proceeds from the direct contamination of the circulating fluids by its material cause, — the nervous symptoms, local affections, inflammations, &c. appearing in its course, arising from the action of vitiated blood upon the organs: — 4th. That the causes first affect the cerebro-spinal nervous system, the phenomena of fever arising from the changes produced by them upon this system: — and, 5th. That the morbid impression is first made upon the organic or ganglial nervous system, and, owing to the circumstance of this system actuating the circulating, secreting, and excreting viscera, is manifested, in an especial manner, by the changes observed in the state of vascular action, in the animal temperature, in the functions of secretion and excretion, in the circulating fluids, and in the other functions which are more or less intimately dependent upon the ganglial system. (See my views respecting this system, in the *Appendix* to M. RICHERAND's *Elements of Physiology*, p. 556.: and as to its pathological relations, &c., particularly in connection with the causation of fever, in the *Lond. Med. Repos.* vol. xvii. p. 376.)

91. *A*. The doctrines imputing fever to *inflammation of the brain*, or of *the digestive mucous surface* are subverted by nearly the same facts and considerations: — *a*. Inflammatory appearances are not uniformly observed in fatal cases, and *a fortiori* cannot generally exist in those which recover. — *b*. The lesions which actually exist, although possessing certain of the characters usually ascribed to inflammation, are wanting in others, especially those indicating sthenic, or purely inflammatory action; therefore these lesions, as stated above (§ 50.), are either not the consequence of inflammation, or the result of an inflammation remarkably modified from the common or idiopathic kind, by some superadded cause, or by pre-existing changes in the state of vital power, and of the circulating fluids, as will appear hereafter. — *c*. As the lesions, whatever their nature may be, are often inadequate to account for the symptoms, or for death, they are to be looked upon as contingent phenomena, or merely as the grosser portion of those changes, supervening throughout the frame; the whole group of symptoms, their succession, and the ultimate issue, depending more upon the functional disorder in the first instance, and the consequent changes in the fluids and general organisation, than upon the more palpable lesions of structure, which occur in different parts from various influences determining or exciting a predominant state or grade of the morbid or general action, during its course, to some particular viscus or structure. — *d*. The inflammatory appearances observed after fevers are not co-ordinate with those produced by inflammation, nor are they identical with, or even similar to, them (§ 50.). — *e*. These lesions are not restricted to the same situation or viscus, the inflammatory complications or local determinations whence they proceed, being chiefly seated in different organs, in different cases and different epidemics; — the stomach and bowels being principally or predominantly affected in one case or in one epidemic; the head in another; the lungs in a third; the liver in a fourth; according to various predisposing, concurrent, and determining influences, as previous disorder, mental distress, the temperature, season and weather, the state of the air and of the locality, fatigue, exposure to cold, &c. — *f*. The existence of vascular congestion, although more

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[*] The views embodied in this chapter, and indeed throughout the whole of this article, which are not assigned to some other writer, especially those on the *Nature and Complications of Fever*, were promulgated by me on various occasions, and in different works, since 1819. In 1820, 1821, and 1822, they were published in the *Foreign Medical Review*, the *Medical and Physical Journal*, the *London Medical Repository*, and other works (see the *References.*). In the winter of 1820 and 1821 they were fully stated, in answer to the views of Dr. CLUTTERBUCK, during a discussion at the London Medical Society, in which that able physician and myself were chiefly engaged, for three successive evenings. They were also fully developed in my lectures from 1824 to 1827, and in the Westminster Medical Society, as reported in the medical journals of the day. My experience of fever had been considerable previously even to the earliest of these dates. I had treated the most malignant types and complications of fever in the most pestilential climates within the tropics; I had closely observed the typhoid forms of it which prevailed in Germany and France soon after the late war; and had seen and treated it as it presented itself in various parts of Great Britain since the year 1810. I state this, in order to show that whatever opinions are here offered, similar to those contained in works which have appeared subsequently to 1821 and 1822, are certainly at least not derived from them.

common than the other inflammatory appearances, in no way supports this doctrine of fever, inasmuch as it may be present to the extent observed in most instances of fever, without causing much disturbance, or it may supervene shortly before death, or even immediately after dissolution. But readily granting its existence even early in the disease, it is merely one of several changes consequent upon others much more important, as will appear in the sequel (§ 92.).—*g*. Those who believe in the inflammatory origin of fever do not agree respecting the particular viscus which is its especial seat; some assigning one organ, others another: the diversified complications, or predominance of morbid action in one viscus, or even in several, over others, in different cases and epidemics (*e*), furnishing them with the only arguments they can assign in favour of their opinions. — *h*. The changes supervening in the blood, in the secretions, and in the general organisation, during the progress of fever, cannot be explained by, or reconciled with, its origin in local inflammation. — *i*. The appearances considered inflammatory, and to which this class of pathologists refer in support of their doctrine, most frequently take place in the progress of fever, and seldom at its commencement, as shown by a careful observation of the symptoms. — *k*. The tendency to a favourable termination, and to natural crises, is much more remarkable in *fevers*, than in *inflammations*. — *l*. The general characters of fevers vary remarkably in different epidemics and epidemic constitutions, — a circumstance not remarked in respect of inflammations, or in a much slighter degree, — and lastly, the *juvantia* and *lædentia*, in both respectively, indicate a great difference between them. The extent to which depletions can be carried in both, and the frequent benefit derived from very opposite measures in the former, and which are injurious in the latter, are also no mean proof; for although vascular depletions are often requisite to control the local determinations or even inflammations which supervene in the course of, or early in, fevers, yet they cannot, owing to the state of vital power, be carried so far as in pure inflammations; and, although evacuations are most necessary in some epidemics, and tonics or stimulants injurious, still the former cannot be practised to the same extent, at least in this climate, as in the phlegmasiæ; whilst in epidemics of an opposite character, bleeding is often injurious, and opposite means are required, — a circumstance not observed respecting inflammation.

92. *B*. Certain of the arguments now urged are equally applicable to *the doctrine of congestion*, or *irregular distribution of the blood*. — *a*. The espousers of this opinion do not agree among themselves as to the chief seat of congestion; but granting that it very frequently, or even generally, exists at some period of the disease, especially in the large vessels adjoining the heart, it is only one link of the chain of morbid causation and action, itself being caused and attended by, as well as inducing, other changes equally important. Besides, those instances which occasionally occur of remarkably great congestion of the large vessels of internal viscera, as from asphyxy, &c., are not followed by the phenomena of idiopathic fever; and although, as I shall have to show hereafter, many of the worst forms of fever are attended by congestion as one only of the various changes that characterise them, yet others of a slight kind, as ague, are accompanied with still more remarkable congestion during the cold stage of each paroxysm, without further mischief than the subsequent reaction which it aids in developing. — *b*. When congestion becomes considerable, it is referrible to the noxious influence of the exciting causes exerted primarily upon the organic or ganglial nervous system, and consecutively upon the vascular system; the action of the heart being thereby weakened, and the tone and resiliency of the vessels impaired; and hence, when the morbid impression on the former is very intense, the effects produced upon the latter are also severe, congestion being only one of these effects. — When, in consequence of the persistence of the morbid impression, or change primarily produced in the ganglial nervous system, the effects upon the heart and vessels continue, the resulting congestions, with the other concomitant lesions, either cannot be removed, or are removed with difficulty; the heart being rendered unable to exert a due reaction in order to overcome them; the vessels being incapable of that degree of tonic resistance necessary to a healthy circulation and a regular distribution of blood; and the capillaries being impaired in all their functions, owing to the state of nervous power influencing them, and of the circulation in them. Thus congestion is established as one of the more evident lesions that follow the primary changes in fever, — but only as one of subordinate importance.

93. *C*. To the doctrine that imputes fever to *the direct contamination of the circulating fluid by the material cause*, the following objections may be urged: — *a*. The febrile cause, acting as a poison, should instantly affect the appearance of the blood if it made its first and principal attack in this way; but, when the cause is energetic, the effects, instead of progressively and gradually appearing, as they necessarily would do in this case, instantly manifest themselves in the functions of the nervous systems, more especially of the organic nervous system, and in the functions of the organs actuated by it. I shall, however, have hereafter to show, that the blood is the next animal constituent that becomes affected, although frequently in no very manifest manner, at first, especially when disease slowly developes itself upon the exciting causes. — It should not be overlooked, in our researches on this subject, that agents which especially affect or depress the organic nervous influence, produce also co-ordinate effects upon the vascular system and on the blood itself, owing to the intimate connection subsisting between these two systems. — *b*. In cases where the morbid impression has been already made, either by malaria, or by infectious effluvia, the full developement of the disease may be prevented during the first or second stage, by substances which produce a powerful restorative or tonic action on the nervous systems, particularly that of organic life, — an effect that could not result if the blood were the primary or principal seat of the disease. A powerful stimulant or tonic will instantly cut short an ague, even when given at the commencement of the cold stage, — an effect that would vainly be looked for, if its chief seat were in the blood. — *c*. The phenomena and progress of

those diseases, as scurvy and purpura hæmorrhagica, in which the blood is especially altered, furnish analogous indications that it is not the primary nor sole seat of fever, but that it is merely secondarily affected, to an extent varying remarkably in different fevers and epidemics; and that the change in this constituent is only a part of the general state of disease — is only one of the many lesions forming idiopathic fever. — *d.* The abatement of fever after crises has been considered as evidence of the primary affection of the blood. Granting that morbid matters carried into the circulation, or generated in it from a morbid seminium, are eliminated from it in the form of crises, or by less manifest evacuations, still this is no proof that the blood is primarily or chiefly changed; but merely that it is one of the animal constituents affected, more particularly in certain forms of fever, as the eruptive and infectious; for we often observe critical discharges occurring without any permanent benefit, as in remittents; and recovery taking place in others without any crises. Whilst, therefore, a numerous class of fevers, especially the periodic and simple continued, present little or no evidence of contamination of the blood in their course, unless they change their characters and become complicated, a different class, as the adynamic and malignant, presents as little evidence of this change at their commencement; the vitiation of the circulating current appearing either consecutively upon the morbid impression made upon the nervous system of organic life, or nearly contemporaneously with this impression, and in a less manifest degree, although progressively advancing, owing to the affection of this particular system, and its influence upon the circulation. But the arguments which are about to be offered in support of my views as to the primary lesions in fever, will more clearly show in how far the blood is concerned in causing many of the phenomena of fever in its more severe forms.

94. *D.* The doctrine that *the causes of fever first affect the cerebro-spinal nervous system* is invalidated by the following considerations: — *a.* This system either does not send nerves, or it supplies but few nerves, and those often indirectly, to the organs especially or essentially affected in idiopathic fevers, as the heart, blood-vessels, secreting viscera, lungs, &c. — *b.* That the chief avenues to this system open to the invasion of the exciting causes, are the organs of sense and the cutaneous surface. Of these, the sense of smell is the principal. Although this sense is evidently impressed by several of these causes, when acting intensely, and admitting that the brain is somewhat affected in consequence, still the effect produced in this quarter seems inadequate to explain the chief, and far less the whole, of the early phenomena. — *c.* In some instances, the intense operation of the effluvia generating fever, has produced its effects almost instantly, and even caused death itself with equal rapidity, — a result, which the total annihilation of the cerebral functions could not produce; but which would necessarily follow the interruption or suppression of the influence transmitted to the heart and lungs by the nervous system of organic life. — *d.* The generation of fever within the body itself cannot be explained upon the supposition that the cerebro-spinal nervous system is primarily and solely, or even chiefly, concerned in the production of the disease; but may be readily solved by means of the nervous system of organic life, if we take into consideration its functions and structural relations, especially with the vascular system, the circulating fluids, and the excreting viscera. (See DISEASE, § 65.) — *d.* The early lesions, whether of function or of organisation, characterising the first as well as the advanced periods of fever, cannot be accounted for by assigning the cerebro-spinal nervous system as the primary seat of the disease; for, — 1st. As this system cannot influence the action of the heart and the state of the vessels, excepting through the medium of the organic nervous system, and thus only to a very limited extent, changes in it do not explain the alterations of vascular action, and still less the vitiation of the blood; — 2dly. As it does not control animal heat, so it cannot induce those remarkable extremes and morbid states of temperature distinguishing the malady; — 3dly. As it does not supply, nor materially influence, secreting surfaces and glands, so it cannot give rise to those early changes of function which they present, nor to those lesions of structure which they often subsequently experience; — 4thly. As it does not materially affect the actions of assimilation and nutrition, so it cannot occasion the remarkable changes they present in fevers; — and, 5thly. As it does not present aberrations of function, in the slighter and simpler states of fever, equal in degree to those manifested by the viscera chiefly supplied by the nerves of organic life; and as, when such aberrations supervene in a remarkable manner, they are generally consequent upon those of the organic nervous and vascular systems and of the blood itself, so the primary impression made upon it must be much less energetic than is supposed by those who support the present doctrine; although I may grant that it partakes, in some measure, or in some forms of fever, of the morbid impression especially and principally made upon the nervous system of organic life, and extended to the organs which it actuates.

95. *E.* *That the efficient agents of fever act primarily and chiefly upon the organic or ganglionic nervous system*, is evident from what has been now adduced; and is further proved by the following facts and inferences: — *a.* The intimate connection of this system with the organs of circulation, respiration, assimilation, and secretion, on the one hand, and with the cerebro-spinal nervous system on the other, and the influence exerted by it over their functions in health, are sufficient to show, that morbid impressions made upon it must necessarily affect all the organs and parts, with which it is related. — *b.* The functions primarily disordered in fever, and chiefly affected in its course, are precisely those which are especially subjected to the influence of this system. As we cannot, consistently with our knowledge of the animal actions in health and in disease, infer that a grave and permanent disorder of any one function can exist, unless either the influence that actuates it is impaired, excited, or otherwise altered; or the structure of the organ, which is the instrument of the function, is more or less affected; we are necessarily led to inquire as to which of these sources the disorder is to be imputed. Having inferred from the nature and extent of the disorder, from

the causes in which it arose, and the suddenness and manner of its occurrence, as well as from various other circumstances, that it does not consist of lesion of structure, we are therefore compelled to adopt the former alternative, and, from the kind of disorder, to infer the manner in which the influence actuating the organ is affected. Thus, observing that respiration, circulation, secretion, and animal heat are primarily and especially disordered at the commencement of fever, and that various other morbid phenomena are consequently produced, and finding no structural or local change to account for the affection, we refer it to the state of the influence which actuates these functions. Anatomical and physiological evidence concur in showing that the nervous system of organic life is chiefly concerned in the production of those functions; and therefore it may be inferred that this system is first impressed by the causes of the disease.

96. But it is not merely requisite to shew the particular system first affected, but also to ascertain, as nearly as possible, the *nature* of the affection. This, however, can be only a matter of inference from the kind of disorder manifested in the functions especially subjected to the influence of this system. What, therefore, is the general character of the disorder which these functions first evince? — 1st, The respiratory actions are inadequately performed, volition being often exerted in order fully to dilate the lungs, and the changes in the blood are imperfectly produced;—2dly, The action of the heart is weakened, and the tone of the pulmonary vessels lowered, so that the circulation is languid, irregular, &c., and congestion supervenes; — 3dly, Secretion and excretion are impeded or interrupted, animal temperature diminished, and all the functions indicate at first depression or suppression of the organic nervous influence. There is, however, reason to suppose that this influence may not only be *depressed*, but that it may be otherwise *altered*, according to the cause which affects it, particularly by specific infectious miasms. It is chiefly to this circumstance, that the opinions of JACKSON, FRANK, HILDENBRAND, and others, respecting the irritation excited by the material cause of fever, is to be imputed. Whether the alteration in question be called an irritation, or any thing else, is immaterial, if the term adopted convey any idea of what the change is, in most of the circumstances in which it occurs. But if by this irritation be meant a form of excitement, the term is applicable only to the state of vascular action often consequent upon, and attended by, the alteration of nervous influence, and not to the state of the influence itself. The whole that we know of the matter, from observation of the earliest phenomena, is, that the change evinces diminished power or influence of the system of nerves actuating the organic functions, and very frequently an otherwise altered or morbid state of this influence which cannot well be described, but which is variously modified in different fevers, and is generally attended by depression; these conditions still continuing in diverse grades, although vascular reaction supervenes, which, when it becomes excessive, increases them, and, in consequence, hastens on disorganisation. From this it will appear, that the exciting causes of fever first depress or otherwise alter, or both depress and alter, the healthy influence exerted by the nervous system of organic life. That they primarily irritate or excite this system does not appear from the phenomena, unless either of these states associates itself with some other morbid condition which deflects it from its usual forms; but of this we have little proof, unless it be found in the stage of reaction. This much, however, is apparent, — that certain causes seem to depress the organic nervous influence more than others; and that some alter it more from the merely dynamic states, and impress it with a specifically morbid character.

97. But, whilst disorder of this influence is thus considered the chief and primary constituent of the morbid impression made by the causes of fever upon the economy, it may be asked, Is the impression entirely limited to this quarter? or are the cerebro-spinal influence, and the circulating fluid itself, also partially and primarily affected? — 1st, As to the former of these, it may be inferred, from a consideration of the circumstance of the nerves of one of our senses being extended over the upper part of the respiratory passage — the entrance to a most important and vital organ — in order to convey, by their reports, intimations of the presence of such gases or vapours, as, if received into the lungs, would prove injurious, that the more intense causes will act in some measure upon the brain, although in a comparatively slight and evanescent manner. The lungs evidently digest the air received into them, as much as the stomach digests the food; and the entrances into both organs are guarded by two sentinels — the senses of smell and taste — taking cognizance of whatever passes into them. But in cases where injurious effects follow the ingestion of hurtful matters, is it in the stomach or in the nerves of taste that the morbid impression is to be looked for? and if it be in the former, and not in the latter, that they are to be found, no more should we infer, as heretofore, that the morbid change is first produced on the brain, and not on the nerves of the lungs, when noxious effects follow the respiration of a tainted or infectious air — recollecting always, that respiration does not mean simply the passage of air into and out of the lungs, but the actual digestion of this air by them, the important changes excited by its constituents upon the blood and upon the organic nervous influence, and those effected by this influence upon the blood, and upon the air received into the organ.

98. From various considerations and researches into the subject, in different climates, I infer, that, although the more intense causes may affect the brain, and thereby heighten and accelerate the effects upon the heart and stomach arising from the impression made upon the organic nervous system, yet their action in this quarter is evanescent; and, as I have shown (§ 94.), insufficient to explain the phenomena. Judging from my own sensations on having inspired an air so loaded with infectious effluvia as to be remarkably offensive to the smell, the morbid impression was first sensibly felt in the lungs themselves; numbness, weight, or oppression in the chest, was instantly felt; frequent forcible inspirations were made, and continued for long afterwards to be made, in order fully to dilate the lungs, which felt as if they were partially deprived of their resiliency; the pulse became weak, and the animal tem-

perature was lowered; but the functions of the brain were not impaired. In this case, the lungs were certainly the first organ affected, and almost instantly afterwards the action of the heart and the functions of the stomach. Instances, moreover, are not infrequent, in which the febrile cause has made its impression, and the patient has been removed from every chance of having that impression renewed; and it has not, until the end of weeks, and even months, given rise to its specific effects. In this case, is the cerebro-spinal system, or the nerves of organic life, or the blood, affected, and the seat of the latent, or almost latent impression? I have observed the phenomena occurring during this period, in cases of rabies, of small-pox, of measles, of scarlatina, of typhus, and of marsh or periodic fevers; and in every instance they have not indicated any affection of the cerebro-spinal system, but disorder more especially of the functions depending upon the nervous system of organic life. This period, moreover, is frequently shortened or prolonged; the symptoms attending it, diminished or aggravated; and the impending malady even prevented, by means which act more especially upon the latter system. Hence the importance of this inquiry; for by arriving at just conclusions as to the constituent part of the economy first affected, and the mode in which it is affected, we are the more enabled to guard against fever, or even to remove the morbid impression after it has been made, and before it has developed itself into open disease.

99. The opinion that the morbific causes even partially operate by first inducing changes in the blood, cannot be reconciled with the arguments already stated, and with others which may be offered, although there are circumstances which seem to favour it, the most forcible of which is the propagation of certain diseases by means of a virus, and the long period a virus or morbific miasm often takes to incubate or produce its full effects. But if we look closely into these very circumstances, we shall find that they are not so conclusive of the opinion they are adduced to support as is supposed; for in the case of an inoculated virus — the most favourable to the doctrine of primary contamination of the blood, — the consequent infection will be hastened by whatever depresses, and retarded by whatever exalts without exhausting, organic nervous power; it will be accelerated by the usual concurring and determining causes, as a close, foul, moist air, by cold, by excesses of any kind, and by despondency; and it will be retarded or even prevented by a dry and pure air, by the use of tonics, or what communicates power and increases vital resistance to the invasion of a noxious cause. The phenomena, also, observed between the application of the cause — whether a contagious virus, an infectious miasm, or an emanation from the soil — and the explosion of the malady, however prolonged the intervening period may be, cannot be referred to any alteration of the circulating fluids, that may not be shown to be entirely dependent simply upon the existing state of organic nervous or vital power. In rabies, in which the longest formative or incubating stage is observed, symptoms referrible to the organic nervous system are the first to appear, and the functions depending upon this system are those which especially languish during this period. The same is observed in agues, and in the specific infectious maladies. But even granting that a portion of the animal miasms passes into the blood, and vitiates it, the morbid impression is not the less made by them on the nerves of the organ, and not the less unproductive of the principal part of the phenomena more immediately supervening. But this topic is more fully illustrated in the article INFECTION.

100. In order to show what appears to be the common procession of phenomena consequent upon the impression of the exciting causes, I shall presume that a person in health, with no particular organ especially predisposed to disease, is exposed either to infection by the effluvium from a patient in typhus, or to the operation of marsh exhalations. In these cases the exciting causes, floating in the air, are received into the lungs, and, if they be concentrated or energetic, they slightly, although they may sensibly, affect the organ of smell in their passage. But their chief action is exerted upon the nerves of the lungs themselves. It may even be admitted that they also partially affect the blood during the digestion of the air which is their vehicle by the lungs: of this, however, we have no satisfactory proof; and as their direct operation on the nervous influence of this organ is sufficient to produce all the phenomena, it is unnecessary to assign an additional agency to explain them. The morbid impression having been thus principally made in this quarter, it is necessarily extended to those organs which are chiefly supplied with the same system of nerves; and thus the lungs, the heart, and blood-vessels, the digestive organs, and the secreting and assimilating functions, almost immediately experience the effects. As respects the lungs, their vital resiliency is somewhat impaired; hence, the frequent and forced inspirations; and the changes effected by the air upon the blood, which, although chemical, are partly also vital or influenced by the organic nervous power of the organ, are more or less impeded. This latter fact I endeavoured to put to the test of experiment. In a paper written at the commencement of 1815, I had endeavoured to prove that many of the phenomena of fever were referrible to diminution of the changes produced in the blood by respiration; and in 1817, when engaged in ascertaining the alterations effected in the respired air, under various circumstances, I found, in two cases of ague and in one case of remittent, just before the cold stage of the former, and near the first accession of the latter, that the changes in the respired air were diminished from one fourth to one third their usual amount. These experiments were too few, and not sufficiently varied, but they serve to illustrate the subject.

101. The effect, then, of the morbid impression on the organic nervous influence of the lungs being to diminish the changes caused by respiration on the blood, and to render the pulmonary circulation more languid, one source of the alterations observed in this fluid in the early stages of fever is made manifest. These alterations, at this period, seldom extend beyond a darker or more venous appearance of the blood than usual, the crassamentum being often soft and imperfectly separated from the serum. Almost contemporaneously with the effect upon the lungs, the

action of the heart and the tone of the vascular system generally, become diminished. Hence the increasing languor of the circulation, the internal congestions, and the deficient secretion and excretion; these last, however, depending as much upon the state of organic nervous influence as upon the circulation in the secreting organs. The congestions of the large vessels, and the changes in the quantity and quality of the blood, consequent upon deficient secretion and excretion of its watery and noxious constituents, having reached a certain pitch, bring about vascular reaction, if the organic nervous or vital influence be not too far reduced, or otherwise altered, by the exciting causes; but when the morbid impression has been very intense, and the more immediate changes very great, reaction either takes place imperfectly, or does not supervene at all in extreme cases, vital power being insufficient to develop increased vascular action. Such appears to be so far the progress of the phenomena, as respects the organic functions. The cerebro-spinal manifestations are also early affected — in a slight and passing manner by the impression made by the noxious effluvia on the nerves of smell; but much more seriously by the influence exerted by the organic nervous system upon the brain and spinal cord, or extended from the former to the latter, and consecutively by the changes in the states of vascular action and of the blood.

102. *F. Consecutive Pathological States.*—When reaction thus supervenes upon either of the specific causes mentioned above (§ 100.), it may be variously modified according to the association of various grades of increased vascular action and of diminished or otherwise altered nervous or vital power, and to the local determinations or complications attending it. When, in consequence of the nature and intensity of the causes, relatively to organic nervous energy, the former do not depress the latter beyond the power of reaction, whereby the morbid impression is effaced, and the effects upon the different organs and on the blood are removed, the more sthenic forms of fever take place, vascular action is high, and nervous or vital power not greatly impaired. But when the nature and intensity of the causes are such, in relation to vital power, as greatly to depress or otherwise change it, the more adynamic forms are produced, and vascular reaction is much less energetic, the depressed state of vital power being a prominent and increasing feature throughout the disease. In some of the latter forms, vascular action becomes either excessive or tumultuous relatively to the state of nervous or vital power, owing to the effects produced by the secondary changes in the blood, upon the heart and blood-vessels, and on the organic nervous system, and rapidly exhausts itself, or passes into disorganisation; and in others reaction does not supervene, the tone of the vessels being progressively diminished, and the blood with the soft solids more and more changed. Hence result, in the last stages, discolouration, softness, flaccidity, lessened vital cohesion, and infiltration of membranous and parenchymatous tissues, with effusions of fluids from mucous and serous surfaces.

103. *G. Local determinations and complications* attend fever from an early period, or appear at any time during its course, or even at its decline; owing to the circumstances influencing its terminations (§ 47.), but especially to the following: — 1st. To pre-existing functional or structural lesion of an organ or tissue; — 2d. To the predisposing and concurring causes; — 3d. To the nature and intensity of exciting and specific causes; — 4th. To the character of the epidemic; — 5th. To various determining or consecutive influences; — 6th. To the effects of reaction upon certain viscera; — 7th. To interrupted excretion; — 8th. To the morbid states of the circulating fluids exciting disease, quickly passing into disorganisation; — and, 9th. To injudicious treatment.

104. *a. Pre-existing disease of a part*, especially when seated in the alimentary canal, brain, or lungs, aggravates fever and gives it a modified form. A loaded or congested state of the liver, also, in respect either of its vascular system or of its biliary ducts, often disposes to fevers, and imparts to them a bilious or gastric character. Various lesions observed after fever, and sometimes imputed to it, have existed previously, or have been merely aggravated by it, particularly those seen in the pleura and in the liver, and some of those found within the cranium.

105. *b.* The *predisposition* arising from the use of unwholesome water and food especially favour the low types of the disease, with lesions of the mucous follicles and membrane, which can hardly be said to be inflammatory, and contamination of the blood; that from excessive mental exertion or anxiety, increased affection of the brain; and that from gross living and intemperance, complications with disease of the liver, stomach, and bowels. The *concurring, determining*, and *consecutive agencies* not merely develop the action of specific causes, as shown in the article DISEASE (§ 61.), but they also complicate the fever produced. Thus cold both aids the operation of other causes, and occasions increased pulmonary disorder; and the influences of season, weather, climate, confined air, &c. cause aggravated affections of the intestines, or of the liver, of the brain, of the respiratory passages, or of the circulating fluids.

106. *c. The nature and intensity of the chief or specific causes* often determine the complication.— Malaria most frequently causes congestion of the liver and spleen; the emanations from persons affected by low fevers, aggravated affections of the digestive canal, of the brain, and often also of the lungs; and the exanthematous effluvia, their specific eruptions, and disease of digestive mucous surface and pulmonary organs; these local aggravations of the malady appearing chiefly where the causes have acted most intensely relatively to the state of vital power and predisposition, or have been added by concurring influences. The complications in fevers produced by the former of these causes are the least severe, and those arising from infection the most dangerous, owing to the states of vascular action, of vital power, and of the circulating fluids generally accompanying them; the first of these states being often excessive, or of an unfavourable kind; the second depressed or otherwise altered; and the third more or less changed from its natural condition, or even contaminated.

107. *d.* The complications are different in re-

spect of their seat, nature, and severity, and the states of local action, of vital power, and of the circulating and secreted fluids, in *different epidemics*, often independently of season, climate, weather, and locality, although these have much influence in many that are limited in their diffusion. Consequently, the complications are much more prone to pass into disorganisation in one epidemic than in another; but those occurring in the epidemics of warm countries are more uniform in their character and seat than those observed in the epidemics of temperate countries. It is chiefly upon a close observation of all the circumstances connected with their complications, that a successful treatment of epidemic fevers depends.

108. *e. Reaction* or *vascular excitement* occasions local determinations and complications, which generally present more or less of an inflammatory character; the brain, alimentary canal, the liver, or lungs, most frequently being the seat of the predominant affection, and evincing the effects of it after death. If, however, vascular action far exceed vital power, the superinduced local affection seldom presents many of the truly inflammatory characters, as shown above (§ 50.), and it often rapidly passes into disorganisation, or gives rise to sanguineous, serous or sanious effusions, but very rarely to the effusion of lymph or of albuminous fluids, unless in the most sthenic state of the disease.

109. *f. Interrupted excretion* induces complications frequently at far advanced periods of fever, especially implicating the bowels, the liver, and brain. They are generally of a most severe, although often insidious form, owing to their association with depressed or exhausted states of the constitutional powers; these states having been more or less concerned in causing the imperfect excretions, and with alterations in the blood, which the latter has contributed to produce; and they often quickly pass into structural lesions, not so much from the inflammatory or increased vascular action which attends them, as from the septic and contaminating effects of the retained excrementitial matters upon the tissues, and from their depressing influence on the nerves of the part.

110. *g. Morbid states of the blood* induce the most dangerous complications, and, like the preceding, most frequently at advanced periods of the disease, the mucous membranes, PEYER's and BRUNNER's glands, the brain, and the lungs, being the parts chiefly affected. As the changes in the blood are chiefly caused and attended by a depressed or altered state of organic nervous power, the local affections caused by them, whether they be characterised by increased vascular action or by simple congestion, generally pass quickly into structural lesions, especially of the mucous membranes, or give rise to effusions of a sanguineous, foul, dark, or sanious fluid, either from these membranes or from serous surfaces.

111. *h. Injudicious regimen and treatment* are much more frequent causes of aggravated local lesions in fever than is supposed. External heat or cold inappropriately employed; the improper use of stimulants and tonics; the neglect of suitable evacuations early in the disease; and the use of acrid or irritating purgatives; frequently occasion or heighten predominant affections of the intestinal mucous surface, of the liver, and of the brain. Excessive doses, or the prolonged and inappropriate exhibition, of antimonials, especially tartar emetic, in the manner often resorted to in Italy, have evidently caused serious irritation and ulceration of the mucous membrane of the stomach and bowels, without producing either sickness or vomiting after its first operation in this way. The too early and free use of bark, or of quinine, in periodic fevers, or before morbid secretions have been evacuated, and congestions of the liver removed, has often induced serious inflammation and structural change in the liver.

112. *i.* It must be evident from the foregoing that the predominant affections or complications of fever must vary, not merely in their seat, but also in their intimate nature, in its different types and forms; the low and adynamic states being attended by those which are the least inflammatory, the most imperfectly indicated by the symptoms, and the most prone to pass quickly into disorganisation; this event, indeed, often being the first indication of their existence. It requires, therefore, a close scrutiny of the various functions to detect them, especially when they are seated in the *intestinal canal* and *lungs*. Although the complications in *the former* of these situations may be indicated by tenderness on deep pressure, by distension or fulness of the abdomen, and by the appearance of the evacuations, yet they may be present, nevertheless, without any such signs, even the stools evincing no very material disorder. When the stools are copious without any amendment, and particularly if they continue so, the pulse being weak, soft, and very frequent, and the skin harsh, lurid, or discoloured, we should dread the presence of disease of the digestive mucous surface and follicular glands; and if these symptoms be attended by flatulent distension of the abdomen, and by blood in the evacuations, this complication most probably exists. The complication with disease of the *substance of the liver* is often equally obscure in the adynamic varieties, more especially when the brain is much affected; for, although fulness and tenderness in the region of the organ, or a rising of this viscus high into the right thorax, as detected upon percussion, may sometimes be present, yet serious lesions may supervene without any of these indications being observed.

113. *k.* Most serious *disease and even disorganisation may affect the lungs*, particularly in the low forms of fever, without cough or pain being complained of. This organ, therefore, should receive due attention, and its state be inquired into by percussion and auscultation, which will very often detect bronchial affection, and hepatisation or infiltration of it, although these lesions may be either imperfectly or not at all indicated by the usual symptoms. When the pulse is very soft and weak; the lips, tongue, and skin are dark, lurid, or livid; the delirium is low or muttering; and the respiration is hurried and laboured; the changes effected on the blood in the lungs are evidently impeded, and the cause exists either in depressed nervous influence, or in more palpable disease of the respiratory apparatus, or even in both; for the latter is often the indirect consequence of the former. In the low forms of fever, the changes that supervene

in the bronchial surface, or in the substance of the lungs, as well as those that take place in the alimentary canal, possess but little of the truly inflammatory character, excepting capillary injection sometimes with infiltration of a sanguineous serum into the adjoining tissues, or with effusion of a similar fluid from the injected surfaces.

114. *l. Predominant cerebral affection* less frequently amounts to actual disease, or passes into disorganisation, in fevers, than has been very generally supposed; the disorder most commonly existing in this quarter, in low fevers especially, being more functional than structural—depending more upon the state of organic nervous influence in the organ, than upon inflammatory or other lesions. The effusions and congestions observed in fatal cases, are probably in great measure *post mortem* changes; and, even granting their existence during life, they are often insufficient to account for the symptoms referrible to this part. Whatever the alterations existing within the cranium may be, there can be no doubt that, when the affection of the brain is very predominant, lesions in other situations are very seldom complained of, and with difficulty detected. The above complications, as well as others casually alluded to, will be more fully elucidated, when the particular species of fever come under consideration.

115. *m.* It is evident, from what has been stated respecting the pathology of fever, that a most scrupulous and minute inquiry into the states of organic nervous or vital power, evinced in all the functions, and of vascular action and tone—into the evidence of local congestions, or predominant visceral affection — into the existing functions and lesions of individual organs — and into the conditions and appearances of the secreted and excreted fluids, of the blood, and of the solids — should furnish the basis of our curative intentions, and direct the choice of individual means. Nor ought it to be overlooked, that the mutability of fever is so remarkable, that the pathological states actually existing at the time of investigation, may change their characters and even their nature, in an hour or two afterwards; that each successive stage is very different in the grouping of the phenomena, and in the conditions of vascular action and vital power, from that which preceded it; that serious complications or predominant affections may suddenly arise and become almost irremediable in a very short time; and, consequently, that the treatment devised should be promptly administered; and prescribed either with reference to the usual successions of morbid states, or merely for a period, in which no very important change is likely to take place.

116. X. GENERAL TREATMENT.—The treatment of fevers is *prophylactic* and *curative*. The former has been little attended to by writers, and but imperfectly understood; and the latter has too frequently been directed, without due attention to pathological states, and often with an imperfect knowledge of their seat and nature. Before a general view of the curative treatment of fevers is exhibited, a few remarks on their prevention will be necessary.

117. i. PROPHYLACTIC MEANS. — The prevention of fever should have reference — 1st, to the avoidance of its causes, and the seclusion of those suffering infectious forms of it; — 2dly, to means which may destroy or dilute its more specific agents, and counteract their operation; — 3dly, to measures calculated to fortify the frame against the impression made by them; — 4thly, to means which may prevent the development of disease after the impression has been made; — and, 5thly, to a treatment calculated to arrest its further progress at a period when arrest is still within the reach of art. The *first*, *second*, and *third* of these are so fully insisted upon in the articles ENDEMIC INFLUENCE (§ 20.) and INFECTION, that little further need here be advanced respecting them; the remarks offered under these heads having especial reference to *periodic* and *infectious fevers* respectively.

118. *A. Measures calculated to fortify the frame against the impression of the exciting causes of fever* often succeed in preventing it, especially when these causes are of casual occurrence and of short continuance, or when their presence is known or suspected, and their nature tolerably understood. But in epidemics, particularly those which are pestilential, where these conditions do not obtain, means of this description generally fail, their causes being more generally diffused, and in almost continual operation. The measures resorted to, in order to resist the causes of fevers, should have reference to the habits and circumstances of the individual, to his constitutional powers, and his habit of body. All the predisposing causes should be carefully avoided. Vascular plethora ought therefore to be reduced, and vital power and resistance promoted where it is lowered. High irritability, vascular fulness, and rigidity of fibre, seem to predispose to several pestilential epidemics, especially to yellow fever; and, although these states will often resist for a long time the operation of marsh exhalations, particularly in temperate countries, yet such is not generally the case as respects persons migrating from cold to hot climates; for they commonly experience, in consequence of these states, much more violent attacks of fever than those who have been seasoned to the country; the fever in them often evincing inordinate excitement and re-action, and consequently assuming characters which have caused it to be confounded with the true or epidemic yellow fever. The most efficient resistance to the action of the causes of fever, is afforded by a due performance of all the organic and mental functions. Hence, whatever over-excites or depresses them will be injurious. Confidence, continued mental occupation, and moderate excitement, are especially efficacious in resisting the causes of most fevers. There is a moral courage sometimes possessed by persons, the weakest perhaps in respect of physical power, that enables them to resist infectious and epidemic influences, more successfully than the most robust, who are not thus mentally endowed.

119. The quarter in which the most active causes of fever invade the system should not be overlooked, for the casual or temporary operation of infectious effluvia, when their presence is anticipated, may be easily and certainly guarded against by the use of the aromatic spirit of vinegar, or by keeping a small piece of camphor in the mouth. When terrestrial emanations are present, care should be taken not to be exposed to the morning or night air, especially with an empty stomach, as they are then most concentrated; nor

to sleep in apartments upon or near to the ground floor, for the body is most susceptible of their influence on these occasions. When such precautions cannot be used, a cup of coffee should be taken before going abroad, and a pill with two or three grains of quinine and one or two of camphor at bedtime; but these means are of most benefit in cases of short residence in unhealthy localities, for which occasions I have directed the following pills with success.

No. 220. ℞ Camphoræ rasæ ℈j.; Quininæ Sulphatis ʒss.; Pilul. Galban. Comp. ʒj.; Pulv. Capsici gr. xvj.; Balsam. Canadensis, q. s. M. Fiant Pilulæ xxxvi., quarum capiat duas vel tres hora somni.

120. The system should not be stimulated by wines or spirits, unless better means are not within reach, and even then these should be used in very moderate quantity, otherwise exhaustion and its attendant predisposition will result from them. The same objection is applicable to cigar smoking; care ought also to be taken not to inhale the breath, or the effluvium proceeding from under the bed-clothes, or from the evacuations of persons in continued fevers, whatever means of resistance may be employed; but more especially with an empty stomach, or in states of debility or exhaustion, should this precaution be observed. During the prevalence of epidemics, of which infection is one of the chief elements, or causes of diffusion, strict seclusion can alone be depended upon. Still, other means should not be neglected. It has been supposed, that external irritation, or the discharge from an issue or seton, will prevent an attack of epidemic or pestilential fever; and cases have occurred to countenance the opinion, but they are not sufficiently conclusive. Upon the whole, a due regulation of the digestive, the secreting, and the excreting functions; avoidance of all causes of physical and moral depression; and a proper recourse to the additional means recommended to *prevent* Infection, in that article, are most to be depended upon.

121. *B. After the morbid impression has been made, the development of fever* may often be prevented, if the patient no longer remain subjected to the operation of the exciting causes. We have seen that disease is frequently many days in forming, the system manifesting slight disorder only during the time (§ 34.). The object on such occasions should be to enable the frame to maintain a successful struggle against the impression that has been made, and its more immediate effects. With this view, all the causes enumerated in the article Disease, under the name of *determining or consecutive* (§ 61.), should be carefully avoided, especially exposure to cold, to wet, and moisture; the use of cold fluids, and of cold, indigestible substances; excesses of every kind, and the common causes of physical and mental depression; and the patient ought to remove to a pure, dry, and open air. *Tonics* ought at the same time to be employed, especially such as determine the circulation to the external surface, improve the tone of the digestive organs, and promote the secretions and excretions, particularly those of the bowels and liver. When the actions of the bowels require aid, cold and debilitating aperients should not be prescribed. Warm and *stomachic purgatives* or laxatives, or these combined with tonics, are the most appropriate. When the impression has been energetic, and made by infectious effluvia, an immediate recourse to *stimuli*, especially *camphor*, *ammonia*, aromatic spirits, spirits of nitric æther in tea, &c.; or, if these be not at hand, to warm wine whey, or brandy and water, will generally prevent any ill effects. The *diet* should be regular, moderate, nutritious, and easy of digestion; the stomach having nothing to do that it cannot perfectly accomplish. If these be found insufficient, a *warm bath*, followed by active *friction* of the surface; and, if reaction have not supervened, *warm diaphoretics* may be directed. If the patient still continue to complain of the symptoms of the formative stage, an *emetic*, with aromatic adjuncts (see F. 198. 402.), should be exhibited, and repeated until it fully operates; after which the diaphoretics may be repeated, or a moderate dose of *calomel*, with five or six grains of *camphor*, and one or two of *opium*, may be given, which should be followed, in a few hours, by an active stomachic cathartic (F. 181. 216. 266.). These means have been employed by me in several instances during the formative stage of fevers, with perfect success. But in cases where we suspect inflammatory irritation to have commenced in the alimentary canal, and during the prevalence of epidemics characterised by this complication, emetics, particularly those containing tartarised antimony and acrid purgatives, should be withheld, and the other means be resorted to, especially the *warm bath*, to which stimulating substances may be added, and frictions of the surface. Internal irritants of the digestive mucous membrane should be also abstained from in the formative stage of the exanthemata, for in them this membrane is generally irritable and injected; and it readily becomes inflamed upon the ingestion of stimulating and acrid matters; the healthy development of the eruption being thereby prevented. It is chiefly in robust constitutions, and after the operation of other causes than infection, that severe shocks, by active emetics or cathartics, are best borne; whilst the other remedies, especially camphor, calomel, and opium, warm diaphoretics and diluents, tonics with camphor and ammonia, external derivatives, and warm, mild, but efficacious purgatives, are most suitable when the morbid impression has been made by infectious emanations. This treatment may not succeed in arresting the fever, but it will seldom fail of shortening the premonitory stage, and rendering the subsequent disease more mild or of shorter duration; for it frequently is observed that, when the formative period is allowed to continue, and to develop the series of changes to which it leads when left to itself, the consequent disease assumes a very severe or dangerous form.

122. *C. The arrest of fever may be also successfully attempted*, during the stage of invasion (§ 35.), or up to the commencement of vascular reaction, or excitement; but when once this period has supervened, the fever will run a regular course, although it will often be much shortened by treatment. Fevers, I believe, caused by infection are very rarely arrested after reaction is established. The means just advised for the formative stage may likewise be tried in that of invasion; but much discrimination is requisite in the choice of means. Camphor, ammonia, and warm diaphoretics and diluents, sometimes with opium, when the head is not affected; the warm bath, the vapour or heated air bath, and frictions subse-

quently; are the most generally appropriate. In robust persons, and where terrestrial emanations have been the chief cause, a warm emetic (F. 198. 402.) and active stomachic purgatives (F. 181. 216. 266.) may also be exhibited, but they should more rarely be ventured upon in other circumstances, for the reasons just assigned: the recipes now referred to, however, will not be attended with the least risk. When there is tenderness at the epigastrium, with other signs of gastric irritation and depression of nervous power, instead of an emetic or cathartic, a large sinapism, or a warm turpentine epithem, should be placed upon this region, and over a great part of the abdomen; or, in other cases, upon the insides of the thighs; but neither of these ought to be resorted to if re-action have supervened, nor continued after it has come on.

123. ii. Curative Treatment. — The *indications* of cure in fevers are — 1st, to remove the exciting, and all other causes likely to exert an unfavourable influence on the patient, and to place him in a pure, dry, and temperate air; — 2dly, to moderate vascular action when it becomes excessive; and to impart tone and energy to the vascular system, in states of depression or exhaustion; — 2dly, to support vital power, especially when associated with imperfect re-action, or when resulting from depressed or exhausted organic nervous influence and vascular action; — and, 4thly, to remove local obstructions, congestions, determinations of blood, or predominant states of action, or other disease, in particular viscera. This last may be termed the *symptomic treatment* of fever, the others the *vital*; inasmuch as they have especial reference to the states of organic nervous power, and of vascular action.

124. In endeavouring to fulfil these indications, there are various circumstances to be kept in view, viz. — *a*. The previous health, age, and condition of the patient, in relation to the existing states of vascular action and power, and of individual functions. — *b*. The nature, intensity, and combinations of the causes of the disease, and the unfavourable influences which still continue to operate, and cannot be removed. — *c*. The manner in which different pathological states modify the operation of many of the most active medicines. — *d*. As precise a recognition as the symptoms will afford, of the ever-changing conditions of vascular action, of nervous power, and of exhalation, secretion, and excretion, during the course of the malady; and strict appropriation of the means of cure, not merely as respects their operation in health — their physiological action; but as regards their influence on disease, especially existing states of it — their therapeutical effects. The importance, and, indeed, the necessity, of attending to these circumstances in the treatment of fevers, is well illustrated by the action of antimonials, in their various forms and states. Tartarised antimony is one of the medicines most generally employed on the Continent, particularly in Italy, as a *contra-stimulant*, in what is called, by the modern Italian school, the *stimulant diathesis* of fever; and it is an excellent remedy in several forms of the disease, during the stages of excitement, in which it may be given in very large doses. But the tolerance of such doses depends mainly upon the states of vascular excitement and of vital power, and on the repetitions of the medicine; for they may be remarkably injurious in states of low action, in the very young or in the aged, in persons previously ill fed, in fevers attended with predominant affection of the digestive mucous surface, especially when of a low type and caused by infection; it often occasioning in these, especially when taken in very large quantities, serious lesion of the mucous membrane of the stomach and bowels. Keeping, therefore, these *indications* and *circumstances* in view, the treatment of fever must be directed according to its type, its particular form, its varying conditions and complications, and its varying stage or period, and with due reference to the measures which have already been adopted.

125. *A. The patient should be removed from the exciting, concurring, and consecutive causes,* and be placed in as pure and dry an atmosphere as possible, in a large well-ventilated apartment; but out of the way of currents of air, and in an equable and moderate temperature. When an elevated situation or chamber can be selected, the advantage should not be neglected, particularly in large towns. The earlier in the disease that this intention can be fulfilled the better; as the more completely the functions of respiration are performed, especially as to the changes effected by it on the blood, the less risk there will be of future vital exhaustion, and of contamination of the circulating and secreted fluids. Nor should it be overlooked that, although the pulmonary functions are imperfectly performed during the formative and invading stages, they are more or less completely restored as reaction is developed, and they often assume their accustomed activity, unless the bronchial surface, or substance of the lungs, have been inordinately affected by congestion or determination of blood during the early stages; the subsequent activity of this organ contributing to restore the impaired purity of the circulating fluids, and to prevent or counteract much of the vitiation they afterwards would experience from an impeded elimination of hurtful matters, particularly in circumstances unfavourable to the due performance of the several depurating functions, of which the lungs are themselves one of the most important, and a dry, pure and temperate air, one of the most effective agents.

126. *B. The moderation of excessive vascular action* is obviously necessary; but the particular means by which it should be effected, and the grades of action that should be interfered with, are not so evident. These are points which must not be determined by theory, but inferred from extensive experience and observation. If the patient was previously in good health; if the causes were not remarkably intense, or are imperfectly known; if the symptoms do not indicate great excess of action, or serious irritation of any particular system, or determination to any viscus, or congestion; then little need be attempted, and certainly no active means should be resorted to, especially among the poor, and persons of a spare habit of body. In the rich and well fed, or those who are more plethoric, simple saline refrigerants and diaphoretics, mild aperients, and cooling diluents and diuretics, may be employed, rather with reference to consequent changes, than as respects the existing state of disorder — to the prevention of future lesion, the removal of ob-

structions, and the preparation of the organs for salutary or critical changes. These means exert a solvent or relaxing operation upon the capillary vessels; they promote secretion, soothe vascular irritation, equalise the circulation, and facilitate the excreting actions.

127. When vascular action rises above the state just mentioned, it should be considered excessive, and more energetic remedies employed. Inordinate action varies remarkably in grade, and somewhat in kind, with the causes which induce it, with the consequent state of organic nervous power, and with the constitution, habit of body, and age of the patient, from that just noticed, to the vehement forms, which are rapidly followed by exhaustion, by a dissolved or otherwise altered condition of the blood, by lesion of capillary action and tone, and by structural change, especially in mucous surfaces and parenchymatous viscera. The most intense forms of reaction, and consequently the most rapid in their course, often have nearly passed off before the patient is brought for treatment, the effects of morbid action being then only observed, and the exact nature of the disease frequently mistaken. But in proportion as the action of the heart and the pulse are strong, frequent, full, and hard; the countenance and surface injected, turgescent, and animated; the eyes bright and prominent; respiration full, deep, and laboured; animal heat increased, or acrid and burning; the excretions diminished or suppressed; the animal functions unbroken, consistent, and free; the course of the disease, whether epidemic or sporadic, acute and rapid, and the type perfectly continued; so much the more active and immediate should be the means employed to lower the excited action on which these depend, and to prevent its dangerous tendency. — These means have been usually named from the morbid states they are employed in removing, as *antiphlogistic, antisthenic, contra-stimulant, refrigerant, lowering, evacuant, &c.*, and are very numerous; although the remedies which are appropriate to particular forms of excessive action are much more limited.

128. *a. Vascular depletions* were resorted to by the ancients, generally with the view of diminishing inordinate action, or of diverting an impetuous motion of the fluids from vital organs; and observation taught them, that, when pushed far, with an intention of curing or arresting the progress of fever, they were frequently injurious. A nearly similar practice was adopted by the best writers, from **Hippocrates** to **Sydenham**, who both illustrated it. **Sydenham** explicitly states, that bleeding is required to repress the tumultuous or irregular motions of nature, and remove the flux of blood from an important organ or part, to which the febrile impulse has determined it: and the ideas held respecting the practice, among judicious writers of recent times, nearly agree with the above, although they differ as to the employment of it in certain types and forms of fever. When the symptoms just stated (§ 127.) are present, bloodletting should be promptly and decidedly employed; and when the patient is removed into a pure air, beyond the influence of the causes, and is robust, plethoric, and young, it may often be carried to a great extent. This appears to have been the case with **Dover**'s patients. His account of the treatment of the fever which broke out amongst his followers to South America was given by Dr. **Franklin** to Dr. **Rush**, and was a principal cause of the change which took place in the practice of the latter during the epidemic fever of North America in 1797. **Dover** was a Buccaneer leader, and no mean physician, and practised both professions much in the same spirit. He ordered bleeding to a very great extent at the commencement of the disease, — a treatment successfully adopted in our own times, under similar circumstances; and which I have resorted to in the ardent fever occurring within the tropics. In a case, wherein I directed bloodletting before reaction had supervened, the loss of three or four ounces caused profound and prolonged syncope; yet, within four hours, when reaction had come on, fifty ounces were taken before any effect was produced upon the pulse; — and before the sun of the same day had gone down, forty more were abstracted at one time, — in all, ninety-four ounces within twelve hours. But the patients for whom this practice has been prescribed with success have been young, robust, or plethoric, and removed from the continued influence of the causes which produced the disease.

129. *a.* The extent to which bloodletting should be employed, and the good effects from it, will depend on the particular form and complication the disease assumes, on circumstances peculiar to the patient, on the character of the epidemic, and on the period at which it is resorted to. It may be injurious, from being carried too far, or not far enough, — and from being resorted to before reaction has supervened, or when the reaction is about to pass into exhaustion, or in cases in which it is not indicated. Its effects will depend upon the manner in which these and other circumstances are weighed by the practitioner; but it should not be overlooked, that it depresses the vital energies much more remarkably in fever than in idiopathic inflammations; and, when inappropriately or too freely practised, it prevents or retards salutary evacuations and crises; and either disposes to unfavourable changes, or renders convalescence difficult and prolonged. **Hildenbrand** very justly remarks that, even in cases where the propriety of the practice is undoubted, a moderate quantity only should be taken away at one time, and the effects upon the disease, as well as the appearance of the blood, should be carefully observed, before its repetition be directed. This precaution is especially requisite at the commencement of epidemics, if depletion be employed late in the disease, and if vascular action be tumultuous, or much exceed nervous or vital power.

130. Large bloodlettings have been directed with the view of arresting or shortening the fever; and, when the person has been robust, the constitution sound, the cause not very intense, and its effects not very violent, the practice has occasionally so far succeeded as to subdue the morbid excitement down to that grade which is necessary to the restoration of the secreting and excreting functions, and the production of a salutary crisis. We sometimes observe a large or full depletion in a few hours afterwards followed by a general perspiration, and copious alvine evacuations. But this result should not be confidently calculated upon, even in the class of patients just mentioned, and least of all in fevers arising from infectio

and mental anxiety, or during epidemics, however early in the stage of reaction it may be resorted to. Much discrimination is necessary, even in cases where the practice appears to be indicated, not to run a risk of mischief by having recourse to it.

131. When, in the progress of fevers, but more especially at their commencement, signs of local determination or of predominant vascular action appear in the head, lungs, or abdominal viscera, depletions, both local and general, are most requisite. If, however, these affections come on in advanced periods of the fever, although depletion to some extent is required, the existing states of vital power and action, and even of the blood itself, often forbid it to be practised nearly to the amount generally required in idiopathic inflammations,—unfavourable terminations or even gangrene rapidly supervening, owing to these states, upon a too free recourse to it; for it is not so much from excessive action, as from diminished power, and alterations of the circulating fluids, that these unfavourable results occur in the progress of fevers. The earlier, however, the predominant local disease or complications appear, the more energetically may bloodletting be employed.

132. β. The *circumstances* more especially requiring recourse to vascular depletions may be summed up as follows: — (*a*) Inordinate excitement, or irritation with rigidity of fibre, and general increase of the animal heat; — (*b*) When the patient is robust, plethoric, or young; the sanguiferous system being so surcharged as to prevent the free exercise of the functions; — (*c*) When the general reaction of the vascular system is such as to endanger vital parts, or too strong to allow a salutary or critical change, or so vehement or tumultuous as quickly to exhaust vital power; — and, (*d*) When the blood is determined to, or vascular action is inordinately increased in, an important organ. — In these *conditions* bloodletting is employed, with the following *intentions:* — α. To remove the excitement and irritation, and relax the exhaling and secreting surfaces and organs; — β. To diminish the load which oppresses the vascular system, congests it, or overpowers the organic nervous influence that actuates it; — γ. To reduce the excessive reaction, and thereby to guard important viscera, to prevent consequent exhaustion, and to favour the supervention of salutary evacuations; — δ. To remove or divert the increased impulse or action from important organs.

133. γ. *There are certain considerations and symptoms contra-indicating bloodletting,* that should not be overlooked. Some of these I have seen but too often neglected, even by old practitioners; and others so remarkably misinterpreted by them, as to have been their only reasons for having recourse to depletion, although actually the strongest indications against it. — A very frequent, soft, and open pulse seldom or never admits of depletion, for in such cases the tone of the vessels is insufficient to accommodate them to a diminution of their contents; consequently, remarkable sinking and depression, with increased rapidity of the circulation, &c., supervene. The pulse may be also open, soft, expansive, and tumultuous, indicating excessive action beyond vital power, as in certain forms of adynamic and malignant fevers attended by contamination of the circulating fluid. In this state, the loss of even a very few ounces of blood will produce bad effects. Vascular depletion is seldom well borne in fever, when the pulse ranges so high as 110, and still more rarely if it reach 115 or 120, in adults. Irritable females, however, and those in the puerperal state, offer exceptions to this.

134. Great prostration of strength and of vital power; the supine posture; languor of the eyes; paleness or collapse of countenance; a lurid complexion; a dark or flabby state of the tongue, with indentations of the teeth on its edges, or dark mucous sordes on the tongue, gums, and teeth; great sadness and depression of spirits; low delirium; tremblings of the hands, and especially of the lower jaw; a feeble, small, and weak, or an open, compressible, and undulating pulse; a frequent and hurried respiration; incontinence of fæces or urine; coldness of the extremities, or of the ears or nose; coldness or rawness of the expired air; softness and flabbiness of the soft solids; and a dirty, muddy, lurid, or discoloured appearance of the integuments; are the strongest indications against any kind of depletion, and in all circumstances of fever.

135. In addition to these, the noxious nature of the exciting causes; their concentration, and their intense operation, as in the case of infectious effluvia; imperfect ventilation, &c.; the character of certain epidemics; the continued influence of the contaminated air, or of the infectious emanations that caused the fever; previous depression and insufficient nourishment; the presentiment of an unfavourable issue, or mental distress and anxiety; the circumstance of the patient being treated in the midst of the malaria, or marshy exhalations, that caused the disease, or in an hospital, camp, house, or low street, in which infectious fever is prevalent; all militate against bloodletting, or indicate a necessity of caution in respect of it, according to the form which the disease assumes. — Vascular depletion also is not so well borne by persons living on a poor watery diet; nor by the studious and exhausted; nor by the fat, bloated, cachectic, and intemperate; nor by residenters in low marshy districts; nor by those confined in close factories, or living in close or low apartments and streets; nor by persons passed fifty; as by those differently circumstanced. But the various species of fever furnish peculiar indications in favour of or against bloodletting that will be considered in their proper places.

136. δ. *Of the repetition of bloodletting.* — Previously to determining upon a second depletion, the effects both immediately and more remotely consequent upon the first, and the character of the disease, should be most carefully studied. It may happen that the first bleeding, although small, has produced fainting, followed by so strong reaction as to render a second or even a third full or moderate bleeding indispensable. This is chiefly observed when the first has been practised too early, or before the stage of reaction has been fully developed. If the fever is complicated, and the local affection presents much of the inflammatory character; if the patient has been relieved by the former bleeding; if the pulse remains good; if reaction, or determination to an important organ be diminished, the symptoms which indicated the first depletion still persisting

o a certain degree; we may proceed to a second, but always with circumspection. If, on the contrary, the pulse becomes weak, and the strength sinks, we never ought to repeat the bleeding. In all cases, the physician should attentively observe the pulse during the flow of blood, in order instantly to assure himself of the propriety of depletion: for if it become feeble and irregular, and the patient at the same time more distressed, the evacuation should be immediately stopped. The blood drawn in the first instance sometimes furnishes indications for or against the repetition of bloodletting; but such indications should seldom be acted upon alone. The inflammatory coat, and cupping of the coagulum, are favoured by cold, dry weather, by the puerperal states, by the rheumatic diathesis, and by the blood being taken in a full stream, and in a deep and narrow vessel. — But this condition, as well as a very loose or dissolved coagulum, or imperfect separation of it from the serum, and the other states of the fluid described in the article Blood (§ 78. *et seq.*), should be duly considered, in connection with the other phenomena, before they can be made the basis of curative indications. Van Rotterdam justly states, that when the crust consists of a delicate bluish membrane, covering a greenish gelatinous matter, the crassamentum being livid, soft, and floating in a thick and greenish serum, a second bleeding will prove most mischievous; — and I may add, that least of all should depletion be repeated, in any mode, if the colouring matter be precipitated to the bottom of the weak crassamentum, and of a blackish or purplish colour.

137. ε. *Local bloodletting* is required chiefly in very young patients, or after general depletion, or in local determinations and complications, or in circumstances that render the propriety of bloodletting doubtful. It is most serviceable when the head is affected, and then either cupping or leeches may be employed, but preferably the former, when a quantity exceeding six ounces is to be taken away; and either mode may also be adopted when the viscera in the large cavities are affected. If leeches be employed late in fever, particularly in its low and complicated forms, care should be paid to the bleeding after their removal, as it is apt to continue, and is arrested with difficulty. *Dry cupping* is sometimes useful in states of internal congestion, when the detraction of blood can hardly be risked.

138. ζ. The question has been often agitated, *How late in fever should bloodletting be practised?* but it evidently cannot be answered by any absolute rule, or without reference to the *ensemble* of existing phenomena. In the cerebral and pulmonary complications, as well as in others in some cases, bloodletting, in one mode or other, may be employed until an advanced or critical period. But reaction having come on, and the indications for it being evident, the earlier in the disease it is resorted to the better. In the stage of crises, both vascular depletion and all perturbating means should be avoided. The indications already noticed respecting this remedy will assist the practitioner as to both the latest time of resorting to it, and the repetition of it; but in these matters, as in many besides, he must be guided chiefly by his pathological knowledge, and powers of practical observation and discrimination.

139. *b. Refrigerants*, internal and external, are of great service in moderating vascular excitement; and some of them produce this effect more than others, without lowering vital power. — α. The choice of *internal refrigerants* should depend upon the form fever assumes, and upon their especial action. In the early part, and more sthenic forms of excitement, sedative refrigerants should be selected, as the *nitrates of potash* or *soda* — the various *neutral salts*, the *mineral* and *vegetable acids*. Several of these may be advantageously conjoined, as a solution of the *sulphate of magnesia*, with that of the *acetate of ammonia*; and other substances, also tending to promote the exhalations and secretions, may be added. In the far-advanced stage of excitement, and in its more adynamic or low states, refrigerants which are more restorative and antiseptic — as *camphor* in small doses, the *muriate* and acetate of ammonia, the *spirit of nitric æther*, and the various *ætherial preparations*, particularly *chloric æther* — are upon the whole to be preferred; and may be conjoined with numerous other substances, according to existing morbid conditions. The refrigerant effect of several of these is only relative to the state of action at the time, but it is not the less beneficial. Thus, in the low excitement characterising adynamic fevers, or when vascular action exceeds vital power, and the heat of surface is of a morbid kind, both the vascular action and the unnatural heat are best reduced by the more restorative refrigerants, as by camphor, the muriate of ammonia, chloric æther, &c., all which may be given in conjunction (F. 431.). Much benefit will also result from a judicious choice of refrigerant beverages or *drinks* during the stage of excitement. A selection suitable to particular cases may be made from those prescribed in the Appendix. (See F. 592, 593, 594, 595. 915. and 916.)

140. β. *External refrigerants* are of great service, but they often require much discrimination. The patient, especially in warm weather, should be laid upon a hair mattress, covered only by a single sheet, and his surface sponged, in the more active states of febrile excitement, with cold spring water. If this be done frequently, as much benefit and much less fatigue will be experienced, than from the cold affusion, which, although more rapidly lowering the animal heat than it, hastens the return of the cutaneous reaction. If much determination to the head exist, the hair should be cut off, and *cold*, in various forms, as the *affusion* of a stream *of cold water*, evaporating lotions, &c. should be resorted to, the head being placed on a cool pillow. Formerly, there was much difficulty in regulating the temperature of the head; for, although one half of it was readily cooled by lotions, the other half was kept remarkably hot by the feather pillows in constant use. I frequently, therefore, placed under the pillow-case a folded piece of common floorcloth, which, by intervening pieces of linen, might be so managed as to carry off the excessive heat of the head, as rapidly or as slowly as could be desired. Pillows may now be filled with either air or cold water, and their temperature regulated according to circumstances.

141. In cases of determination to internal viscera, excepting to the head, the use of external refrigerants is more or less hazardous; and, if

the local complication be serious, and the general excitement of a low or adynamic form, it should be laid aside. But when this form of reaction is general, and not attended by excessive determination to, or congestion in, any of the thoracic or abdominal viscera, *tepid*, or *warm sponging* and *ablution*, will prove both useful and grateful. Whether cold, tepid, or warm sponging be adopted, the addition of subcarbonate of soda or of potash, or the sub-borate of soda, to the water thus used, will tend to relax the skin, and will cleanse it from the impurities which impede its functions. In cases accompanied by an acrid heat of surface, tepid sponging, or the tepid bath, medicated as just directed, will be advantageously followed by *frictions with sweet oil*, which, by relaxing the exhalants, will cool the surface.

142. *c. Antimonials* are amongst the most energetic *contra-stimulants* in fever; but they are not suited to all fevers, nor to all their stages. They are most serviceable in the more sthenic or inflammatory forms, in those arising from other causes than infection, in some epidemics more than others, and in the earlier periods. The best preparations are the true *James's powder* and *tartar emetic*, the former of which may be conjoined with *calomel*, and small doses of camphor, or with mild aperients; and the latter may be given in various saline solutions, or in the patient's common drink. Tartar emetic has been employed most largely in Italy to lower febrile excitement, but I believe that it will be found equally beneficial and less injurious to the digestive mucous surface when used in moderate doses. I have frequently given as much as three or four grains in the course of the day in solution; but from one to two grains has been equally serviceable. It is especially indicated when pulmonary affections supervene in the course of fever; but it should not be prescribed in low or adynamic fevers, even when thus complicated, unless with great caution, and in combinations hereafter to be noticed. A judicious use of either of these medicines early in the stage of active excitement, will often either entirely supersede depletions, or prevent the necessity of having recourse to those which are large.

143. *B. Inordinate depression of vascular action*, during the period of the disease which usually follows that of invasion, is very much less frequent than the states of excitement. It sometimes requires the most active means to remove it, but these means should have reference to the cause, and the various pathological states attending it. This condition generally arises from the intense impression of the exciting cause on the organic nervous influence, preventing thereby the evolution of vascular reaction; the stage of excitement either not following the earlier changes, or appearing in an irregular and imperfect manner. In such cases, which are most common in certain epidemics, and in some localities productive of the more concentrated states of malaria, there is generally more or less congestion of the large vessels, and parenchymatous viscera; and the vascular depression is dependent — 1st, upon lowered nervous influence; — 2dly, upon an overloaded or oppressed state of the circulating and vital organs — the state of *congestion* so strongly insisted upon by STAHL and his disciples, but which I have shown (§ 92.) not to be a primary change, as believed by more recent writers. In this case, the means advised for the stage of invasion (§ 122.) should be resorted to, especially the *heated air* or *the vapour bath*, and *warm baths*, followed by *frictions* of the surface. In some cases, especially when irregular or unavailing efforts at reaction are made, the abstraction of a few ounces of blood from a vein, whilst the patient is immersed in a warm bath, and frictions of the surface are being employed, will often assist in restoring circulation to the surface, and in removing the internal congestion. If the pulse rise during the flow of blood, a larger quantity than otherwise might be safe may be taken, or the operation may be repeated, according to the effects observed after the first evacuation. If a satisfactory result is not soon observed from these, a hot *turpentine epithem* should be placed over the epigastrium and abdomen, and covered over with oiled silk, or leather, so as to prevent evaporation; and be either kept there or renewed until erubescence of the surface is produced. In the more dangerous cases, a similar epithem may also be applied to the insides of the thighs. At the same time, moderate doses of *camphor* or *ammonia* may be given internally, in warm diluents, or small quantities of the *chlorate of potash*. Depressed vascular action, whether occurring in the early progress of the disease, or consequent upon some grade or other of excitement, being chiefly an effect of the change in the state of organic nervous power, although often associated with congestion at the commencement, and with vitiation of the circulating and secreted fluids in the latter stages, should be further combated by the measures which are required for the fulfilment of the next intention; an especial attention to these conditions being paid in the remarks about to be offered.

144. *C. To support organic nervous and vital power*, especially when associated with imperfect vascular reaction, or with a morbid state of the blood, or when proceeding from exhaustion, is of the greatest importance; but the circumstances in which the accomplishment of this intention becomes requisite, and the treatment most appropriate for it, in the various states of fever, are amongst the most difficult topics of practical medicine. In certain varieties, especially those that commence with low excitement or imperfect reaction, the debility is owing in great measure to *suppression* of power — to the overloaded state of the vascular system, consequent upon interrupted exhalation and secretion, preventing its free reaction upon its contents. In such, power is best restored by moderate vascular depletion, the pulse becoming more free and developed as the congestion and load are removed. It is in this class of cases that early evacuations are most requisite, as the best means of preserving vital power, and are the oftenest neglected; whilst in others, particularly those which are characterised by excessive action, although attended by loss of vascular tone and nervous power, or by a vitiated state of the blood, or both, depletions are inappropriate, and the most likely to be injuriously resorted to. In certain adynamic fevers, in which reaction assumes this latter form, and apparently indicates bloodletting rather than opposite means, if employed sufficiently early and with much circumspection, some advantage, or little mischief, may result from it, especially if the patient was

in health, well-fed, or at all plethoric, before the attack. But when the pulse is very quick, broad, or open, the vessel yielding on a gentle pressure of the finger, as well as before the impulse of the heart upon the column of blood in it, depletions should either not be attempted, or be accompanied with remedies which will restore nervous power. In general, however, they are in any mode hazardous in such cases; the febrile poison or cause having infected the organic nervous influence, and the vascular system, as well as its contents, and prostrated vital power in such a manner as to be roused only by tonics and restoratives. But even in these circumstances, stimulants should at first be cautiously used and judiciously selected; for a too early recourse to them, especially to such as are at all heating, may be very injurious. When this state of the circulation occurs late in the disease, or is consequent upon a more vigorous reaction, and an obviously vitiated state of the blood, the most energetic means of restoration are necessary.

145. Debility from *suppressed power* is frequent in the early periods of fever, when the brain and lungs are predominantly affected, and is best relieved by moderate depletions and derivatives. Care should be taken to distinguish this form of debility, as, whether occurring early or late, the use of stimulants would be more injurious than beneficial, unless in peculiar circumstances, and when these medicines are conjoined with other more appropriate means. The association of this state with vascular congestion, in these as well as in other cases, requires rather the treatment directed for depressed vascular action (§ 143.), than that for exhaustion.

146. It must be evident from the foregoing, therefore, that numerous circumstances must be duly considered before restoratives — either of a tonic or stimulant kind — should be resorted to in fevers. These circumstances furnish the true *indications* for the employment of them, and are chiefly the following: — *a*. The intense operation of the causes of infectious and epidemic fevers, these generally requiring, *cæteris paribus*, an earlier and more liberal use of restoratives, than those which are sporadic; — *b*. The summer and autumnal seasons; — *c*. An age past the meridian; — *d*. Imperfect nourishment and clothing; the patient having lived chiefly on vegetables, or on fish, or salt provisions, or having been addicted to ardent spirits, or to sexual indulgences; — *e*. An intermittent, remittent, or low *type* of fever, or any of its adynamic *forms*, especially if uncomplicated with any inflammatory state; — *f*. The continued operation of the poisonous effluvia which caused the disease, as in low marshy situations, the close air of crowded hospitals, &c.; — *g*. Signs of real debility or of exhaustion, especially when attended by a moist or flabby tongue, by a very soft and quick pulse, the secretions not being suppressed; — *h*. An indifferent or apathetic state of mind, despair of recovery, mental depression, &c.; — and, *i*. The symptoms enumerated above as contra-indicating bloodletting (§ 133.). Besides these, there are numerous others, which appertain more especially to certain species and forms of fever, and which will be noticed hereafter. Various circumstances may, however, arise, which will render vascular depletions, and a recourse to tonics, and even to stimulants, nearly at the same time, extremely proper. Remittents and intermittents, particularly in warm countries, and several complicated states of continued fever, often exemplify this.

147. *The selection of means* in order to support nervous and vital power must have reference to the cause and form of fever, and to existing pathological states and complications. In *endemic* fevers, the various preparations of *cinchona* and sulphate of *quinine* are upon the whole most appropriate. In those caused by *infection*, the same preparations with *camphor*, the chlorates, especially the *chlorates* of potash and soda, *serpentaria*, *arnica*, camphor with *opium*, *wine* given in *Seltzer water*, *yeast*, *carbonic acid*, various *tonic infusions* taken with the *citrate of ammonia* in a state of effervescence, *spirits of turpentine*, *pyroligneous acid*, *kréosote*, the *mineral acids* and *æthers*, especially the *muriatic* or *chloric* and *chloric æther*; and in the complicated states of fever especially, external *derivatives*, *vesicatories*, *sinapisms*, *epithems* with warm turpentine, or liniments with this latter, and camphor, capsicum, &c., are the most efficient remedies. When the blood appears contaminated, or the excretions acrid, offensive, and excoriating, combinations of tonics with antiseptics, as the decoction of cinchona with the chlorate of potash — a combination which I have used for many years with much success — or with chloric acid and chloric æther; the pyroligneous acid with kréosote; spirits of turpentine, &c.; and these, or similar substances, administered in enemata; are the most to be depended upon. But the appropriation of these and of other remedies to the particular forms and states of fever, is more fully shown in the sequel.

148. *D. The promotion of the exhalations, secretions, and excretions*, by *emetics*, *purgatives*, *diaphoretics*, and *diuretics*, is a most requisite intention in the cure of every type and form of fever. By a judicious selection of means belonging to these classes of remedies, adapted to existing pathological conditions, vascular action may be developed when it is low or suppressed, or moderated when it is excessive; nervous power may be relieved when it is oppressed, or supported when it is exhausted; and the circulating fluid may be preserved in a state of comparative purity, or relieved from the contamination it may have experienced in the course of the disease.

149. *a*. *Emetics* were formerly more employed in fever than at present. — SYDENHAM, STOLL, and many others, prescribed them very generally; but the recent views as to the seat of fever in the brain, and digestive mucous surface, have tended to bring them into disuse. In the early stages of the simple and sporadic forms of fever, they are often of great benefit, especially in arresting them, as advised above (§ 121, 122.), or in developing imperfect action. They are seldom productive of much service after the excitement has become fully established or stationary, and should not be employed in the cerebral complication, or when tenderness or pain are felt in the abdomen, especially at the epigastric region. When prescribed thus early, they are calculated to prevent congestions of the lungs and liver, and even to remove them at their commencement. SYDENHAM, from a fear of their effects upon the brain, seldom prescribed them until bloodletting was premised, and thereby lost much of the benefit they are

calculated to afford, inasmuch as the period at which bloodletting could be advantageous, was more advanced than that in which emetics are most serviceable. Ipecacuanha is, upon the whole, the best substance that can be used. Tartar emetic is not so safe, if there be tendency to the gastric complication, or in low infectious forms of the disease. Some authors have recommended emetics at a late period; but I have had but little experience of them later in fever than I have advised them. In the early stages I have both frequently prescribed them, and seen them prescribed with benefit. They may, however, prove beneficial in more advanced periods, especially in the bronchial complication, and to answer particular purposes; but they should be conjoined with such other substances as will assist them in answering the especial intention with which they are directed.

150. *b. Purgatives* are the most generally prescribed medicines in fever, in this country; and are at least amongst the most useful when judiciously selected. *Calomel* early in the disease, in conjunction with *James's powder*, and in the adynamic states with *camphor*, &c. — *jalap* with *cream of tartar*, in sporadic cases, — the *mild neutral salts*, or the more *cathartic salts* in mild doses, in similar circumstances, — *rhubarb* in nearly all fevers, variously combined, — *spirits of turpentine* with castor or olive oil, &c., when the head is much affected, and in certain states of the abdominal viscera; and various other mild aperients, as *manna*, *tamarinds*, prunes, &c., with the *citrates*, *tartrates*, &c.; are the most serviceable. The *phosphate of soda*, or any of the strong *neutral salts*, either alone and in small doses, or with diaphoretics and diuretics, will frequently produce both refrigerant and evacuant effects. They are indicated chiefly during the stages of excitement, more especially in sporadic and endemic fevers.

151. In general, the purgatives used in fevers should be mild, and such as are not calculated to irritate or inflame the digestive mucous surface. They should be employed with the intention — 1st, of simply removing mucous sordes and accumulations from the prima via; — 2dly, of promoting the secreting and excreting functions of the collatitious viscera, and of the intestinal surface; — and, 3dly, of thereby unloading the vascular system of a part of the effete materials conveyed into it, and liable to accumulate in, and contaminate, the blood. They should rarely or never be prescribed with a view of deriving the circulation from other parts to the digestive canal; for, in fevers, irritants of any kind acting upon this part will often react upon the brain and liver; with the exception of the purgatives just enumerated. If oils be employed, especial care should be taken that they are quite fresh, otherwise they may occasion great danger. In pulmonary complications, the addition of tartarised antimony in small doses, or of ipecacuanha, to the purgatives, will be useful, and will promote their operation. In advanced stages, the utmost discrimination is necessary in the selection of purgatives, and more especially if we dread the presence of disease of the mucous follicles. In these, doses of rhubarb sufficient to evacuate freely the bowels, with the hydrargyrum cum creta, camphor, and ipecacuanha, are most beneficial. This lesion is commonly connected with, if it be not caused by, the injurious remora of sordes or morbid secretions in the canal, and by a vitiated state of the blood; the aperients or purgatives selected should, therefore, not merely be mild, but possess tonic and antiseptic properties, or be conjoined with such substances, especially camphor, cinchona, sulphate of potash, the chlorates, or kréosote.

152. *c. Diaphoretics* should be prescribed with strict reference to the existing degree of excitement; for if the vascular action mount above a certain pitch, the cutaneous exhalation cannot be procured until it is reduced; and if it sink too low, the perspiration will either be interrupted, or become partial or clammy. In the stage of excitement, therefore, depletions and refrigerants are the most efficacious diaphoretics; or such substances as relax the skin by acting on the digestive mucous surface, as calomel with antimony, and in some forms of fever especially, with opium; or ipecacuanha with nitre and opium, &c. During this period, the more *cooling diaphoretics* should be selected, especially those mentioned under the head of *refrigerants* (§ 139.), and *emollients* and *relaxants*, will often very materially aid their operation, especially if gastric and *intestinal irritation* be present. Whenever vascular action, or vital power, particularly the latter, sinks materially, the warm or *stimulating diaphoretics*, as camphor, serpentaria, ammonia, arnica, &c., should be preferred, and be combined with tonic infusions, &c., according to the circumstances of particular cases and existing pathological states.

153. *d. Diuretics* are upon the whole less requisite in fevers, than the preceding; but they are often useful adjuncts to tonics, diaphoretics, or even to the milder purgatives. The ætherial preparations, especially the spirits of *nitric æther*, *citric acid*, and the *citrates*, the *tartrates*, and most of the *neutral salts*, and nearly all the *refrigerants* (139.), may be thus employed. They are indicated more especially in the pulmonary, cerebral, and hepatic complications of fever; those of an antiphlogistic kind being the most appropriate.

154. *e. Mercurials* are often necessary in fevers, especially calomel, blue pill, and the hydrargyrum cum creta. *Calomel* is of great service as a deobstruent purgative, in fevers arising from endemic causes, especially when the liver becomes obstructed; in conjunction with opium, after bleeding, in the gastric and other complications; and with camphor and opium, in certain malignant states, which will be particularly noticed. *Hydrargyrum cum creta* is most useful, with ipecacuanha and rhubarb, or with camphor and opium, in the intestinal affections occurring in the progress of the disease. Of the use of *mercurial frictions* in continued fevers I have not had much experience; but in periodic fevers, when the liver has become enlarged, I have directed them with advantage; using either the ointment with camphor, or the mercurial liniment with the compound camphor liniment, or one of those in the Appendix (F. 306. 311.). Mercury pushed so far as to affect the mouth or to produce *salivation*, has been considered both a prophylactic and a cure for fever. I have tried to affect the system in the most malignant forms of fever in warm climates, without succeeding; and where I have succeeded, there was every reason to believe that recovery

would have taken place nevertheless. In some complicated states of fever in this country I have given very large doses of calomel and camphor with opium every four or six hours, with success; and although recovery has taken place, as frequently without the mouth having been affected, as otherwise, I have generally considered the latter a favourable occurrence. This treatment was introduced by me about fifteen years ago, and was then resorted to in many cases in a public institution: it was taught in my lectures, and published in several periodicals ten or twelve years since. The circumstances in which it is calculated to succeed, will be pointed out hereafter. That mercury possesses no prophylactic influence against fevers, has been satisfactorily shown by several able writers, and proved by my own experience. A person, whose mouth was affected for the cure of syphilis, was seized with malignant remittent fever in Africa, in 1817, and came under my care soon after the attack. He died a few days afterwards; the most active treatment having failed in developing vascular reaction, and in supporting the vital powers. A nearly similar case is mentioned by Dr. GRAVES, in his excellent lectures. I believe, however, that instances, in which *salivation* has followed a mercurial treatment of fever, without recovery having taken place, are very rare.

155. *E. It is often necessary to remove local congestions, determinations of blood, or predominant states of vascular action, or other disease of particular viscera*, during the progress of fever, and thus to protect important viscera from injury during the febrile action. — *a*. One of the most dangerous and most frequent complications — one which does not limit itself to any particular type or form of fever, although more frequent in some localities than in others, and in some epidemics — is *predominant affection of the digestive mucous surface*, particularly of the lower part of the ilium and cæcum. This condition is more particularly noticed hereafter, with reference to its early occurrence; when it forms the mucous gastric and intestinal fevers of authors. It is chiefly to its occurrence in the advanced stages that I shall here advert. Notwithstanding the erroneous views of BROUSSAIS and his followers as to this point of pathology, we are indebted to them for the great attention which has been paid to it in recent times. Unfortunately, lesions in the small intestines may proceed to a fatal issue in fevers, without any evident sign of their existence. Those symptoms, nevertheless, which are most frequently observed, as well as those which are occasionally connected with them, should receive due attention. When, therefore, pain or tenderness are felt in the abdomen or epigastrium on pressure, with tension and burning heat, a loaded tongue with red point and edges, a soft and very quick pulse, from twelve to twenty leeches should be applied; and after the bites have bled sufficiently, a warm turpentine epithem or fomentation in the same situation will prove of great benefit. This epithem has been very frequently employed by me, since 1820, in the complicated states of fever, in both public and private practice, and has been publicly recommended by me for them on several occasions soon after that time.

156. *a*. If this complication appear early in fever, a repetition of these means will often be necessary; and, if the bowels be not sufficiently free, or if the evacuations be acrid and offensive, laxatives, especially rhubarb with the hydrargyrum cum creta, ipecacuanha, &c., and emollients or demulcents, will be necessary. If it occur very late in fever, and be attended with much depression, or *with diarrhœa*, small but frequent doses of the hydrargyrum cum creta, with camphor, ipecacuanha, and opium, ought to be given, the above epithem being also resorted to; and, if these fail, the chlorates, particulary the chlorates of potash or of lime, should be prescribed, with the preparations of cinchona, or of tormentilla; or the treatment advised for the *Asthenic Forms of* DYSENTERY (§ 88. *et seq.*) may be employed. In these latter cases, the affection of the mucous follicles is either consequent upon, or coëtaneous with, contamination of the circulating and secreted fluids; therefore the chlorates, cinchona with muriatic acid, chloric æther and opium, camphor in large doses, kréosote, and other tonic and stimulating antiseptics, are especially indicated. If dark grumous or bloody stools, and more particularly if large *discharges of blood* take place, turpentine should be administered by the mouth, and in demulcent enemata, it being the most efficacious means we possess in such circumstances, as well as when flatulent distension of the abdomen supervenes. Ulceration of the follicular glands, and softening and even sloughing of the mucous surface of the bowels, may take place in the latter stages; and, although these lesions are often preceded by the symptoms just noticed (§ 155.), and attended by evacuations indicating their occurrence, no very conclusive evidence of their existence may be observed, unless they terminate in perforation and peritonitis. This is more especially the case, when the abdominal symptoms are marked by severe cerebral affection. But ulceration may especially take place in this insidious manner also when the sensibilities are not thus obscured, and even during the periods of decline and convalescence. — These more extreme changes in the internal surface of the bowels can be met only in the manner just advised, the medicines being exhibited both by the mouth and in enemata; and by the means recommended in similar states occurring during DYSENTERY (§ 89.). — If *peritonitis* consequent upon ulceration and perforation supervene, terebinthinate epithems, or sinapisms, and large doses of opium, as advised by Dr. GRAVES and Dr. STOKES, or of camphor and opium, are the most rational means. The administration of other medicines by the mouth or by injections, or, indeed, the ingestion of any substance whatever, may increase the mischief, by its passing through the perforation, which may possibly be repaired, if the actions of the bowels be restrained by the remedies just advised; the natural processes which sometimes take place in such cases, being thereby favoured. The application even of leeches may be injurious, particularly if this occurrence take place late in, or during adynamic states of, fever, by depressing the powers of life too low for the exertion of the usual processes of reparation.

157. *β*. The *occurrence of diarrhœa*, of a mild character, the stools being feculent and not remarkably unhealthy, should not be interfered with, more especially at a critical period of the

disease. But when the symptoms of inordinate vascular determination are present, the evacuations being watery, offensive, or otherwise morbid, small doses of hydrargyrum cum creta and DOVER's powder should be given every four or five hours; and, if these fail, and more especially if the type of fever be low, the stage far advanced, and vital power depressed by the evacuation, the more active means just mentioned (§ 157.) should be administered. This complication is more common and more apt to assume a dangerous form, in some localities than in others. Thus it is more frequent and severe in Paris than in London, and in London than in Edinburgh, probably owing to the water in common use in these cities.

158. γ. When *flatulent distension* of the abdomen comes on in any of the forms of fever, but more particularly in adynamic states, PIORRY advises that an elastic tube should be introduced into the rectum, in order to carry off the flatus. I am, however, not sure that the discharge of it in this manner is so beneficial as may be supposed; and I am confident, that at the period of the disease when this is a troublesome symptom, the internal surface of the bowel will be readily injured, owing to its tender and almost softened state, even by the incautious introduction of a clyster-pipe. I have, since 1820, recommended and employed the spirits of turpentine, in cases of this kind, — by the mouth, in several forms (F. 216.), in enemata (F. 150, 151.), and in warm epithems and fomentations placed upon the abdomen. This substance is especially indicated where, with the abdominal distension, and intestinal affection, there is also delirium or coma; and is equally beneficial in a relaxed, as in a constipated state of the bowels; for, by modifying the dose and the combination, it will increase or restrain their actions, according as either effect is desired. In a remarkably dangerous, and indeed hopeless, case of this description, which I attended in 1822, with Mr. BUSHELL of Crawford Street, this medicine was resorted to with instant benefit and ultimate success; and, although I have met, both previously and subsequently to this date, with numerous instances, in public and private practice, where it has proved equally beneficial, I refer to this in preference, because it is amongst the earliest cases of the kind, of which I can find the notes, where I employed this medicine in consultation with another practitioner, — the fact thus not resting merely upon the testimony of an observer, who may be supposed to be over-partial to a medicine which he was the chief means of bringing into general use (see my *Memoirs on the Action and Use of Terebinthinate Remedies in various Diseases, in the Lond. Med. and Phys. Journ.* for July and August, 1821.), but also upon that of an equally competent observer. A nearly similar instance to that now referred to is adduced by Dr. GRAVES (*Lond. Med. and Surg. Journ.* vol. ii. p. 781.).

159. The nature and treatment of the complications of fever with intestinal disease have not always been well understood; for, as they have too frequently been considered as merely inflammatory, and not as consequences of the pathological states explained above, so have they been viewed as contra-indicating the exhibition even of mild purgatives. — This, however, is not the case: inasmuch as they may not only be occasioned by the insufficient use or neglect of these medicines, early in the disease; but also aggravated by the same cause, at a later period. The septic and irritating effects of the morbid secretions and excretions poured into the alimentary canal, and even from its own surface, during the course of adynamic fevers, when its mucous membrane possesses its minimum of tone and vital resistance, require both that the intestinal contents should not be allowed to accumulate and remain long in contact with it, and that they should be rendered less injurious by dilution and the exhibition of antiseptic substances, — indications, of which both reason and experience have shown the propriety and success.

160. *b.* The *complications of fever with severe lesions of the respiratory functions and structures* are more frequent, and often occur earlier, than generally supposed. — The influence of early impairment of these functions in the production of the consecutive phenomena of fever should of itself attract a particular attention to them during the progress of the disease. We shall generally find that, in proportion as the causes of fever act intensely upon the lungs, and impede the changes of the blood in them, the more severe and complicated will be the form of the disease, and the more disposed will this organ be to experience either manifest or concealed disorder, generally consisting of a peculiar congestive form of bronchitis, or of congestion of the lungs and bronchial lining, or of determination to these parts, or of asthenic or nervous pneumonia, passing into condensation of portions of the organ, in the lower types of fever; or of peripneumony or more purely inflammatory states of both the lungs and pleura, in the more inflammatory varieties. There are also other circumstances, which should influence the treatment of these complications, viz. — *a.* Their greater frequency in the low adynamic fevers, than in the sthenic; in the continued, than in the periodic types; and in some epidemics, seasons, and localities, than in others; — *b.* The particular stage of the fever in which they appear; — *c.* The part they seem to act in superinducing further complications, especially cerebral and hepatic affections; — and, *d.* Their particular form and character in relation to general vascular action and nervous power. It must be evident that, inasmuch as this complication may supervene, and proceed to a fatal length, without detection, especially when the brain is much affected, an attentive inquiry after it should be made by means of auscultation, through the progress of the disease, and even during convalescence.

161. *a.* In cases where the local affection, as well as the general disease, evince most of the inflammatory characters, *general* or *local depletions*, according to the circumstances of the case, are especially indicated. Of the latter, *cupping* is the most useful, especially between the shoulders, — and if leeches be applied, the glasses may be placed over the bites. In the adynamic states, local depletions only are admissible; and if leeches be used, attention should be paid to the bleeding afterwards. If further depletion cannot be ventured upon, *dry cupping* on the back or chest will sometimes be serviceable. Great advantage will also accrue from resorting to external derivation or revulsion, after sufficient depletions have been practised. The repeated application of blisters,

so as to produce merely a rubefacient effect; or of sinapisms; frictions with irritating liniments (F. 299, 300.), especially with capsicum, croton oil, &c.; and stinging with nettles; are frequently beneficial. But I have found, in numerous cases, since 1821, of both common and eruptive fevers, where these means have failed, that warm terebinthinate epithems, placed over the chest or epigastrium, or even upon the insides of the thighs, and retained or repeated until erubescence and burning heat were caused, have produced decided benefit. Such instances have occurred where I have met with other practitioners, amongst whom I may mention Mr. FAXON, Mr. BARNWELL, Mr. PAINTER, Mr. BRYANT, Mr. BYAM, Dr. T. WILLIAMS, and Mr. LEESE, who have witnessed with myself the efficacy of this application.

162. β. *Antimonials*, especially the tartar emetic solution, have been much employed in this complication; but the caution already offered respecting their use (§ 142.), particularly in the low forms of fever, should not be overlooked. The doses of tartarised antimony ought not to exceed the quantity advised above. When judiciously employed, and following moderate depletions, it is productive of great benefit, and very frequently prevents the necessity of recurring to bloodletting. In some of the states of predominant pulmonary affection, where, although occurring early in the disease, vascular depletion can hardly be ventured upon, this substance, either alone, or with camphor and small doses of squills and opium, will often prove efficacious. In such low forms of the complication, especially when supervening late in fever, even tartar emetic may not be either beneficial or indicated. In these, the external derivatives just mentioned; ipecacuanha with camphor and opium, or also with squills; the decoction of senega, and other medicines advised in the *Asthenic Form of* BRONCHITIS (§ 79. 84.); will prove most serviceable. It will sometimes become a question, whether or not wine and the more active tonics and stimulants, sometimes required at an advanced stage of adynamic fevers, should ever be administered when complicated with nervous or asthenic bronchitis or pneumonia. To this I would answer, that, having resorted to the means already advised, or merely to dry cupping, the external applications and the internal medicines just insisted upon, without benefit, vascular depletion not being further admissible, the administration of appropriate stimulants and tonics should not be longer delayed, and more especially in an advanced stage of fever, the external means being repeated and assiduously persisted in. Before, however, wine and the more heating stimulants and tonics be resorted to, the effects of camphor in full doses, or of ammonia, with opium, &c., should be fully tried. If the bronchi be loaded with accumulated mucus, and the respiratory functions thereby obviously impaired, the exhibition of an emetic (F. 198. 402.), or repetitions of it, will be serviceable, however late in the disease.

163. γ. The treatment just advised is also applicable to the more rare complication with *pleuritis*. Vascular depletions are more generally required, and may be carried to a somewhat greater extent in it, than in associated bronchial and pneumonic affections. Full doses of calomel, James's powder, and opium, are particularly indicated; and if the mouth become affected, the occurrence may be considered favourable. The external remedies should be strenuously enforced, particularly the turpentine epithem, on the outside of which a piece of soft leather or oiled silk may be laid, in order to prevent evaporation. The tartar emetic solution should also be prescribed; and the more largely, the more manifestly sthenic or inflammatory the fever and local affection; in order to economise the loss of blood.

164. *c*. The *affections of the cerebral functions*, owing to their nature, often present more prominent characters in fevers, and hence attach to themselves greater importance than they are actually entitled to. Even in cases where they have been most remarkable, the *post mortem* examination has not disclosed any lesion sufficient to account for them. The circumstance of their being more frequently caused by the state of organic nervous influence in the encephalon, and by morbid changes in the blood, and of their being often consequent upon affections of the respiratory functions and of the digestive mucous surface, has been too generally overlooked; and a treatment has consequently been adopted, more calculated to interfere with the salutary efforts of nature, than to remove morbid conditions which have actually existed. If we analyse those cases which present, in the common estimation, very prominent lesions of the cerebro-spinal functions, and compare these lesions — whether of mental manifestation or of voluntary power — with those evinced by the other organs or systems, — with the functions of digestion, assimilation, circulation (comprising the changes affected by respiration on the blood), secretion, and excretion — in what will the predominance of cerebral disorder be found to consist? and, still more, to what organ or system will the balance of morbid action incline? Keeping, therefore, this inference in view, that prominent symptoms, especially those connected with the sensitive functions, do not always prove, or truly indicate, the amount of lesion, or even its seat in the part disturbed, the cerebral complications of fever should receive a due but not an exclusive attention, even when most predominant. In proof of this position, I can appeal to no very limited experience, and to those who, like myself, have witnessed the worst forms of typhus fever, as they occurred in various parts of France and Germany soon after the peace, whether or not death was caused more by the cerebral than by the other changes, judging from an intimate analysis of the symptoms in the latter stages, and of the morbid appearances. Indeed, in many instances, the lesions of other organs were individually greater than those found within the cranium.

165. In cases of fever attended by very marked determination of blood to the head, or by vascular action increased to an inflammatory state, or by severe cerebral symptoms at advanced stages of the disease, *vascular depletions*; full doses of calomel, with purgatives, or followed by them, especially by Formula 216., and enemata (F. 140. 150.); and cold applied to the head, particularly the cold affusion on it, the rest of the body being kept moderately warm, or revulsants being applied to the lower extremities; should be promptly resorted to. Bloodlettings ought not, however, to be too implicitly confided in, for they will never of themselves remove this complication. No advantage

will accrue from opening the temporal artery or jugular vein, above that derived from bleeding from the arm; and even this will not be frequently requisite; the more especially as an equal or even greater benefit, at a less waste of blood, will result from cupping largely on the nape or over the mastoid processes, or from leeches in the latter situation and occiput. Both bleeding and the cold affusion on the head may be carried to an injurious length, especially if it be attempted to remove, or materially to benefit, within an inadequately short time, this complication; many of the phenomena of which are dependent upon, and inseparable from, the fever, and to be removed only with it. Let not, therefore, this or any other treatment be mischievously persisted in, with the mistaken view that it can accomplish what the nature of the disease renders impossible; but, at the same time, let it not be insufficiently employed. Purgatives, especially those with calomel, with James's powder, or other antimonials, should follow early depletions, particularly if this complication occurs early in the fever; and at later periods the calomel may be given with opium, every four or six hours, the bowels freely opened, and derivatives applied to the insides of the thighs or calves of the legs. As to the treatment of Coma and Delirium in fever, it is unnecessary to add any thing to what I have advanced in those articles, and at other places in this. It should, however, be recollected, that other complications may coexist with predominant cerebral affection, particularly in adynamic fevers; and if this affection be very severe, or consist of delirium or coma, and more especially if it depend upon a morbid state of the blood, these complications may be thereby masked, and proceed to a fatal height before they are detected. This we have seen to be the case as respects the lungs and intestines, and it is not less so as regards the *liver* and *spleen*. Nor should the readiness with which sphacelation occurs, either from the pressure of the body, or from excoriating discharges, and inattention to cleanliness, and to the preservation of a dry state of the linen, or from blisters or injuries, be overlooked; for an early inquiry after the first indications of this occurrence will often prevent much trouble, suffering, and danger.

166. *F.* The *regimen and management of patients in fever* are much more essential to recovery than is sometimes supposed. Not only are the purity, dryness, and rapid renewal of the air deserving of attention, but also its temperature, which ought to be regulated, as well as the quantity of the bed-clothes, according to the states of vascular action and vital power. The patient should be skreened from too free a current, particularly of cool air, and especially in fevers of low excitement, as the pulmonary and, indeed, other complications may be induced by this circumstance. When excitement is fully developed, the air should be cool, and the clothes light; but in other conditions, especially when the temperature of the body does not rise above natural or is depressed below it, proportionately increased warmth is necessary, in respect of both the air and the quantity of bed-clothes. The room also should be darkened, all noise excluded, and mental excitement or irritation carefully avoided. The mouth and gums ought to be washed from time to time, and the *linen* changed very frequently; the surface of the body being sponged with simple or medicated water, of a temperature in relation to the forms of fever, as stated above (§ 140.). All the evacuations ought to be passed in the bed-pan without leaving the supine posture; and if they take place involuntarily or unconsciously, oiled silk should be placed next the bed, and folded sheets underneath the patient. Care must be taken that retention of urine or over-distension of the bladder does not occur, without being detected at once and remedied. The accounts of the nurse must not be trusted to in this, more than in other matters, but the state of the abdomen above the pubes carefully examined. If pressure cause excoriations, or threaten sloughing, measures should be immediately taken to prevent further mischief. The part may be washed, as Dr. Graves advises, with a solution of ten to fifteen grains of nitrate of silver in an ounce of water, or with a weak solution of the super-acetate of lead in spirits of turpentine; or with this latter and dilute pyroligneous acid; or it may be covered by defensive plasters. If sloughing occur, carrot poultices copiously sprinkled with the chlorates, particularly of lime, or with spirits of turpentine, or with kréosote, must be employed; or poultices with bark, to which either of these may be added; and pressure removed from the part and its immediate vicinity by air-pillows, or by the use of Dr. Arnott's hydrostatic bed. But these unpleasant occurrences should be prevented, where the appearance of the soft solids and the prostration of the patient indicate a disposition to them, by having early recourse to these latter means, and by supporting vital power by the means appropriate to existing pathological states.

167. *G.* The *food and drink in fevers* should be varied with the existing states of vascular action and power. In periodic fevers, light food may be allowed in proportion as the apyrexial period is complete. But in continued fevers, particularly during the early stages, and whilst excitement continues, no food beyond thin water gruel, fresh whey, and orangeade or lemonade, should be given. The best drinks during excitement are those prescribed in the Appendix (F. 592. *et seq.*), or any of the mineral acids in sugared water, and flavoured by lemon peel, or weak black tea, according as they may be congruous with the medicines prescribed internally. Thus, care should be taken not to allow the patient any of the mineral acids, when calomel, or any of the other preparations of mercury, is being taken. But when vascular reaction is low or imperfect, and vital power considerably depressed, or when the pulse is very rapid, tumultuous, and soft, Seltzer or soda water with old wine, hock, or weak punch, or wine whey, spruce beer, brisk bottled stout or brisk bottled beer, &c., according to the peculiarities of the case and the previous habits of the patient, may be allowed. If coma be present, *green tea* is one of the best beverages that can be allowed; and if the powers of life be very depressed, it may be made into a weak punch; the patient also being often roused by talking to him on lively interesting topics. He may be allowed oranges, grapes, or lemons sweetened with sugar, particularly when the mouth is foul and dry; but care should be taken that neither the pulp nor the stones are

swallowed. These will often both refresh and feed the patient as much as is necessary until the decline of the disease. If the fever be prolonged, or of a slow nervous character, very light nourishment may be allowed as the excitement subsides, such as roasted apples, jellies, in some cases asses' milk, sago, arrow-root, tapioca, wine whey, chicken or mutton broth, weak beef tea, &c.

168. *H. Convalescence* from fevers requires the utmost discrimination of the physician, and yet both the patient and his friends are but too eager to supersede his functions. The ill consequences of mismanagement in this period are chiefly — 1st, Relapse; — 2dly, Inflammatory affections of the lungs, bowels, or brain; — 3dly, Dropsical effusions; — and, 4thly, Mental alienation. These are usually caused — *a.* by the patient getting up too early from bed; — *b.* by errors in diet; — *c.* by too early exposure to the weather, to the sun's rays, to cold, malaria, &c.; — *d.* by mental excitement or irritation; — and, *e.* by premature exertion of the physical powers. Convalescence is prolonged and difficult, and the consequent risk of some one of the ill effects of mismanagement supervening proportionately great — *α.* when the fever has been unusually severe; — *β.* when it has been very promptly and actively treated at its commencement, and either quickly subdued or thereby rendered of short duration; — *γ.* when it has slowly subsided without any regular crisis; — *δ.* When it has been complicated in the severer forms stated above.

169. *I. Relapses*, as well as inflammatory or other affections of the principal viscera, are most frequently caused by getting about too soon, and by indulgence of the appetites, particularly that for food, which very generally requires restraint at this period. When the disease has been shortened by large bloodlettings, these or other ill effects, as mental alienation in persons predisposed to it, are very apt to occur. The greater is the necessity, therefore, to place the patient upon the strictest diet and regimen during convalescence. At the same time he should not be kept too low, either in respect of food or medicine; otherwise anæmia, dropsy, mental disorder, chronic debility, and rheumatism, &c. may be thereby produced. Change of air, sea voyaging, and travelling, with due precaution against cold or wet, will particularly assist recovery. If either of these cannot be adopted, the use of gentle tonics, especially when the situation is not remarkably healthy; and strict attention to the bowels, and indeed to all the secretions and excretions; are particularly necessary. The patient should not be in too great haste to remove the hair after fever, or to have it cut too close; and he should be particularly careful not to expose his head to the sun's rays. The return to his occupations — whether mental or physical — as well as to his usual food, ought to be gradual. As the cuticle and hair generally fall off after severe fevers, warm or tepid baths, when convalescence is far advanced, will promote the patient's comfort.

170. If, notwithstanding these precautions, a *relapse* takes place, the treatment should proceed according to the principles developed in this article, with reference to its cause, the progress it has made, the state of action, and of power, &c. The fact of the greatest proportion of cases of this kind being occasioned by errors in diet should not be overlooked. Hence the great success ascribed by the older writers to an *emetic* in such circumstances. Therefore, after the action of an emetic, the bowels also ought to be freely opened by a mild purgative, the operation of which may be promoted by enemata; and the treatment, in other respects, should proceed according to the type and form the disease assumes, and the stage at which our assistance is required. If a relapse is merely threatened, or if the symptoms characterising its invasion be present, the remedies just mentioned are especially indicated, with the other means above advised (§ 121, 122.) in this period. (See the art. DEBILITY, § 36. 43. 45, 46. for still more particular directions as to the management of CONVALESCENCE, and as to the measures that ought to be adopted.)

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See also the BIBLIOGRAPHY subjoined to the chapters on the *Special Forms of* FEVER; the above having reference chiefly to Fever generally.

Those who wish a further reference to the subject may consult also the collections of BONET, MANGET, and PLOUCQUET, where comparatively few of the above works will be found, in this case, as in every other throughout the work.

XI. INTERMITTENT FEVER.

SYN. — Διαλείποντες πυρετοι, Hippocrates and Galen; *Anetus*, Young and Good; *Kalte Fieber*, *wechelfieber*, Germ.; *Paludal Fever*, *Periodic Fever*, *Ague*.

171. DEFIN. — *The febrile phenomena running their course rapidly, observing a certain succession, usually terminating in crises, and returning after regular apyrexial intervals.*

172. Intermittents have been *divided* by modern writers — into the *quotidian*, *tertian*, *quartan*, &c.; into *vernal* and *autumnal*, — into *regular*, *erratic*, and *anomalous*, — into *simple*, *complicated*, and *masked* (FOURRIER, VAIDY, &c.). But in addition to these TYPES, which have reference merely to the *intervals* between the accessions of the paroxysms, agues assume certain FORMS or *characters*, which are still more important than they in a practical point of view. These have been variously distinguished by writers. J. P. FRANK arranges them into the *nervous*, the *gastric*, and *inflammatory*, the second and third of these, in being *complicated*, often assuming a remittent type. J. FRANK divides them into 1st, the *evident*, and, 2d, the *masked*; the former being — *a. benign*; *b. malignant*; *c. regular*; and, *d. irregular*. M. PINEL classes them

into *inflammatory, gastric, mucous, adynamic,* and *ataxic*; — M. Boisseau, into *benign, pernicious,* or *complicated,* and *erratic, anomalous,* or *masked*; — and Mr. Annesley and the Author, into — *α.* the *simple,* or *uncomplicated*; *β.* the *inflammatory*; *γ.* the *adynamic*; *δ.* the *complicated*; and, *ε.* the *anomalous,* or *masked.* — I shall follow the same arrangement here.

173. — i. *Simple Ague — Mild, uncomplicated,* or *benign Intermittent* — appears after a longer or shorter interval from the time when the morbid impression was made by its cause upon the system. During this *formative* or premonitory stage, symptoms of disorder may be more or less manifest; but they are often very slight, or hardly discernible, until shortly before the paroxysm, which may occur suddenly or unexpectedly, with the usual *invading* symptoms (§ 35.). The *premonitory* phenomena are essentially the same in ague as have been described (§ 33.); but frequently, during the few days immediately preceding the full developement of the fit, slight fever appears, and returns about mid-day or a little before; consisting of accelerated pulse, white tongue, thirst, lassitude, and pains in the back and loins, loss of appetite, high-coloured urine, &c.

174. *a.* The *fully developed paroxysm* commences with a creeping chilliness along the spine, with languor or a sense of fatigue, paleness and slight collapse of countenance, lividity of the nails, and a feeling of universal coldness. The temperature of the surface is reduced; the skin is dry and rough, sometimes with livid patches, or spots, especially on the extremities; shiverings, tremblings, or rigors occur; and the teeth chatter. Sighing, oppression, or anxiety at the præcordia, yawning, stretchings, difficult or forced respiration, occasionally cough, and nausea, are also present. The patient complains of a constrictive pain in the head and temples; of aching of the back and loins; and of clamminess and a disagreeable taste in the mouth. The tongue is white or loaded; the appetite lost; the urine limpid, sometimes pale, and voided often; and the bowels are generally constipated. Sickness and bilious vomiting sometimes supervene and hasten the next period; the pulse is constricted, small, weak, and often accelerated; and the mental powers are weakened, or overpowered. — Such is the *cold stage,* which answers to the period of *invasion* described above (§ 35.).

175. *b.* These symptoms, having continued from half an hour to three, very rarely to four, hours, are followed by transient flushes of heat, at first alternating with rigors; by restlessness; great heat of surface; flushings and turgescence of the countenance and skin; rending headach and throbbing of the temples; by a full, strong, and free pulse; high-coloured and scanty urine, intense thirst, and most of the symptoms characterising the period of *excitement* (§ 36.), with the first part of which especially, this, the *hot stage,* corresponds.

176. *c.* After a time varying from two to eight hours, but most frequently three or four, perspiration breaks out over the forehead and breast, increases rapidly, extends over the whole body, and soon becomes profuse. All the symptoms now subside quickly; the urine being more abundant and depositing a lateritious sediment; the bowels being more readily acted upon, and the mind more composed. A sense of exhaustion only now remains, and the patient often falls asleep; and the paroxysm is at an end. This, the *sweating stage,* corresponds with the *periods* of *crises* and *decline* (§ 40, 41.). The whole *duration* of the fit varies from four to sixteen hours, the common length of it being about six or seven.

177. *A. The Types and Intermissions.*—The paroxysm, having terminated more or less completely in health, some degree of lassitude and debility usually remaining, is renewed after an interval, the duration of which constitutes the *type* of ague, — after twenty-four hours, in the *quotidian*; after forty-eight hours, in the *tertian*; and after seventy-two hours, in the *quartan* types. The most common of these is the tertian, which is considered the primary type of fever. These form the primary and *regular* types of intermittents; but there are others which are *irregular,* as the double, triple, and reduplicating tertian; the double, the triple, and reduplicating quartan, &c. Of these, the *double tertian* is the most common, and differs from the quotidian only in having, on alternate days, fits corresponding in severity, character, and duration. The *triple tertian* has two fits on one day, and one the next. A *duplicated tertian* has two paroxysms in alternate days, with one whole day of intermission. A *double quartan* has a fit on one day, a slighter fit the next, and a complete intermission on the third day; the paroxysms returning in a similar manner on the fourth and fifth. A *triple quartan* has a paroxysm on each day — on the two usual days of intermission; but, as in the case of the double tertian, the fit of each differs in character, and period of accession, so that the one returning every fourth day is alike. The *duplicated quartan* has two paroxysms on one day, with two whole days of intermission. Besides these, intervals of four, five, six, seven, or eight days may occur, or even longer periods, constituting *erratic* or *atypic* forms of ague; and may be caused by treatment, by atmospheric vicissitudes, or states of the digestive organs; but they are comparatively rare.

178. *a.* The *quotidian* usually begins in the morning, and continues the longest; having the shortest *intermission,* or period between the termination of one fit, and the commencement of the next. — *b.* The *tertian* usually appears about noon; the duration of the fit being about seven or eight hours, but that of its hot stage being often the longest. — *c.* The *quartan* commences in the afternoon (from two to five), and has the longest cold stage, and the shortest paroxysm. — *d.* The tertian is the most common, the regular quotidian the least so. — *e.* Agues are most prevalent in spring and autumn: tertians and quotidians in spring, and in adults of a sanguineous or bilious temperament; and quartans in autumn, in very young persons, in females, and in the lymphatic temperament. Tertians are the mildest and the shortest in duration; and sometimes disappear of themselves. Quartans are removed with greatest difficulty, particularly in autumn; and they occasionally continue till the following spring.

179. *B.* The longer the *apyrexial interval,* the more complete is the restoration to health; but during this period, or *intermission,* the patient often complains of weakness, of heaviness or pain of the head, of a sense of cold, want of appetite, &c.;

many of the symptoms stated above, as indicating the *formative* period of fever (§ 33.), being present. Indeed, the interval in every respect corresponds with this period. When the ague continues some time, although it may not change its type or form, as it is then prone to do, especially in warm climates, the patient becomes weaker, loses flesh, has a sallow hue, and experiences obstructions or enlargements of the spleen, liver, mesenteric glands, &c., with a deranged state of the secretions and excretions; the disease passing into the complicated states (§ 183.), or terminating as will appear hereafter (§ 189.).

180. *C.* The *conversion* of one type of ague into another often occurs: tertians and quartans changing to quotidians, or to double or triple tertians and quartans, especially when they become aggravated; and quotidians into tertians when they are somewhat ameliorated. Agues, particularly quotidians, may also be converted into remittents, or even into the continued type, by the constant operation of the exciting causes, or by other powerful determining influences; but they often assume a complicated or an irregular form in the course of transition. When the fits of a quotidian, or of a double tertian, or of a triple tertian, approach each other so closely that the one is hardly finished before the next commences, the fever has been called *sub-intrans*, or sub-intrant; and differs but little from a remittent type, excepting that the cold and sweating stages may be somewhat more marked in the former.

181. ii. *Inflammatory Ague.* — Intermittents with more or less of inflammatory excitement have been described by Sydenham, Pringle, Huxham, Selle, Fizeau, Boisseau, &c. Mr. Annesley and the Author have shown their frequency in warm climates, especially during the cold seasons, in elevated situations; and in persons of a previously healthy constitution. They are characterised by very severe rigors in the cold stage, followed by vomitings and intense vascular reaction; unquenchable thirst; by severe and rending headach, sometimes with delirium; by great heat, and by turgescence of the countenance and of the whole surface. The reaction during the hot stage is generally attended, particularly in plethoric persons, by marked determination to, and vascular turgescence of, particular viscera, according to accessory or determining causes. The organs which thus evince a predominance of vascular action, are, the encephalon; the liver and stomach, especially in warm climates, and in autumn in cold countries; the lungs and bronchi, in some instances; and the uterine organs, in rare cases. — This form generally assumes a tertian or quotidian type; is easily removed if actively treated, owing to its common occurrence in sound constitutions; but it rapidly passes into organic change, or into the remittent or continued type, in hot climates, when neglected or improperly treated.

182. iii. *Ague with oppressed Power*, or partaking more or less of an *adynamic character*, is often met with in Europeans who have resided long in hot miasmatous countries; in debilitated persons living in low, marshy, and moist countries; and in the intemperate; but it rarely occurs in these in an uncomplicated state. Whilst vascular reaction and vital power rise above the standard presented by *simple ague*, in the *inflammatory form*; they sink more or less below it, in the *adynamic.* — The cold stage is often attended in this latter, by general tremblings, rather than by strong rigors; and is followed by nausea and vomiting; developing a burning or pungent heat of the skin, which is dry, and occasionally somewhat sallow. The pulse is very quick; the tongue loaded, and red at the edges; and the epigastrium tender and oppressed. This state nearly approaches the *gastric variety* of Continental writers. More frequently, however, this form commences with horripilations, seldom amounting to trembling or rigors; often with nausea and vomiting; fulness at the epigastrium, and headach. To these succeed increased heat, alternating at first with chills; a quick, oppressed, but not hard or full pulse; somnolency, and imperfectly developed and hot and sweating stages. — Thirst is not much increased; the heat is moderate; the skin is sallow, yellowish, or lurid; the urine citron-coloured; and the subsequent perspiration is scanty, or offensive. — This form usually assumes a quotidian, double tertian, or triple quartan type; more rarely tertian; and sometimes erratic. It commences also irregularly, either early in the morning, or in the evening, or at night. The *intervals* are attended by more or less disorder; by an unhealthy appearance of the surface, a loaded tongue, and morbid excretions. The lower grades of ague are more frequently complicated (§ 183.) than simple; or, if the latter, they soon superinduce congestions, obstructions, and organic lesions of important viscera, most frequently of the stomach and bowels, of the spleen, liver, mesenteric glands and pancreas.

183. iv. *Complicated Ague* — *Intermittent pernicieuse*, of the French — *Intermittentes comitate*, of Torti, — the *Malignant*, of some writers — is very frequent in warm climates, and in marshy districts in the south of Europe; and is sometimes met with in parts of this country. It usually presents the preceding form as respects the states of vascular action and power, but it may assume more or less of the inflammatory character, particularly in the early paroxysms. It often has less perfect intermissions than the foregoing forms, especially after two or three paroxysms; is generally quotidian, double tertian, or triple quartan; and frequently passes into a remittent or nearly continued type, especially in Europeans who have resided long in hot countries, and in the intemperate. It appears in two ways; — *a.* primarily in a faulty constitution, or in persons with previous disorder of some important viscus, — and, *b.* as an advanced grade of either of the preceding forms. The most frequent complications are with diseases of — *α.* the digestive and biliary organs and spleen; *β.* of the thoracic viscera; *γ.* of the cerebro-spinal functions; and, *δ.* of other parts.

184. *A. With disease of the abdominal organs*, ague presents diversified symptoms, according to the viscus especially affected. — *a.* If the *stomach be* particularly diseased, severe, burning pain at the epigastrium, with tenderness, distension, nausea, and vomitings, which are increased by whatever is taken into the stomach; distressing flatulency; dry or red tongue; high-coloured and scanty urine; sallow or depressed countenance; yellow streaks around the mouth; imperfectly developed hot stage, with a sharp, quick, and contracted

pulse; pungent heat on the trunk, with little alteration or even depression of it in the extremities; intense thirst, hiccup, and headach or delirium, are commonly present. — *b*. If the *liver* is principally affected, fulness, pain, oppression, or tension at the epigastrium, right hypochondrium, and right shoulder; oppressed breathing; bilious vomiting; diarrhœa, or a dysenteric and morbid state of the stools, which are sometimes black or bloody; a jaundiced, sallow, lurid, and harsh appearance of the surface; and the other symptoms just enumerated; are complained of. — *c*. If the *bowels* are chiefly disordered, the fever assumes a dysenteric character, the evacuations being very morbid; sickness and vomiting are less urgent, or are altogether absent; and the hot and sweating stages are imperfectly formed. — *d*. If the *spleen* be diseased, more or less enlargement is very evident in the region of it; extending into the epigastrium, and over a great part of the abdomen; most of the other phenomena being also present. — These complications may co-exist, or one or two of them may predominate; but they seldom continue long without assuming still more dangerous features; and the patient sometimes dies in the cold stage. The heat of surface often passes from an acrid or pungent state, to a clammy or raw condition, as the paroxysm subsides; and the coldness or lividity of the extremities frequently continues through its imperfectly developed stages — syncope, great debility, quick, small, and weak pulse; a dry, brown, red, or raw state of the tongue; constant thirst; anxiety and oppression at the præcordia; and lastly, delirium, coma, or death, taking place.

185. *B*. The *pulmonary complication* is much less common than the abdominal; but I believe that congestion of the *bronchi* and *lungs* obtains to a greater or less extent in most forms of ague, especially in the cold stage; and that, in the more severe states, a sub-inflammatory condition, or active congestion, often exists, although in a form that can be recognised only by the aid of the stethoscope. Dr. STOKES has adverted to this in his able paper on the treatment of ague. But, in ordinary circumstances, the respiratory organs merely participate with other viscera of the large cavities in the congestion characterising the cold stage. If, however, symptoms of inflammatory, sub-inflammatory, or congestive disorder of these organs continue throughout the hot stage, the ague may be justly considered as complicated with such disorder. The symptoms, even when the pulmonary affection is most severe, are not always very decided, unless the pleura be implicated, which is seldom the case. Those of catarrh, or of bronchitis, are the most common; but the substance of the lungs may be seriously affected without much cough being present; the respiration being only short, quick, or laboured. Particular attention is therefore necessary when this symptom is complained of. The *paroxysm* of ague in this complication is usually *quotidian*, or double tertian; and, in *character*, it may be more or less inflammatory, and but rarely adynamic, unless it has continued for some time.

186. *C*. The *cerebral complication* is seldom observed in the early course of ague; but it often supervenes on the adynamic and the inflammatory forms, and upon that attended by the complications already noticed, especially the abdominal. According to the particular character which the cerebral complication during the paroxysm presents, it has been denominated the *delirious*, *apoplectic*, *lethargic*, *comatose*, *soporose*, *epileptic*, *convulsive*, or *paralytic*, these affections occasionally occurring — the delirious and comatose being the most frequent, the epileptic and paralytic much more rare. TORTI, STARCK, WERLHOF, and BAILLY, have adduced cases of the apoplectic complication; but it is rather a termination of the disease — recovery from it being rare. The convulsive state occurs chiefly in children, as observed by STOLL, especially in warm countries. These states seldom occur in this country, unless towards the close of a neglected or improperly treated ague, when the functions and state of the more important excreting organs have been overlooked. They are, however, more common in the south of Europe, as shown by the numerous cases adduced in the works of GROTTANELLI, BAILLY, and others.

187. *D*. Besides the above, several other complications have been noticed by writers: of these the most remarkable are, the *rheumatic* and *arthritic*, the *neuralgic*, the *asthmatic*, the *nephritic*, and *uterine*. But although instances rarely occur in which these affections accompany a fully developed paroxysm of ague, they present themselves rather as masked intermittents, or without a clearly defined fit.

188. v. *Masked Ague — Simulating Intermittent — Febres Intermittentes larvatæ*, of foreign writers — may assume most diversified forms; or rather, during seasons in which intermittents are very prevalent or *epidemic*, numerous affections, especially those of the nervous system — as *neuralgia*, *rheumatalgia*, *arthritic rheumatism*, and *sciatica*; *gout*; *headach* and *hemicrania*; *amaurosis*; *toothach*; *otalgia*; *catarrh* and *asthma*; *palpitations*; *painful affection of the spleen*, *nephralgia*, *hysteria*; *singultus*; *gastralgia*, or *enteralgia*, or *colic*; *epistaxis*; various *disorders of the stomach*; and *paryalsis* — may put on an intermittent type. Of these, the rheumatic and neuralgic are the most common; and as they frequently are occasioned by the same causes as produce ague, acting in a less intense mode, the circumstance of their intermittent form cannot be a matter of surprise. A case of intermittent *flatulency* lately occurred to me, the quantity of flatus eructated daily from noon to three or four o'clock being enormous, the patient continuing to belch without intermission. The *type* of masked ague is generally quotidian, double tertian, or tertian, and sometimes quartan or double quartan. As in other forms, it is most common in spring and autumn, especially the former, and when easterly winds prevail; and is usually attended by more or less disorder of the digestive, biliary, and excreting organs — a successful treatment mainly depending upon attention to this circumstance.

189. vi. CONSEQUENCES AND TERMINATIONS OF AGUES. — *A*. The *Effects* of ague depend upon — *a*. the previous health and strength of the patient; — *b*. the intensity of the causes, and the duration of their action; — *c*. the continuance of the disease; — *d*. the treatment adopted; — and, *e*. the other circumstances noticed above (§ 47). Intermittents seldom continue long, even in the simple form, or return frequently, without materially

impairing the vital energy and vascular tone of the viscera of the large cavities, especially those of the abdomen. Hence arise — 1st, the complications described above; — 2dly, remittent or continued fevers, with more or less affection of particular organs, or of the circulating and secreted fluids; — 3dly, inflammations or structural change of internal viscera, superseding the periodic seizures; — 4thly, dropsical effusions; — 5thly, chronic dysentery and diarrhœa; — and, 6thly, a fatal issue, chiefly in the cold stage, owing to insurmountable congestion of the lungs, heart, liver, and spleen, or to rupture of this latter organ.

190. The congestions of these viscera, in connection with impaired organic nervous power, more especially of the liver and spleen, give rise, by frequent repetition, to enlargements, to a torpid state of the former, and consequently to engorgements of the portal vessels and of the hepatic ducts; to imperfect secretion and assimilation of the chyle absorbed and passed into the mesenteric veins; to obstructions of the mesenteric glands; to obstructed circulation and its consequences, through the veins contributing to form the portal circulation; and ultimately to an unnatural state of the blood, and structural lesions of the digestive mucous surface, and of the large secreting and excreting glands. Hence, old and complicated agues are accompanied with a sallow, sunk or bloated, and œdematous countenance; pale lips; foul, loaded tongue; yellowish, foul, or lurid skin; fulness, distension, or tenderness at the epigastrium, both hypochondria, and over the abdomen; pain and aching between or under the shoulders, and in the loins; clay-coloured, or dark, watery, offensive, and otherwise morbid stools, the bowels being more or less disordered; dark-coloured and scanty urine; great debility and dyspnœa; and a weak, irregular, and frequent pulse. If *rupture* of the spleen occur, acute pain is suddenly felt in the splenic region; with diffused fulness, pain, and tenderness of the abdomen; small frequent pulse, cold extremities, syncope, &c.

191. *B. Appearances in Fatal Cases.* — *Death* may take place either from overpowering congestions in the cold stage, or from rupture of the spleen; but it most frequently results from the superinduced disease of internal viscera, in connection with exhausted organic nervous power, and sometimes with a morbid state of the circulating fluids, particularly in the adynamic and complicated forms. The chief lesions are seated in the liver, spleen, digestive mucous surface, and lungs. — *a*. The *liver* is often enlarged; its consistence being either increased or diminished; tubercular or purulent formations being, moreover, dispersed through its substance. Increased consistence or density, softening, purulent or tubercular formations, &c. may also exist separately, or in various combinations. Engorgement of the vessels with dark blood; distension of the hepatic ducts and gall-bladder, with a dark or greenish black, thick, and viscid bile; thickening and injection of the ducts and gall-bladder, &c.; are often observed in connection with other lesions, but more especially with enlargement and softening of the substance of the viscus. — *b*. The *spleen* is often remarkably enlarged. Morgagni and Grottanelli found it to weigh eight pounds. In some localities, it occasionally reaches an enormous size. On the Gold Coast of Africa it has been found double this weight in Europeans. I saw a case in which it was nearly eleven pounds. Its envelope sometimes presents appearances of chronic inflammation — is injected, thickened, and almost cartilaginous. Its consistence internally is rarely increased; but is most frequently diminished; its structure being friable, oftener almost diffluent, or consisting of a greyish black semifluid substance, traversed by greyish fibrous shreds or fibres, and containing a sanguineous fluid of a purplish hue, or resembling wine lees. Instances have also occurred where adhesions have formed between the spleen and stomach, and between the spleen and colon in others; and the thick black blood of this viscus has been thus discharged into the digestive canal by ulceration, the matters passed from the bowels or thrown off the stomach presenting a blackish appearance (Morelli, Gasté, Bailly). — *c*. The *digestive mucous surface* is, in various parts — in the ilium, the cæcum, colon, stomach, duodenum, and œsophagus — more or less altered; often softened; injected with dark blood in patches or spots; and occasionally ecchymosed. The mucous follicles are frequently enlarged or inflamed in various parts. *Ulceration* is seldom observed, unless the disease has been complicated with diarrhœa or dysentery; and then this lesion, with thickening and softening of the coats of the bowels, especially of the cæcum and large bowels, and peritoneal injection, is generally observed. — *d*. The *mesenteric glands* are sometimes enlarged, and present signs of obstruction or of chronic inflammation; more especially when lesions of the digestive canal are very remarkable. — *e*. The *pancreas* is occasionally enlarged, in some instances so as to obstruct by its pressure the common bile-duct. — *f*. The *lungs* are sometimes congested; but seldom otherwise changed, unless pulmonary complications have existed, when similar lesions to those described above (§ 53.) are observed. — *g*. The *brain and its membranes* are not often much altered, unless in the comparatively rare cases in which coma has attended the fit; or apoplexy, or convulsions, or paralysis, has occurred in it; when congestion, injection of the pia mater, effusions of serum between the membranes, or in the ventricles, are the usual appearances. — *h*. *Dropsical effusions*, especially in the peritoneal cavity, and cellular tissue; a pale, flaccid, or softened state of the structure of the *heart*; and more or less discolouration of a yellowish, or lurid, or dirty hue; are sometimes also observed, particularly in the more adynamic or protracted cases.

192. vii. Prognosis. — It is evident that an opinion as to the result of ague should depend especially upon the form and pathological condition in which it presents itself. As to these, enough has been advanced to enable the reader to form his own opinion. But, in the adynamic and complicated forms especially, and in protracted cases, the diagnosis should be more or less unfavourable, or at least very guarded. The circumstance, also, that even in more favourable states of the disease, a very dangerous complication, or structural change, may occur, ought not to be overlooked, — apoplexy, coma, paralysis, fatal congestions of abdominal or thoracic viscera, or rupture of the spleen, may supervene. The epidemic prevalence of the disease, and more particularly the influence

of the locality, should be taken into consideration. In some situations, as in this country, ague is a comparatively mild disease; whilst in others, as in some parts of Italy, Austria, Hungary, Holland, low warm countries near the sea coast, &c., they are very serious maladies.

193. viii. Diagnosis.— Ague may almost insensibly pass into *remittents*, especially when it assumes the quotidian, double tertian, or triple quartan types, or the adynamic and complicated forms. But in the latter there is no complete apyrexia, and the cold and sweating stages exist very imperfectly. *Hectic fever* may be mistaken for either of these types. But in hectic the pulse is always accelerated in the intervals, whilst in ague it falls to a natural frequency. The febrile paroxysm of hectic commences in the afternoon, and the sweating stage is of long duration; in quotidians, it begins earlier, its first stage is more severe, and its last is shorter, than in hectic. In ague the countenance is sallow, and the skin muddy or discoloured; in hectic the former is flushed, and the latter clear.

194. ix. Causes.—*A. Remote Causes.*—*a.* The *predisposing causes* of ague are, whatever depresses the physical and mental powers, more especially the causes fully described in the article on the *Causation of* Disease (§ 23. 27. 30. 33. and 35.). — *b.* The *exciting causes* are chiefly, if not solely, exhalations from stagnant water, or from marshy or clayey soils — from the various sources pointed out in the article on Endemic Influences (§ 5. *et seq.*). Some authors, as M. Boisseau and Dr. Good, state that agues may arise from other causes than from malaria. M. Broussais believes cold and moisture sufficient to occasion them; and M. Vaidy supposes that they may be produced by the influence of the mind and by irritation. Dr. Good and Mr. Cooper refer to the rare occurrence of ague in London from the commencement of the present century to 1822 or 1823, and to the frequency of the disease since this time, as a proof of other causes than malaria being in operation. But as respects London and its vicinity, changes have taken place sufficient to explain the circumstance. The streets have been Macadamised, constantly watered, and covered by a wet clayey mud; the soil surrounding the metropolis has been turned up for the purposes of building, &c., to a much greater extent since that period than formerly; and the muddy and marshy banks of the river have been unusually disturbed and inundated by the swell from the paddles of numerous steam-vessels. It should also be recollected, that the morbid impression may have been made upon the system many days or weeks before some determining or accessory cause — as exposure to cold, errors in diet, &c. — has occurred to bring it into action; and that, without such occurrence, no effect might have followed the impression produced by the specific cause of the disease. Besides, after an attack of ague, very slight causes — as cold and moisture, painful injuries; improper diet, indigestions; north-east or easterly winds, &c. — will bring it back, after months or even years have elapsed; the fully developed disease leaving the frame remarkably liable to be affected by the diffusion in the air of the smallest proportion of marshy effluvia. That agues may be caused by *infection*, has been believed by Werlhof, Cleghorn, Marx, Fordyce, Kortum, Amelung, Audouard, and Bailly; and instances have been adduced by them in support of the opinion. Dr. Brown states, that he has met with cases which have led him to suspect that such was the fact. The *epidemic prevalence* of agues is, however, a better established fact, and has been admitted by most writers; the circumstances concurring to cause it being noticed in the article on Epidemics.

195. *B. The proximate Cause or Nature of Agues.* —*a.* Willis attributed agues to a periodic fermentation in the blood; F. Deleboë to the absorption of an acid fluid from the pancreas; and Borrelli to irritation of the nerves, by an acrimony of their fluids. Torti had recourse to something out of each of these three doctrines. Boerhaave and Stoll came nearer the truth, in viewing them as an affection of the nerves that admitted of no further explanation. Selle and J. P. Frank considered them to result from a peculiar irritation of the nervous system, and more especially of the nerves of the digestive organs. Dr. Reil, and M. Roche have entered into long and intricate explanations of the periodicity of the morbid action: the former imputing it to the intermittent character of all the organic and nutritive functions; the latter to the periodicity of the exciting cause, and to a disposition of the organisation to repeat the phenomena, it has several times experienced. M. Broussais attributed intermittents, as well as other fevers, to inflammatory action in the digestive mucous surface; and modifications of the doctrine have been offered by some who profess to belong to the same school — inflammatory irritation in some part of the digestive, or even of any of the abdominal organs, having been assigned by Boisseau, Mongellaz, &c. M. Bailly, taking into consideration the circumstance of the localities of agues being those in which epizooties most frequently occur; and observing that, whilst the latter is always continued, the former is periodic, although the causes are manifestly the same; has come to the conclusion, that the intermittent action is owing to the periodical change from the vertical to the horizontal position, which man only experiences. All these hypotheses, however, fail of fully explaining not merely the periodicity of the several states of ague, but also their difference of type. Those who espouse the doctrine as to the origin of intermittents in inflammation of some part of the digestive organs, are met by the fact urged by Tommasini and others, that true inflammation is not periodic, but continued. Whilst some endeavour to get rid of the difficulty, by giving to the morbid action the name of inflammatory irritation. If, by this latter term, be meant a lower or slighter grade of increased vascular action of a part causing irritation of its nerves, a sort of amalgamation of the inflammatory and of the nervous doctrines is manifestly attempted—more or less of either being assumed, as the circumstances of particular forms of the disease may seem to require. The facts of M. Mongellaz as to the intermittent character of some forms of inflammation; and that recorded by Dr. Elliotson, in which the bites of leeches became irritable and inflamed during a fit of ague; certainly do not prove the cause of ague to be inflammation, but merely what *à priori* reasoning, and a full recognition of the phenomena connected with the disease, might suggest; namely, that

either pre-existing or superinduced inflammation, if it be not sufficiently intense to supersede the intermittent type, will be aggravated during the paroxysm, especially the hot stage of it.

196. *b.* From attentive observation of the disease in localities the most fertile in its cause, I conclude — (*a*) That paludal exhalations act in the manner already stated (§ 95.), and especially affect the nervous system of organic life; — (*b*) That consequently the organs, which are especially actuated by this system, experience the chief effects of the morbid action; the functions of circulation, calorification, digestion, secretion, assimilation, and excretion, evincing the principal disorder, and the organs performing these functions the chief lesions in protracted, or fatal cases, as shown by the appearances described above (§ 191.); — (*c*) That where, owing to the speciality of the exciting cause, and the intensity or continuance of its operation, its peculiar impression is fully made upon the organic nervous system, either pre-existing, or superinduced disease, inflammatory or even structural, if existing in a slight degree, or in a chronic form, will not supersede the periodic or intermittent type; but if such disease be acute or active, or associated with high irritability of fibre and vascular plethora, the type will be either continued or remittent, or change from the intermittent to either of these types; — (*d*) That a similar conversion of type will result from contamination of the circulating and secreted fluids when it reaches a considerable height; — (*e*) That, in localities productive of malaria, the slighter diseases, especially those consisting chiefly of disordered function, or of altered sensibility, assume more or less of the intermittent type; only the most acute maladies, or those of altered structure, or attended by contamination of the blood, assuming a purely continued course; — (*f*) After viewing the effects of malaria arising from the various sources pointed out in the article on Endemic Influences (§ 5.), on the human frame, in the various epochs of existence; after considering the nature of the agents by which such effects may be counteracted, or removed; and after the experience of the primary and consecutive action of this particular cause upon my own system; I believe that it has a primary, specific, and uniform tendency to impair the energy of all the vital manifestations; — (*g*) That the morbid impression having been made by it, and the formative changes having reached that pitch necessary to the production of the cold stage, the consecutive alterations proceed in the manner stated above (§ 101.), but much more rapidly and imperfectly, and in a way insufficient to efface the primary morbid impression made by the cause upon the organic nervous system; consequently the morbid state of this system is little affected by the successive changes characterising the paroxysm; and, continuing the same after, as it was before the fit, is equally efficient in operating a return, after an interval of varying but of short duration, of the same succession of phenomena.

197. From this last inference, and from previous observations, it will appear, that each paroxysm is a complete febrile seizure, the successive and critical changes of which are insufficient in most instances for the restoration of health; that the disorder remaining after the subsidence of the fit is in every respect similar to that characterising the formative or premonitory stage of fevers generally; and that it is necessary to the cure of the disease, that it should be treated in a nearly similar manner. This view is supported by the fact of relapses of continued fevers being common, when their duration is shortened by an active or very depletory treatment at their commencement. As to the periodicity of the return, or the relapse, of the febrile paroxysm in ague, it seems to be the consequence of the specific nature of the exciting cause, of the morbid impression made by it upon the organic nervous system; and of the continuance of this impression, or rather of the morbid state it occasions; for, as long as the morbid condition of this system is uneffaced by treatment, change of air, or by the full evolution of critical changes, it operates a return of the febrile paroxysm after an interval, which may be prolonged or shortened by the state of vital power, and peculiarity of temperament or diathesis. As to any further explanation of the matter, I can add nothing to what is given in the article Disease (§ 155—157.).

198. *c.* The *consecutive changes*, and the *low or complicated forms of ague*, are manifest consequences of repeated seizures, or returns of the disease, in connection with predisposition, and with the intensity and continued operation of the cause. Owing to the impaired tonicity of the vessels, consequent upon depressed vital power, and to the frequent returns or severity of the cold stage, congestions, and subsequently torpor, obstruction, and organic change, of internal viscera, often take place; the large vessels becoming engorged, and the cavities of the heart itself sometimes softened, or distended, and enlarged. — The changes observed in the digestive mucous surface are chiefly attributable to the same causes, and to the morbid condition of the biliary and pancreatic secretions. The low or adynamic forms are evidently results of the intensity of the cause in relation to predisposition and the state of system — of the continued operation of the cause, as when the patient cannot be removed from the locality productive of the malaria — of complications supervening in the course of the disease — and of changes in the circulating and secreted fluids.

199. x. Treatment. — Ague is treated with comparative ease and success, when the patient is removed into a pure air, and when it is neither complicated nor of a low grade. If removal is impracticable, it is often very difficult to manage, and dangerous as respects its consequences or sequelæ, although an unfavourable result may be long deferred.—The treatment, however, in either case, naturally divides itself into that applicable —*a.* to *the paroxysm*,—*b.* to *the interval*, — and, *c.* to *the effects* often consequent upon repeated attacks.

200. *A. During the paroxysm.*— The principal *intentions* that should be kept in view in the treatment of the fit, are — 1st, to guard important viscera from injurious congestions during the cold stage; 2dly, to protect internal organs from the effects of excessive or inflammatory reaction in the hot stage; and, 3dly, to promote an abundant perspiration in the sweating stage, whereby the vascular system and the internal viscera may be relieved.

201. *a. Treatment of simple ague.*—The means advised by Stoll are here generally sufficient.

He employed warm diaphoretics, and external warmth, in the cold stage; refrigerants during the hot stage, and bloodletting if the patient was plethoric; and diluents and diaphoretics in the sweating stage. In some cases, a warm emetic (F. 198. 402.), administered at the commencement of the cold stage, is of essential service, especially when the biliary secretion requires to be promoted. — *Emetics* at the beginning of the fit have been strongly recommended by De Bourges, Cleghorn, Huxham, Murray, Cullen, Trnka, Otto, and Thomson; but, although they may be serviceable in any of the forms of the disease, it is chiefly in the simple ague that they are unattended by any risk. They are contra-indicated by tenderness in the epigastrium or hypochondria; but in other circumstances they usually shorten the cold stage, and render the paroxysm milder. In slight attacks, when no particular viscus is predominantly affected, and the patient is neither very plethoric, nor much debilitated, and the disease has not been of long continuance, little further than diluents and diaphoretics, to promote the sweating stage, is necessary, until the intermission; when the usual means to arrest the disease are to be employed.

202. *b.* In the *more inflammatory form*, and in plethoric or athletic persons, especially in spring, *bloodletting*, general or local, or both, is necessary: if determinations to the lungs, head, or liver be remarkable, it should not be dispensed with; and still more especially if the paroxysms be prolonged and the apyrexia incomplete, — as these circumstances indicate the supervention of visceral inflammation. In these cases, the depletion may be practised in the hot stage, especially at its commencement, and when important parts are threatened by the severity of reaction; although in some instances it is better deferred until the interval, when the state of disorder and the effects of the evacuation may be more justly estimated, than during the tumult of reaction. Dr. Mackintosh, however, advises it to be resorted to in the cold stage; and in cases of the kind now being considered, or when congestion is great, in plethoric persons, it may be safely and beneficially practised. But in ordinary circumstances, or in the lower forms of the disease, I believe it to be a hazardous remedy in this particular stage. This opinion is substantially the same as that which Dr. W. Stokes has stated, after the full trial which he and Mr. Gill gave the practice. Cooling diaphoretics and diluents with diuretics, especially the tartrate of antimony, nitrate of potash, liquor ammoniæ acetatis, &c., are all the additional means usually required.

203. *c.* In the *low or adynamic form of ague*, a warm emetic (F. 198. 402.) should be given only at the commencement of the cold stage, and when indications of inflammatory action in the stomach or liver are absent. — *Warm diaphoretics* and antispasmodics in this stage, the *warm bath* followed by frictions of the surface and of the extremities, and the *vapour bath*, often shorten the hot stage, and give rise to a profuse and salutary perspiration. In several countries, the vapour bath at the beginning of the fit constitutes the chief, and almost the only, remedy against the disease; the copious perspiration following it, removing internal congestions and proving a perfect crisis. — If the paroxysm be attended by great fulness, and tenderness at the epigastrium and hypochondria, *local depletions* should be resorted to in a decided manner, and *hot fomentations* afterwards applied. Where this practice has been already employed; or where the states of vascular action and vital power contra-indicate it, — which, however, will seldom be the case as long as the disease retains its periodic type; or even immediately after local depletions; a *mustard poultice*, or the *warm turpentine epithem*, should be placed over the stomach and abdomen, and retained or renewed until it cannot be longer endured, or until a copious perspiration is thereby produced; the latter application especially causing an abundant and salutary sweat. During the course of the paroxysm, *diaphoretics* should be freely administered with small or moderate doses of *opium*; camphor, ammonia, æther, warm wine whey, &c., may be also used with this intention. If great irritability of the stomach be present, the external means just advised will relieve it; or a large dose of *calomel* with *opium*, or with *camphor*, also, will have the effect.

204. *d.* The *paroxysm of complicated ague* is often irregular, the hot and sweating stages imperfect, and the intermissions incomplete, the disease assuming the characters commonly called *sub-intrant* (§ 180.). The cold stage is also frequently severe or protracted. In these, particularly at the commencement, the *warm* or *vapour bath* is a valuable remedy; especially in the lower and more congestive forms. If the complication be of an inflammatory nature; and if the lungs, liver, stomach, or head, be predominantly affected; general or local depletions, or both, should not be dispensed with. The circumstance of the hot stage being imperfectly developed, is no proof that internal inflammation or structural change may not be present; but is the strongest evidence of the existence either of these, or of congestion, and the most conclusive argument for vascular depletions and the external applications mentioned above (§ 203.). If inflammatory excitement be developed within the head, during the fit; or if delirium, or coma, with increased heat of the scalp, be present; the affusion of cold water on it, or cold applications, should not be neglected. If the disease be not only complicated, but also adynamic, a combination of the means advised in this and the preceding paragraph, according to the predominance of vascular determination, and of impaired vital power, will be necessary. — If *diarrhœa* or *dysenteric symptoms* exist, the internal and external means, already advised (§ 203.), especially the vapour bath, the warm epithems, the combination of diaphoretics with opium, &c., will be most appropriate.

205. B. *Treatment in the intermissions.* — Having by the above means, prescribed appropriately to the different forms and states of the disease, conducted the paroxysm to a safe conclusion, the next object is to *prevent its return.* — Our endeavours to fulfil this intention should be equally strenuous in all the forms of ague; for, although the fit has been slight, a much severer one may follow. Even a comparatively and apparently slight paroxysm may produce almost irremediable mischief in an important viscus; and, however mild, its frequent return often occasions serious structural change.

206. *a*. After the paroxysm, and especially if the disease be recent, an *emetic* should be administered, and its operation promoted by diluents. If it have been given at the beginning of the fit, and acted freely, it may be dispensed with now. But it should not be administered if symptoms of determination to the brain, or of inflammatory action of the stomach, liver, or spleen, be present. After its full operation, a large dose of *calomel* — from ten to twenty grains — ought to be given; and, about four or five hours afterwards, a *purgative* draught. If these act not sufficiently in a few hours, a cathartic enema should be exhibited. Having removed local congestions or general plethora by *depletions*, and evacuated morbid secretions and fæcal accumulations, *cinchona* or the *sulphate* of *quinine* may be exhibited, to prevent the return of the fit. These are almost indispensable preliminaries to the quinine or bark, especially in the complicated and congestive forms: for, without them, it will either not be retained on the stomach; or, if retained, will convert congestions, or slight forms of inflammatory irritation, to active inflammation, or to structural change.

207. *b*. If the stomach remain irritable after the fit; or if pain or tenderness at the epigastrium, with other symptoms of inflammatory irritation or congestion, be present; the full dose of calomel, either alone or with opium, ought not to be withheld; for, as Mr. Annesley has shown by his instructive experiments (*Sketches of the Diseases of India, &c.* 2d ed. p. 374.), this remedy has the effect, in large doses, of diminishing vascular action in the stomach and in the upper portions of the intestinal canal. When prescribed after depletions, general or local, and the external measures described above (§203.), the internal disorder will be removed, and the quinine, which is almost indispensable to the arrest of the disease, will be retained without uneasiness. If *quinine*, especially its sulphate, cannot be procured, the *bark* in substance, in large doses, must be substituted; and conjoined with ammonia, or camphor, capsicum, or opium, &c., shortly before the expected accession of the paroxysm. The decoction with serpentaria, the extract, or the compound tincture, may likewise be employed, but chiefly as an adjuvant. In every state of the disease, during the exhibition of quinine or bark, the excretions demand attention: a full dose of calomel, especially in warm countries, ought to be given from time to time, and followed by active purgatives and enemata. If the alvine excretions, and the biliary and other secretions, be not freely promoted during the exhibition of bark or quinine, great risk of superinducing inflammation, congestion, obstruction, and enlargement of the abdominal viscera, or violent determination to the head, will be incurred.

208. *c*. If the disease have been of long standing, congestion, obstruction, or enlargement, or chronic inflammatory action in some abdominal organ, has probably taken place. In these, the immediate use of *bark* or of quinine will be of doubtful efficacy. The treatment should therefore be commenced with sufficient local depletions, followed by the external mean salready noticed (§ 203.), and by the repeated exhibition of purgatives, a full dose of calomel having been premised and given again at bed-time, as circumstances may require. This treatment is especially indicated in those more severe cases in which the intermissions are imperfect, the tongue much loaded, and fulness, distension, or uneasiness in the upper regions of the abdomen, are complained of. Morbid secretions and local disorder being removed by these means, the sulphate of quinine or bark should be prescribed, at first either with purgatives, or alternately with those which will act decidedly. It is chiefly to a neglect of this practice that complications and unfavourable consequences so often follow the use of bark, quinine, or of arsenic; for these often interrupt excretion, and over-excite and inflame loaded, obstructed, or congested organs.

209. *d*. When the patient cannot be removed from the continued influence of malaria during the treatment, we must nevertheless trust to the energetic employment of the above means; thereby removing morbid secretions, improving the secreting and excreting functions, subduing local disease, and making a powerful tonic impression upon the organic nervous system and digestive organs. With this last view, the doses of quinine or bark should be as large as the stomach will bear, and exhibited shortly before the expected return of the paroxysm, or immediately after the sweating stage, when the intermissions are short or incomplete. Its effects will often be promoted, and it will not so readily offend the stomach, if it be given with camphor, opium, capsicum, pepper, cinnamon, &c., according to the peculiarities of the case. In these circumstances, as well as when the disease presents an adynamic form, or is more or less complicated, especially when the tongue is much loaded, or flabby and pale, the paroxysms prolonged, and the intermissions imperfect, calomel, in full doses, at bed-time, either alone, or with James's powder or opium; a warm stomachic purgative the following morning (F. 216. 266.), thereby procuring three or four evacuations daily; and the quinine alone, or combined in the manner just stated, during the intermissions, or until the accession of the cold stage; are most to be depended upon. If the spleen be much enlarged, and the patient subjected to the enervating influence of malaria, calomel must be given with greater caution, and its effects watched. In such circumstances, the purgatives selected should be prescribed with a tonic; as, the sulphate of quinine with the sulphate of magnesia; the decoction of bark with the sulphate of magnesia and the tincture of senna, or with the compound decoction of aloes; or the compound infusion of gentian, or the infusion or decoction of cinchona with the infusion of senna, and warm tinctures.

210. *e*. In cases of protracted, irregular, complicated and reduplicating ague, as well as in those of a low form, and in those occasionally following remittents or continued fever in warm climates, the *liver*, *spleen*, and *digestive mucous surface*, are generally more or less diseased. The intermissions, even when distinct or perfect, are accompanied with great languor, general uneasiness, want of appetite, a foul or loaded tongue, a sense of oppression in the epigastrium and hypochondria, and unhealthy countenance and skin; the upper abdominal regions being often full, tumefied, or tense. Here, local depletions, if they be not contra-indicated, and calomel, followed by purgatives, as already advised, should precede the exhibition of quinine. We must not, however,

wait for the removal of these signs of congestion and obstruction, before resorting to quinine or the bark; for the patient may sink too low, and vital power become insufficient to resist the progress of disorganisation. It should therefore be given as soon as free evacuations have been procured, and the tongue begins to clean. As long as the tongue is moist, the circumstance of its being loaded must not prevent the administration of quinine, if it be otherwise indicated; but it should be conjoined with a purgative, or the latter ought to be given in the intervals between its exhibition. In ordinary circumstances, I have prescribed calomel, or blue pill, with or without opium, at bed-time; an active and stomachic cathartic early in the morning; and quinine or the bark in a large dose, with camphor, &c., shortly before the return of the fit, or soon after the subsidence of it, when the intermissions are short.

211. *f.* When the *liver* becomes enlarged, and more especially if it be also tender or painful on examination, *local depletions* followed by *fomentations* and *poultices*; in some instances by the *turpentine epithem*; in others by *blisters*, and a judicious employment of *purgatives*, and of the *bark* or *quinine*; as circumstances may warrant, are indispensable. In most instances of enlargement of the liver consequent upon ague, purgatives, if appropriately combined, and firmly persisted in, have a most remarkable and beneficial effect. If enlargement be connected with torpid function, or if the latter only be present, the *mercurial ointment with camphor* may be rubbed over the hypochondrium; or a large plaster formed of the *emplastrum ammoniaci cum hydrargyro*, or of it and the *emplastrum picis*, or the warm *nitro-muriatic lotion*, may be applied over the hypochondrium and epigastrium. An *issue* or *seton* in the right side may also be resorted to if the above fail. In cases of enlargement of the *spleen*, in addition to the use of tonics and purgatives conjoined, the *turpentine epithem*, or the *plaster*, or the *lotion* just mentioned, may also be tried. In all cases of ague, and especially in the protracted, the adynamic, and the complicated, the excretions, particularly those from the bowels, should be carefully and daily examined; and from these, from the appearance of the tongue, the hue of the skin and countenance, and the state of the abdominal regions, should our therapeutical inferences chiefly be drawn. The presence, however, of enlargement of the liver and spleen, especially the latter, although requiring other and appropriate remedies, must not prevent us from having recourse to quinine; for the ague must be removed as soon as possible, in order that its repeated return may not increase the local affection; and as soon as this object is attained, the local disorder will the more readily yield to proper means.

212. C. *Remedies employed to prevent the return of the fit.* — The most certain of these, quinine and bark, have been already noticed. But numerous other substances have a similar operation, although in a much slighter degree. Indeed, any substance which stimulates, in a more or less permanent manner, the nervous system of organic life, tends to efface or to supersede the morbid state or impression made upon this system by the exciting cause of the disease. Hence stimulants and antispasmodics have a febrifuge action, although in a much less degree than bark; and even affections of the mind of an exciting kind exert a similar influence; whilst the depressing passions increase the malady, tend to complicate it, and cause an earlier as well as a severe return of the paroxysm.

213. *a. Cinchona*, or *Peruvian bark*, was brought to Spain in 1632, and came into use in England in or about 1655. It soon afterwards fell into discredit, so that CROMWELL died of ague without the exhibition of it. According to Sir G. BAKER, Drs. PREJEAN, BRADY, and WILLIS, countenanced its employment; but STURMIUS (*Febrifugi Peruviani Vindiciarum, Pars prior.* Antw. 1659) first established its reputation. SYDENHAM, MORTON, and LISTER extended it in this country, and ascertained the circumstances in which it was most beneficial. The preparation of *quinine* and *cinchonine* from the bark, and the combination of the former with sulphuric acid—the *sulphate of quinine*—has been one of the greatest triumphs of pharmaceutical chemistry. This latter substance has, since 1820, in most instances of ague, superseded the bark, as the small dose in which it is exhibited — from two to ten grains — renders it less offensive to the palate and stomach. After morbid matters have been evacuated from the bowels, it may be given in a full dose — six or eight grains — immediately after the fit, or shortly before its return; or a large dose followed by smaller doses every three or four hours; or the latter by the former, may be exhibited. Inflammatory or congestive complications do not contra-indicate its use, as shown above, if the requisite evacuations have been practised; for, in ague especially, the almost simultaneous employment of depletions, purgatives, and quinine, is often both appropriate and beneficial. The quinine or bark should be continued, and the digestive functions carefully attended to, for a considerable time after the disappearance of the fits. In cases where even the sulphate of quinine cannot be taken in sufficient quantity without offending the stomach, M. DE MARTIN (*Rév. Médicale*, Sept. 1827.) has shown that it may be applied efficaciously to the skin denuded of the cuticle, having reduced it to very fine powder and mixed it in cerate. It thus is absorbed into the circulation, and acts upon the organic nervous system through the medium of the vascular system, with which the former is so intimately associated.

214. *b.* Dr. FOWLER's solution of *arsenic* holds the next place to quinine or bark in the cure of ague. Dr. BROWN advises it in preference to quinine, when ague is attended by inflammatory determinations. This may be the case, but I have found quinine, employed as above directed, or given in solution with a neutral sulphate, as that of soda or magnesia, equally beneficial in such cases with the arsenical solution. The dose of this solution should not exceed twelve drops, given every four hours during the intermission, either alone, or with a few drops of laudanum, or with the tincture of hyoscyamus. The *sulphate of zinc*, in doses of two or three grains every four hours, or as much as the stomach will bear, is also efficacious; but chiefly in mild cases, or when inflammatory action is present. It was much praised by Sir G. BLANE, and is the best emetic that can be prescribed in the disease. The *muriate of ammonia* is also capable of arresting the fits, and is best given in an infusion

of cinchona, or of orange peel, or of cloves, in as large doses as the stomach will retain. It was much employed by Muys, Werlhof, Senac, Pringle, and Brocklesby; and is most appropriate to the inflammatory states of ague. Morton gave a scruple of *chamomile flowers*, ten grains of salt of wormwood, and as much of the calx of antimony, every sixth hour; Dr. Heberden, *myrrh* in large doses; and Dr. Cullen, *tormentil* and *gentian* with *galls*.

215. *c*. The preparations of *iron* have been employed, especially the *ferrum ammoniatum*, by Stahl, Triller, Huxham, and Hartmann. The *prussiate of iron* has lately been strongly recommended by Zollickoffer, who prescribed it in doses of four grains twice or thrice daily. —The sub-nitrate of *bismuth* has likewise been given by Henkesen; *phosphorus* with bark, by Hufeland; the flower of *sulphur*, in full or large doses, by Riverius and De Haen; powdered *carbon*, in doses of two drachms, shortly before the fit, by Pierquin; *ammoniated copper*, by M'Causland, Bianchi, and Brera; Dippel's *animal oil*, by Werlhof and Haller; and *cobweb*, by Paulini, Grant, and Jackson.—I have given the *chlorate* of potash with benefit in the decoction of bark, and in the infusion of valerian, with a little tincture of capsicum.

216. *d*. The *barks* of various astringent, tonic, and aromatic trees and plants have been tried, both before the introduction of the *cinchona* into practice, and subsequently as a substitute for it. The most esteemed of these are the *willow bark*. This substance was prescribed by Closius, Günz, Stone, Resenblad, Thilenius, Hilscher, James, Styx, and White; the *angustura bark*, by Wilkinson and Brande; the bark of the *Swietenia febrifuga*, by Roxburgh; *cascarilla bark*, by Hecker and others; the *pomegranate bark*, by Rehmann; the bark of the *Ilex aquifolium*, by Rousseau; the barks of the *chestnut tree*, of the *elm*, and of the *oak*, by various writers; and the *carapa* bark of South America, which has been said to have succeeded where cinchona had failed. Various other stimulating, aromatic, and tonic vegetables, have been employed, and some of them are still in use, either as adjuvants of the bark, or of quinine; or in the form of infusion, as vehicles for other substances. The most useful of these are *quassia*; *serpentaria* (Lysons, &c.); *Calamus aromaticus* (Gulbrand, Moseley, and Horn); *arnica* (Aaskow, &c.); and *Capsicum annuum* (Bergius and myself).—*Ammonia*, *camphor*, the *æthers*, *castor*, *musk*, *myrrh*, *ginger*, *black pepper*, *garlic*, *mustard seed*, &c. have likewise been employed, chiefly as adjuncts to more permanent stimulants and tonics, or in large doses with opium, shortly before the accession of the fit. Of these, the most serviceable are *camphor* and *ammonia*. *Piperin*, the active principle of black pepper, has been lately employed by Bertini, Gordini, and others, in doses of one or two grains, to arrest the paroxysms; and *salacine*, an alkaloid found in willow bark, has been very recently recommended as a substitute for quinine. *Ignatius's bean*, and the preparations of *nux vomica*, were formerly used against ague, by Paullini, Bourieu, Aaskow, Cullen, Horn, and Fouquier; and their active principle, *strychnine*, may also be found useful in the lower grades of the disease, especially when complicated with *diarrhœa*; in which, as well as in the *dysenteric* complication, the tormentil, ipecacuanha, Dover's powder, the hydrargyrum cum creta, and opium, are useful adjuncts to other medicines.

217. *e*. The *mineral acids*, especially the *muriatic* and *nitro-muriatic*, have been given in the decoction of bark, especially when the liver or spleen have been enlarged. I have employed the latter in such cases; and, in a state of very weak solution, as a common beverage for the patient during the intermissions. The *sulphuric acid*, similarly exhibited, has been recommended by Storck and Joerdens. It is an useful adjunct to the sulphate of quinine. The *citric* and *acetic acids* have been directed, but chiefly as an addition to the drink taken in the hot stage, in which, however, acid drinks should not be taken, as they tend to diminish the perspiration, which is more or less salutary.—*Æthers*, especially the sulphuric and muriatic, have also been prescribed in large doses, either alone, or with camphor and opium, shortly before the paroxysm, with the view of shortening the cold stage (Hoffmann, Clutton, and Davidson).—The *volatile alkali* has been likewise employed, similarly combined, and with the same intention; and the various preparations of *antimony* have been given before and during the paroxysm, and throughout the intermissions, in conjunction with bark or other febrifuge tonics. *Alum* was at one time much used in ague, it having been recommended by Ettmüller, Lindt, Mueller, and others. Lange and De Meza prescribed it with aromatics, and sulphuric acid, or æther; and Adair, with cinchona.—The *sulphate of iron* has been tried by several writers; but is of inferior efficacy to the sulphate of zinc, or to the *tincture of the muriate of iron*. The *Prinos verticillatus*, and the bark of the *Prunus Virginiana*, and *P. silvestris*, have been mentioned in favourable terms by Barton and other writers; the bark of the *pine*, by Berzelius; and *valerian* and *gentian*, by Vaidy and others.

218. *f*. *Anodynes* have been used in conjunction with, and as adjuvants of, antispasmodics, stimulants, and diaphoretics. *Opium* has been exhibited with these, and with antimonials, shortly before the fit, by M'Causland, Breda, and Thomann; with *camphor*, by Senac and Amelung; with ipecacuanha and nitre, by Dover; and with aloes and camphor, by Audouard. The extract of *belladonna* has been prescribed with bark and other tonics, by Hufeland and Erdmann; the *Lauro-cerasus*, by Brown Langrish; *bitter almonds*, by Bergius; and the powdered leaves of the *Laurus nobilis*, by Sir G. Baker, given in doses of two scruples, in bitter decoctions, shortly before the paroxysm.

219. *g*. In old and protracted cases, attended by infarction of the abdominal viscera, *mercurials*, especially calomel, have been employed in frequent doses, until slight salivation was produced, by Willis, Stahl, Baker, and Lysons; and the propriety of the practice, in some circumstances, is confirmed by more modern experience.—In similar cases, repeated *frictions* of the surface have proved serviceable, especially with some one of the liniments prescribed in the Appendix (F. 299. 311.). Frictions along the spine, with stimulating substances, have been advised by Hautesierk, Van Swieten, De Haen, Trnka, and others: *rubefacients* and *blisters* over the epigastrium and

upper regions of the abdomen have been directed by **Kortum**, **Schlegel**, and the writers just quoted; and are of essential benefit in congestions, inflammatory irritations, or obstructions of the abdominal viscera, and in the low forms of the disease. Frictions with the *antimonial ointment* have been preferred by M. **Peysson**. Compression of the lower extremities by ligatures shortly before the paroxysm has been advised by **Trotter** and **Kellie**; and the *cold-bath* during the intermissions has received, since the appearance of the work of Dr. **Currie**, numerous and often indiscriminating trials. In the simple form of ague, or during convalescence, when the practitioner is convinced, by a careful examination of the patient and the state of the excretions, that no complication exists, either a common plunge bath, particularly in sea water, or the *shower-bath*, will often prove serviceable, especially when it is followed by a genial glow on the surface.

220. *h. Masked or anomalous ague* requires a nearly similar treatment to that already recommended. The decided and repeated use of cholagogue purgatives, both before, and alternately with, a liberal use of quinine, or other tonics, or of the *carbonate of iron*, especially when the complaint assumes a neuralgic character; change of air, and attention to the digestive and excreting functions, are the chief and most successful remedies. In the more painful or spasmodic forms of these affections much advantage will accrue from conjoining quinine with camphor and colchicum; neither these nor other stimulants or antispasmodics, impairing the sedative action of colchicum, in as far as regards pain. In some cases of this kind I have given the chlorate of potash, in the decoction of bark, and the infusion of valerian, with camphor, and the ammoniated spirit of colchicum, with benefit. The *alkaline carbonates* in large doses, with energetic tonics; and the *kreosote* are also sometimes efficacious.

digestive and excreting organs must be restored,

221. *D. Treatment of the sequelæ.*—The treatment of agues should not terminate with the discontinuance of the paroxysms. The functions of the and the more severe consequences of the disease in the abdominal viscera removed; otherwise, a return of the fits will follow the slightest causes; or the obstructions in these viscera will induce very serious structural lesions. Certain of the complications are also among the most serious sequelæ of ague, especially diseases of the liver, mesenteric glands, large bowels, &c.; for these may both accompany and remain after the fever; or they may not be very manifest, although doubtless previously existing, until the fever has disappeared. This is not infrequently the case with dysentery and chronic diarrhœa, particularly in warm climates; and with dropsies in this country, which, however, are only contingent consequences of the disease. The treatment must mainly depend upon the nature of the consecutive affection, which, as respects the *liver*, commonly consists of enlargement, chronic inflammation, or both, with or without more or less obstruction of the portal circulation, or of the biliary secretion. In either case the means which have been recommended by Mr. **Annesley** and myself, viz. local depletions, followed by repeated blisters or setons; a full dose of calomel, taken occasionally at bed-time; the hydrargyrum cum creta or blue-pill the intervening nights; and mild purgatives early in the morning; will be found most beneficial. After these have been persisted in according to the nature of the case, and the more active symptoms have been entirely removed, this organ continuing torpid, the *nitro-muriatic acids* used both internally and externally, and exercise on horseback will be of service; but mercurials must have been relinquished some time before the use of the acids. Lastly, a course of Cheltenham or Harrowgate waters, or judicious substitutes for them, used daily and perseveringly, will confirm the recovery.

222. If enlargement of the *spleen* be present, or that of the *mesenteric glands* be inferred, frictions of the abdomen with warm stimulating liniments (F. 311.); stomachic purgatives, as rhubarb with sulphate of potash, and small doses of the sulphate of iron; the hydriodate of potash in moderate doses; and blisters, setons, moxas, &c. will be found most successful. In neither of these states of disease will depletions be required, unless pain and tenderness on pressure be complained of, when local depletions, followed by blisters or the turpentine epithem, will be sufficient. The most appropriate treatment in cases of consecutive *dysentery* and *dropsy* is fully described in these articles.

inflammatory form, or associated with active de-

223. *E. The Diet* during the intermissions should be light, nourishing, in very moderate quantity, and taken at a time not too close upon the accession of the paroxysm. If the disease be of an termination to an important viscus, *abstinence*, as directed by **Celsus**, **Senac**, **Tessier**, &c. should be observed. Whilst purgatives are being employed, broths and weak soups are most suitable. In the paroxysm, diluents only are admissible.

224. *F. During convalescence*, strict attention should be paid to the diet and regimen, and to the states of the digestive and excreting organs. The latter should be assisted occasionally, and always when they are sluggish, by the usual means; and quinine, the other preparations of bark, or different tonics, should be continued for some time after the disappearance of the paroxysms. Regular and moderate exercise, especially on horseback, also, will materially promote recovery. Exposure to cold easterly or northerly winds, or to the night air and moisture, ought to be carefully avoided; and if change of air cannot be enjoyed, or if the patient be still liable to be exposed to malaria, the *Prophylactic Measures* advised in the article **Endemic Influences** (§ 20.) should be adopted as far as circumstances will permit.

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See also the BIBLIOGRAPHY to *Fever in general*; and PLOUCQUET'S Repertorium, which contains a numerous list of foreign works, down to the commencement of this century, very few of which are here referred to.

XII. REMITTENT FEVER. SYN. — *Exacerbating, Paroxysmal, Sub-continual, Endemic, Endemial, and Endemical, Fever*, of various writers.

225. DEFIN. — *The febrile phenomena evincing striking exacerbations and remissions, one paroxysm occurring in the twenty-four hours.*

226. This fever, although holding a middle rank between agues and continued fevers, approaches the former most nearly in its causes, phenomena, and consequences. It is most common in warm climates, and in the warmer countries without the tropics, in which it is most prevalent in summer and autumn. It is strictly a disease of locality and climate, and hence very generally denominated *endemic*; but as climates and localities vary remarkably, so is it modified in character from the mildest form, in which it is similar to simple ague in every respect but the complete remissions, to the more malignant states, in which it so nearly approaches yellow fever in warm countries and seasons, and continued fever in temperate climates, as to have been frequently confounded with them. To intertropical practitioners, especially, as well as to those in temperate countries which abound with the endemic causes of disease, this fever presents great interest. It is not infrequent in the vicinity of London; and in marshy localities in the southern counties of England, and Ireland, during the summer and autumnal months.

227. i. CAUSES. — The *predisposing* and *exciting causes* have been noticed above (§ 194.), and more especially in the articles DISEASE (§ 31. 55.) and ENDEMIC INFLUENCES. Dr. CHAMBERS has supposed that remittents arise from two principal sources: — 1st, from marsh-miasmata; 2dly, from sudden vicissitudes of atmospherical temperature precipitating some other deleterious principle evolved from hidden sources. — Of this latter, however, we can have little or no knowledge; and, even granting the evolution of such a principle, we have no evidence of any sources from which it can arise different from those pointed out in the articles now referred to. As, therefore, the exciting causes of endemic fevers in *adults* are chiefly emanations from the soil — from decaying organic bodies on its surface or commingled with it — and from stagnant putrid water; and, as these causes are necessarily varied in concentration, activity, and in their nature, according to the states of the air, and to the varying proportions of vegetable and animal matters undergoing decay, so it must be inferred that the effects produced by them, even when the constitution of the recipients is the same, will be also varied: but, when we consider the great variety of habit, organisation, temperament, and susceptibility, it must necessarily be concluded that the forms and states of fevers resulting from

these causes must be still more remarkably diversified, and will vary, not merely in type, from a simple tertian, through the remittent forms, to a purely continued state; but also as to vascular action, vital manifestation, and visceral complication. Remittents, therefore, and as observation has repeatedly proved, are merely severer grades of the same pathological states as constitute intermittents; a more concentrated form, or intense action of the exciting causes which produce the latter, either absolutely or relatively to the predisposition or susceptibility of the individual, also occasioning the former. That concentration of the exciting causes, or intensity of action, is, in some measure, concerned in creating the difference, is shown in the constant residents of an unhealthy locality having ague at one season, when the exhalations are rationally inferred to be neither abundant nor intense; and remittents at another, when these causes are either the one or the other. That the state of the recipient has a marked influence, is proved by persons recently arrived in districts productive of endemic fevers having some one of the forms of remittent at the same time and place as those who have been long resident have ague. Remittents are most prevalent in autumn, next so in summer, and the least so in spring. They rarely occur in winter, in temperate countries, unless in those which nearly approach the tropics.

228. ii. DESCRIPTION, &c.—From the varying forms remittents assume, owing to the circumstances just mentioned, it is evident that all *divisions* of them must be purely conventional, and founded on degrees of severity, and on alterations of their most prominent features. M. BEAUMES has distinguished them into three grades — the *severe*, the *less severe*, and the *benign;* and M. BOISSEAU into the *inflammatory*, the *bilious*, the *mucous*, the *adynamic*, and the *ataxic*. The three last of these are merely modifications of the adynamic, as respects the state of vital power and vascular action. I shall adopt a nearly similar arrangement to that which I have stated above (§ 44.)

229. *A. Mild remittent* appears after slight ailments of several days' duration; the precursory symptoms being chiefly uneasiness at the epigastrium, lassitude, and pains in the back, limbs, and head, with restlessness at night. These may continue for some time; the *formative period*, or the time elapsing from the impression of the cause to the *invasion* or developement of the febrile phenomena varying from five or six to about thirty days, as determining or accessory circumstances may arise to accelerate or reinforce the action of the chief cause. The stage of *invasion* is similar to that already described; it being attended by coldness of the surface, and frequently by shivering. The coldness is soon superseded by heat, by febrile flushes, or by alternations of heat and cold, by nausea, and occasionally by vomiting, which soon develope the stage of *excitement*. With it, the pains of the head, back, and limbs become remarkably aggravated; the mouth is clammy and dry; the tongue white or loaded; the surface very hot and parched; the face flushed; the features tumid; and the pain of the head attended by a feeling of distension and throbbing, often passing into delirium. The pulse, which, at the invasion, was small, irregular, and weak, is now full, large, strong, and frequent; thirst is urgent; the bowels constipated; and the urine scanty and high-coloured. There is always more or less tenderness at the epigastrium, with nausea, and often with vomiting. These symptoms generally continue from about ten or twelve to eighteen hours, when perspiration breaks out; the pulse falls in frequency and strength; the irritability of the stomach subsides; delirium disappears; and the skin becomes cooler: but there is merely a remission or abatement, but no intermission, of the febrile symptoms. The remission usually continues from three to nine or ten hours, when an exacerbation occurs, sometimes preceded by chills or shiverings, at other times not, and the severer symptoms are renewed. Thus the disease proceeds with alternate remissions and exacerbations, the former generally taking place in the morning, until the seventh day, or the ninth, eleventh, or fourteenth day, or much later, in temperate countries, when a copious perspiration generally puts a termination to its progress. This form of fever has a particular disposition, as Dr. JACKSON has remarked, to a favourable critical change on the seventh, fourteenth, twenty-first, and twenty-eighth days; but in warm countries it seldom continues longer than fourteen days.

230. *B.* The *inflammatory form* frequently attacks sanguine plethoric Europeans residing in warm miasmatous climates. It differs from the foregoing chiefly in grade, and the greater degree of vascular reaction in the period of excitement, which is sometimes so great as to exhaust the tone of the vessels and the powers of life, and even to change the blood, thereby simulating some forms of epidemic or continued fevers, especially when the remissions become obscure, as is often observed in the worst cases. It commences either as the foregoing, or with rigors, pain and sickness at stomach, and oppression at the præcordia, followed by vomiting, headach, great dejection of spirits, and mental delusions of a low or gloomy kind, sometimes impelling the patient to suicide, which, in two instances, I have seen attempted even before much complaint had been made. In other cases, the patient falls down in a state of syncope, following several days of indisposition, with a cold pale surface, and dejected countenance. The pain of the stomach and head increase, is attended with vomiting, sometimes of bilious matters, at other times of a whitish fluid, with fulness and tenderness at the epigastrium. The vomiting is generally followed by vascular reaction: the pulse, from being small, weak, irregular, or intermitting, becomes full, strong, and very quick; the face injected and tumid; the eyes prominent, watery, and red; the thirst intense; the throat arid and sore; the tongue furred, its edges red; and the headach and delirium increased. In about twelve or fourteen hours a copious perspiration breaks out, the symptoms subside, and the pulse falls to about ninety. After a short remission, the thirst, pain at the stomach, headach, &c. are aggravated, and the delirium and vomiting return. If the disease be neglected at the beginning, the remissions disappear, the skin becomes dry and caustic, or moist and clammy; the pulse small and irregular; the tongue black and crusted, and the vomiting, pain at the epigastrium, &c. more

constant. In the most severe and unfavourable cases, yellowishness of the skin, or vomiting of matters like coffee-grounds, or both, occasionally supervene. The bowels, which, before the attack and at its commencement, were torpid, are, at further advanced stages, irritable; the evacuations being watery, greenish, and, at last, almost black; the urine being very scanty and high coloured. If the disease be not actively treated at the commencement, an unfavourable termination takes place between the third and seventh days; but it is often prolonged beyond this period, and it then generally occasions visceral disease.

231. Such is the inflammatory remittent of warm climates. A nearly similar fever attacks unseasoned Europeans lately arrived in the West Indies and intertropical Africa, and often presents an obscurely remittent or almost continued type. It has been very generally mistaken for true yellow fever, owing to the malignant symptoms it assumes at an advanced period, or state of exhaustion consequent upon the vascular excitement of the early stage. The inflammatory remittent, the bilious inflammatory, the adynamic or malignant remittent, and the ardent or seasoning fevers of Europeans lately arrived in warm countries, are merely modifications of each other, and differ essentially from epidemic yellow fever, with which, however, they have been all most singularly confounded.

232. *C. Bilio-inflammatory remittent fever* differs but little from the foregoing in its characters and course. It is most prevalent in Europeans who have not resided long in a warm miasmatous country, and in low marshy localities, or in thickly wooded districts. In temperate climates, it is observed chiefly in the autumns consequent upon very warm summers; and in the bilious or bilio-sanguineous constitutions. It is often dependent upon the vicissitudes of season, especially wet seasons following great warmth, or a very hot summer consequent upon a wet spring; and it is often very prevalent or almost epidemic during the hot months, after very heavy rains, within the tropics. Violent determination to the brain characterises the commencement of reaction, in this variety; and inordinate affection of the liver and digestive mucous surface, the more advanced stages. Pain in the head is most severe, especially in the forehead and sockets of the eyes; the conjunctiva is yellow or suffused; the countenance and skin become dusky or yellow; the tongue is loaded by a bilious coating; and the evacuations are bilious; especially the matters thrown off the stomach. The bowels are at first costive, but they afterwards often become irritable or dysenterically affected. After the vomiting has continued some time, the appearance of the matters is changed, and ultimately assumes in fatal cases the characters just described (§ 229.).

233. *D.* The *adynamic or malignant remittent* is one of the severest and most fatal of endemic fevers. — *a.* It is observed only in places where the endemic causes are concentrated or intense relatively to the state of predisposition; and is seldom ushered in by shiverings, but generally by a prolonged sense of cold, universal collapse of the vital powers, and of vascular action. Pain in the head of a peculiar constrictive kind; mental depression and insane delusions; imperfect efforts at reaction; remarkable lassitude and pain in the loins and limbs, are present at the commencement, with great anxiety, pain, and oppression of the præcordia, and nausea, sometimes giving rise to vomiting, which assists in developing the stage of excitement, and in partly overcoming the internal congestions. The pulse is small, constricted, or irregular; the skin becomes dry and caustic, or moist and clammy; and impresses the hand of the observer with an acrid or tingling sensation; the eyes are watery and injected; the tongue is clammy, moist, or flabby and coated, and afterwards dry, rough or brown; the face is flushed, but dusky or purplish: the bowels are costive, subsequently relaxed or irritable, and the urine is scanty, high coloured, or suppressed. After twelve or fourteen hours, a slight remission is observed, after which the symptoms are exacerbated; the stomach is remarkably irritable; the epigastrium painful and tumid; the breathing hurried; and the patient restless and distressed. In the more dangerous cases, hiccup, constant vomitings, yellowish discolourations of the skin, exudations of blood from the digestive mucous surfaces, low delirium, and death, supervene between the fourth and seventh days.

234. *b.* This variety is variously *modified*, in different circumstances and persons. It sometimes assumes more of a *cerebral or typhoid character;* at others, it is *bilious or gastric*, according to peculiarity of season or concentration of the cause. In some intertropical countries it becomes epidemic, or rather this endemic is more than usually prevalent. Occasionally the remissions are indistinct from the commencement, and they generally become so after three or four days. — *α.* In some cases the vascular excitement is at first more or less intense, with remarkable determination to the head, liver, and stomach, and maniacal delirium, the disease very nearly approaching the inflammatory, or bilio-inflammatory forms. — *β.* In others, vascular reaction is very low and imperfect; the pulse small and quick; the abdomen tumid and hot, whilst the extremities are cold or clammy; the evacuations foul, morbid, and offensive; the tongue fuliginous; the gums, spongy, or oozing a bloody sanies; the vomiting constant, and ultimately grumous and dark; the stools towards the close, black or pitchy; the urine scanty or nearly suppressed; the solids flaccid; and the skin earthy or discoloured. In both these states, a yellowness of the surface occasionally presents itself about the third or fourth day, beginning in the conjunctiva, neck, and breast. The yellowness often passes to a pale greenish hue, in patches, shortly before death; and the soft solids present a liquescent state, having lost their vital cohesion.

235. *c.* In other cases of this form, the symptoms are at first mild, and the excitement inconsiderable; when, after two, three, or four exacerbations, the powers of life appear suddenly exhausted; the pulse becomes weak and fluttering; the tongue foul, black, and dry; the evacuations offensive; the prostration of strength extreme; and the fætor of the perspiration remarkable. At last, great anxiety; tenderness and tension of the epigastrium; fulness of the hypochondria; collapsed features; a squalid or yellowish surface; vomiting of dark or grumous matters, supervene, and indicate the utmost

danger. This insidious modification of the adynamic form generally occurs in persons highly predisposed, or who have suffered from bowel complaints, or who are debilitated, and are subjected to the more concentrated effluvia.

236. *d.* In some instances the remittent commences in so mild a form, that the patient is even able to walk about his apartment; and, for several days, complains only of irregular exacerbations of fever, when, suddenly, violent and malignant febrile action supervenes, which rapidly exhausts vital power, and either quickly carries off the patient, or induces serious structural change in several of the abdominal organs. In other cases, vascular excitement is hardly manifest at any period of the disease, the exacerbations consisting merely of increased anxiety, restlessness, general distress, and mental depression, occasionally with augmented sickness; and pain in the head, epigastrium, and loins; the pulse being but little accelerated until the close, and the temperature, unless at the epigastrium, rather under than above natural. In these, however, the weak, soft and open or irregular pulse; the dark-coated, or soft, flabby, and lobulated tongue; and the blackish, greenish-brown, and morbid excretions, in connection with the other symptoms, denote extreme danger. It would seem as if the causes had nearly annihilated the irritability of the moving fibre, and deprived the system of its ability of reacting upon, or superseding, the morbid condition induced by their first impression.

237. E. *Complicated remittents.*—Complications are observed in the inflammatory, bilio-inflammatory, and adynamic forms; the alterations that take place in the seats of predominant disease, being the chief causes of unfavourable terminations. The importance, therefore, of recognising them at an early period must be evident.— *a.* Amongst the earliest complications in remittents are *inflammatory states of the mucous surface of the stomach and duodenum.* This condition is indicated by constant irritability of stomach; by fulness, heat, and tenderness of the epigastrium; and by a foul loaded tongue, with red sides and apex. This pathological state often extends to *the small intestines*, and even to the *large bowels*, as indicated by tumefaction and tenderness of the abdomen; by a sense of inward soreness or heat; by irregularity of the bowels, or frequent, scanty, and morbid evacuations; and by diarrhœa or dysenteric symptoms. If the *large bowels* be chiefly affected, the dysenteric symptoms are more urgent; and on examination soreness or tenderness will often be complained of in the region of the cæcum and course of the colon. Remittents thus associated often pass into, or terminate with, dysentery. The *gastric complication* is frequently induced by the irruption of an acrid bile at the commencement of the fever; the morbid state of this secretion irritating and inflaming the parts over which it passes. The *intestinal affection* probably arises from the same cause, or from accumulations of mucous sordes or other morbid matters in the bowels. But collections of acrid and morbid secretions and of fæcal matters most frequently occasion the *dysenteric disorder*; and a morbid state of the bile frequently contributes its aid also in producing this complication.

238. *b. Disease of the liver* is a common complication of remittents, especially in the East Indies and in warm climates; and even in this country. In most cases of this fever, the functions of the liver are disordered; but actual structural change is also common; and may appear early in the disease, or at later periods. The biliary secretion is most frequently increased; in a few cases it is diminished; and in some it is accumulated in the ducts and gall-bladder for a time, and is afterwards let loose, increasing the disorder of the stomach and bowels. But, whether in excess or diminished, it always is more or less changed in quality. The structural affections of the liver attending remittents are nearly the same that are met with in agues, excepting that inflammatory action, acute congestion, or moderate determination, affects its internal structure more frequently in the former than the latter, and the vascular action partakes more of the asthenic character. With congestion and inflammation, more or less enlargement also exists; and occasionally puriform matter is formed; but the latter is seldom evinced by diagnostic symptoms; signs of diseased structure of the viscus being only apparent. Even when horripilations or rigors do occur, they are liable to be mistaken for the cold stage of the paroxysm. *Softening* of the internal structure of the liver, with or without congestion or enlargement, is a common lesion in the adynamic states of this fever. I have observed it most frequently after fulness, tenderness, a sense of burning, or pain in the right hypochondrium and epigastrium, with great anxiety, intense thirst; dark-coloured and loaded tongue, very quick and weak pulse; offensive evacuations, and dark grumous vomiting. *Disease of the spleen* is a common complication in old European residenters in hot climates, and in many localities in the south of Europe. It is similar in kind to that already noticed. In the low forms of remittent complicated with disease of the liver or spleen, the greatest care should be observed to avoid roughness in the examination of the abdomen and hypochondria. Too great or sudden pressure has produced irreparable injury in such cases.

239. *c. Determination to the brain* of an active kind, rather than pure inflammation, often occurs early in the more severe remittents. In the most prominent of this class of cases, the symptoms of cerebral excitement, and increased vascular action in the brain, are superseded by stupor, coma, low delirium, and typhoid or adynamic symptoms. The peculiar delirium, insane delusions, and mental depression or apprehension, which often affects the patient from the commencement, seems to be less the result of inflammatory action in the brain, than of impaired nervous and cerebral power. It often passes off, or it changes into a state of apathy or indifference to the result of the disease, and strong disinclination to take the medicines prescribed. This effect upon the spirits and mental powers evidently arises from the peculiar or specific action of marsh poison, which, as I know well from experience, occasions a distressing feeling of depression and despondency, even when it does not induce open disease. Maniacal excitement or delirium often passes into coma or stupor, and the patient expires as if in a quiet sleep.

240. *d.* The association of remittents with *pulmonary affections* is observed in temperate countries, especially in the spring and summer; and

more rarely in warm climates. The pulmonary functions are more or less impaired during the formative and invading periods; but acute disorder is seldom developed until the period of excitement, and consists chiefly of *bronchitis*, *catarrh*, and *pneumonia*, of a nervous or congestive form. In some cases *congestion* of the lungs, and of the bronchial surface, commences during or shortly before the period of invasion; and either partially continues throughout the disease, or passes into a low form of inflammatory action, and even into hepatisation. *Rheumatism* is also occasionally complicated with remittents; and *erysipelas* sometimes supervenes when a part is injured, the cuticle abraded, or the skin divided. *Ulcers* and *sores* not unfrequently take place on the lower extremities in the course of remittents, as well as of intermittents, particularly in low, wooded and swampy districts within the tropics.

241. *F. The terminations of remittents* are—1st, In restoration of the healthy functions;—2d, In a chronic form of remittent;—3d, In organic change of one or several important viscera, particularly of those which manifest predominant disease during the progress of the fever;—4th, In fever of a different type;—5th, In dysentery;—and, 6th, In death. Although any of the *consequences* pointed out above (§ 47. 189.) may arise, changes of the viscera of the abdominal cavity are by much the most common, in this class of fevers, as well as in agues. The PROGNOSIS is apparent from what has been advanced, and in every respect agrees with what has been stated on the subject above (§ 57. *et seq.*).

242. *G. The lesions observed after death* from remittents, as respects both their seat and nature, differ but little from those already described in connection with agues. They, however, are of that kind which are generally observed to result from acute action in connection with deficient power. The *liver* is usually injected, remarkably softened, of a dark colour, friable, and sometimes enlarged. The *spleen* is often so soft as hardly to admit of being handled. The *digestive mucous surface* is softened, injected, ecchymosed, of a dark due, and sometimes thickened, abraded, or even ulcerated in the lower parts of the canal. The *mesenteric glands* occasionally, and the *pancreas* more rarely, are enlarged or otherwise changed. The *bronchial lining* is generally dark, injected, and soft. The *lungs* are sometimes congested, infiltrated, condensed, or inflamed. The *pleura* and *pericardium* often contain some dark sanguineous serum; and the substance of the *heart* is frequently soft, flaccid, and readily torn, the cavities being occasionally dilated, more especially after the adynamic states of the disease. Adhesions between the pleuræ are rare. The changes *within the cranium* consist chiefly of congestion of the veins of the pia mater and sinuses, with a fluid dark blood; and sometimes of effusion of serum into the ventricles, and between the membranes. But the lesions of the encephalon are seldom very great, or in relation to the severity of the cerebral symptoms during life.

243. iii. DIAGNOSIS.—It might be supposed that the remissions would be a sufficient characteristic of this fever, and they certainly are so as respects the remitting type. But the occasional occurrence of yellowness of the skin, and of black vomit, in the advanced stages of its more intense forms, has been the means of confounding it with two other species of fever, in which also yellowness of the skin and black vomitings occur — the *bilio-inflammatory* or *ardent fever*, which attacks only new comers to an intertropical country, especially America and Africa — and the *true infectious yellow fever*, which sometimes spreads in a most pestilential form. The more intense and adynamic forms of remittent, the bilio-inflammatory, or ardent seasoning fever of Europeans recently arrived in a hot climate, and the true yellow fever arise from different causes, and present different phenomena at their commencement and early course, although the character of the symptoms often approximates in their last stages.

a. 244. As respects the *intense and adynamic states of marsh remittent*, it has been shown above that the exacerbations seldom continue above fourteen or eighteen hours, so that one takes place daily, varying however, in intensity, so that they thus usually present a quotidian or double tertian type; but in the *bilio-inflammatory*, or *ardent seasoning fever* of Europeans, the type is continued, or a remission does not occur till after thirty or thirty-six hours, a different train of symptoms then usually appearing. These two fevers arise from different causes; — the *remittent* always proceeds from malaria in some form; hence it is common to all warm countries, and to temperate regions in warm seasons, and varies remarkably in severity; *the bilio-inflammatory* or *ardent fever* may probably also arise from the same cause, but it is more especially the effect of temperature upon European constitutions, or of atmospheric vicissitudes and other causes acting concurrently with these; hence the much greater uniformity of its character, in which it nearly approximates to the bilio-inflammatory form of the remittent. Whilst remittents can, in every instance, be traced to terrestrial exhalations — to the sources described in the article ENDEMIC INFLUENCES, ardent fever often appears where the operation of such causes has been impossible, and where I have endeavoured in vain to account for its occurrence, excepting in the way stated hereafter.

245. *b.* These two diseases are *the seasoning fevers of Europeans arrived in a hot climate* — ardent fever commonly appearing in robust plethoric persons who have emigrated to the West Indies, intertropical Africa, &c.; the intense forms of remittent, in those less robust, or who have not been attacked by ardent fever, and who have been exposed to malaria after their arrival. This statement is illustrated by the following facts which came under my own observation in 1817 and 1818: — Some young men arrived from Europe in a place within the tropics, during the healthy season, and where no sources of malaria then existed. They soon were attacked by the common ardent fever, with two or three exceptions, and recovered by means of the treatment advised for this disease; but during the unhealthy season, several of them had remittent fever; and those who had not been attacked by the ardent seasoning, had the more severe forms of remittent, which was their seasoning. In the East Indies, the inflammatory forms of remittent are the most frequent fevers in recently arrived Europeans; but in the West Indies, ardent fever is the most common, especially in the young, plethoric, or robust — in those much exposed to the sun's rays, who use great

exertion, and live freely or intemperately, who neglect their bowels, or check the perspiration. — In the latter, the yellow skin, and vomitings of dark matters are most frequent, and appear earlier than in the intense forms of remittent, and both diseases, although distinct, have been denominated yellow fever, from the contingent appearance of a single symptom, towards their close, and have thereby been confounded not only with each other, but also with another fever distinct from both, and merely because one *or* at most two symptoms are common to all three, but only in the last stage of the most unfavourable cases.

246. *c. The true or pestilential yellow fever* is different from severe remittents and from ardent fever, *neither of which is infectious*, whilst *true yellow fever is eminently infectious.* — *α. Ardent fever* occurs only in Europeans recently arrived in hot climates, and never in the acclimated, nor in aboriginal or native inhabitants: it cannot attack the dark-skinned races, and the assimilated European. — *β.* The *severe forms of remittent* affect both those who have recently arrived in miasmatous districts after they have been exposed to endemic causes, and those who have resided longer, and become seasoned or acclimated, especially when the causes have been concentrated or intense. They may also attack individuals from adjoining districts, especially from elevated situations, when they descend to the low grounds, and swamps near the sea, or the embouchures of rivers; but they rarely affect the aboriginal inhabitant, and the negro races. — *γ.* The *true yellow fever*, on the other hand, attacks the unseasoned, the seasoned, the constant resident, and the dark-skinned races — the negro as well as the European — all within the sphere of its infection *who have not previously had the disease.* A former attack protects from true yellow fever; but remittents will occur again and again in the same person; and even ardent fever will occur a second time, if the person who has once been affected by it has returned to Europe, resided long in it, and afterwards gone to a warm country; although on this second visit, the fever will much more probably be an inflammatory remittent, than the ardent or bilio-inflammatory disease. The remittent is endemic in warm climates, and in several temperate countries in warm seasons, especially those abounding with the sources of malaria; the ardent fever occurs only among persons who have recently arrived from cold or temperate climates, into a very hot country; and true yellow fever appears only occasionally, and then the infection may either extend to a few only, the circumstances favouring its diffusion not existing, or to great numbers, the disease thereby becoming epidemic. Thus the first and second of these fevers are always occurring, especially the first; the third, seldom, or after long intervals.

247. The confusion which has thus arisen from confounding three diseases so essentially distinct has been perpetuated by published works and in official returns. Thus a practitioner observes fever in the West Indies among sailors or soldiers lately arrived; and has to treat, although the locality is healthy, a number of cases of ardent fever, with high action at the commencement, and, in some of the most unfavourable of these, with yellowness of the skin, black vomit, &c. in the last stage. He finds large depletions cure the disease; and notwithstanding his range of observation is confined, and the symptoms referred to contingent, he publishes, to inform all whom it may concern, that he has had numerous cases of yellow fever to treat, that he cured nearly all of them by large bloodlettings, and that the disease was neither contagious nor infectious; all which was very true, with the single exception of the disease being yellow fever, the ardent or bilio-inflammatory, arising from very different causes, having been mistaken for it; and very probably a case of true yellow fever had never come within the sphere of his observation during his residence in the country; or if it has appeared, it has been mistaken for the disease now instanced, or for a severe remittent; or indeed all three may have been confounded together, as most commonly is the case. — A second practitioner arrives in a part of the country where the intense or concentrated states of remittent are endemic, and where it presents the inflammatory, or bilio-inflammatory form, in persons more recently arrived from Europe, and where also yellowness of the skin, &c. occasionally appear in the last stage. He finds that bleeding kills as many as it cures when indiscriminately and incautiously employed, and has therefore recourse to mercurials, especially calomel, observing that, when salivation occurs, the patient is generally safe. He also believes that he has had yellow fever to treat, that it is the endemic of the country, and not infectious, and that mercury given to produce salivation and not bleeding is the cure for it. He writes to convert those who entertain different opinions from himself, and thinks that no one else knows anything of the matter. The same errors are committed in this case as in the former, excepting that another disease has been mistaken for yellow fever, although that malady has either never been seen by him, or has been confounded with the endemic of the country. — A third practitioner has enjoyed a more extensive range of observation: he has observed not only both these diseases, but a third also; he has recognised the origin of the three in very different causes; has noticed marked distinctions between them, in their early stages especially; has ascertained the infectious nature and the only occasional occurrence of one of them, to which the name of yellow fever is most applicable; he has watched the beginning, progress, and devastating spread of this malignant disease; and he has experienced the inefficacy of treatment in its most severe cases. These important facts and many others connected with the subject are placed before the public, but are controverted by the first and second practitioners, and those who, having observed, like them, in one confined circle, and during a period of no great duration, have, notwithstanding, become instructors of others; and who, wanting the experience of those whom they oppose, have not even inspiration to plead either in behalf of their doctrines, or as an apology for their intrusion. Thus the inexperienced are bewildered by contrariety of opinions, or misled by partial views which do not apply to the circumstances and diseases which often will present themselves. It will, therefore, be better for him, who has to treat for the first time the fevers thus generally confounded with each other, to apply himself to the task with a mind well instructed in pathological principles and

with a due knowledge of disease and of therapeutical agents, but perfectly unbiassed by doctrine or by the reputed efficacy of certain modes of treatment; otherwise, he may find out, after some untoward experience, that neither the doctrine, nor the practice founded on it, applies to the cases which he is called upon to treat. I never shall forget with what bitterness an amiable physician many years ago told me, on my meeting him in an unhealthy climate within the tropics, where he had arrived some months before myself, of his want of success in treating the fevers of the country. Being desirous of the guidance of those who had written on the disease, he had treated it at first conformably with the instructions given in books, and the first nine cases terminated fatally in rapid succession. The practitioner should observe and think for himself; and whilst his mind is open to the suggestions which works will furnish, he should ascertain the states of vital power, and of local and general morbid action, in each case, and employ medicinal agents appropriately to these, and with promptitude and decision, guided but not weakened by caution.

248. iv. Treatment. — *A. Of the mild remittent.* The treatment of this form differs not materially from that advised above for agues, especially when the remissions are distinct. At the commencement, before reaction is developed, and when there are no indications to forbid their exhibition, *emetics* are generally of great benefit. After their full operation, a large dose of *calomel*, or of calomel and opium, may be given, and an action produced on the bowels by *purgatives* and cathartic enemata. These means having been repeated until morbid secretions and fæcal accumulations are evacuated, bark or quinine may be prescribed, if the remissions are distinct, and the patient not removed from the unwholesome locality. But in cases where the previous health and long residence of the patient in an unhealthy climate do not forbid it, moderate *bleeding* in the stage of excitement will shorten the disease, and render the remissions more perfect. During reaction in the early exacerbations, repeated doses of *James's powder* with calomel, or the *tartarised antimony* given in solution every hour or two, or every half hour, in full doses, commencing it in the cold stage, so as to produce vomiting, and continuing it in this manner throughout the subsequent reaction, will frequently accelerate a favourable termination; and render large vascular depletion less necessary. In old residents in warm climates, or in those constantly living in an unhealthy situation, this medicine will often supersede bloodletting, if the bowels are early and freely evacuated. In the mild autumnal remittent, also, of this climate, a similar treatment is appropriate; bleeding being required chiefly in the young, robust, and plethoric. Subsequently, refrigerants, cooling diaphoretics, and other appropriate means may be employed.

249. B. In the *Inflammatory and Bilio-Inflammatory Forms* the practice, early in the disease, should be energetic. — *a.* In the cold stage, or that of invasion, and when, although there may be most severe headach, the heat of the scalp and the action of the carotids indicate that it is not inflammatory nor dependent upon fulness of blood; and when excessive vascular action in the stomach and liver has not yet been developed, an active *emetic* is of essential service. As soon as the stage of excitement is developed, and proportionately to its excess, and to the degree in which vascular action becomes predominant in the head, liver, or stomach, should *bloodletting*, generally or locally, or both, be practised; the quantity having relation to the constitution, habit of body, &c. of the patient. In order, however, that depletion may be productive of benefit, it must be practised early in the disease; for if deferred till the excitement has partly exhausted the powers of the system, its good effects cannot then be obtained; the nature of the pathological states admitting of *local depletions* only, which, however, should be employed in order to remove such local congestions as may have taken place.

250. *b.* Full doses of *calomel*, followed by purgatives (F. 181. 216. 266.) and cathartic enemata (F. 140, 141. 150.) are also early requisite; the first of these having been given soon after the operation of the emetic, and combined with James's powder. During the vascular excitement, particularly when the skin is very hot and dry, the cerebral symptoms strongly marked, and the abdominal viscera free from congestions, *cold applications* should be kept to the head, and the *cold affusion* frequently resorted to. When vital power is much impaired by the impression of the exciting causes, or exhausted by the previous excitement, and when the abdominal viscera are congested, as evinced by the fulness and tenderness of the hypochondria and epigastrium, the cold affusion is a hazardous measure, the constitutional powers not being always sufficient to bear the shock, and the overloaded viscera sometimes suffering further from the external impression. In such circumstances, especially when the pulse is quick and irritable and the skin harsh, the *tepid bath*, and sponging the surface with cold or tepid water, will be preferable. A certain degree of vital power is necessary to a successful application of the cold affusion; the surface being hot and dry, and the internal viscera not seriously congested.

251. *c.* When the *head* is much affected, *leeches* to the temples, behind the ears, and to the occiput, or cupping, will be serviceable; evaporating lotions, or the cold affusion on the scalp being resorted to: but even these may be injurious if employed too late, or in states of exhaustion. The appearance of the face and eyes, the heat of the scalp, the expression of the countenance, and the action of the carotids should guide the practitioner, and not the degree of delirium or of insane delusion; for these may be most remarkable where vascular action in the brain is lowest, as they depend more upon nervous and cerebral power than upon vascular action. When much heat, pain, tenderness, and fulness of the *epigastrium* or *hypochondria*, with nausea and vomiting, are present; the matters thrown up being viscid or ropy and abundant, and yellow, green, or yellowish green, or dark green, or colourless and mixed with albuminous flakes, energetic vascular depletion should be early resorted to, otherwise the vital tone of the mucous coat and capillaries of the stomach will be soon exhausted, and dark grumous vomiting supervene. In these cases, a large bloodletting from the arm, and twenty grains of calomel, with two or three of opium, should be promptly prescribed. If these be fol-

lowed by marked mitigation of the symptoms and a copious perspiration, this latter should be encouraged by cooling diaphoretics; but if the symptoms continue or return, either a repetition of these remedies, or a large depletion near the seat of the chief disorder, ought to be directed. A large *blister* should be afterwards applied, or the warm *turpentine epithem*. The latter is preferable, inasmuch as its effect is almost immediate, as it excites a copious perspiration, and as it may be renewed from time to time with additional benefit. *Purgatives* may now be given, and they will generally be retained; but those which are least irritating to the stomach should be selected, and their action promoted by cathartic enemata. In the intervals, the liquor ammoniæ acetatis, with camphor mixture and nitrate of potash, may be prescribed, or other cooling diaphoretics.

252. *d.* If *the bile* be secreted in great quantity and acrid quality, the consequences of the active determination to the liver occasioning this disorder, and the effects of the morbid secretion upon the digestive mucous surface, ought equally to be guarded against, by local depletions, by external derivatives, cooling diluents and demulcents, and by aperient injections. If symptoms of inflammatory action in *the liver* are manifest, the same measures should be promptly and energetically employed. If the *bowels* be inordinately affected, a similar treatment is necessary; the external rubefacients being applied over the abdomen; and a large dose of calomel and opium should immediately follow the depletions. All these ought to be repeated according to circumstances; emollient and laxative medicines being exhibited by the mouth and in enemata, and cooling diaphoretics in the intervals. When soreness, tension, or fulness of the bowels continues notwithstanding, the external applications (§ 251.) should be repeated. If with fulness of the abdomen, there is much load on the tongue, and oppression at the epigastrium, purgatives, especially in enemata, should be persisted in.

253. *e.* The *exhaustion* of the advanced stages, produced by the previous excitement and by the treatment, demands attention. If the above means have removed all local disease along with the morbid excitement, and if the patient is beyond the influence of the causes, little more is necessary, as the system soon rallies. But if he be constantly subjected to them, the consequent exhaustion will be thereby increased, or its character modified, and the adynamic condition superinduced. In such cases, suitable means are devised with great difficulty. If the exhaustion be attended by a distinct remission, the pulse falling in frequency, and the tongue remaining moist, the irritability of the stomach having subsided, the exhibition of bark or quinine should not be delayed; for by it chiefly are we to hope to prevent an accession of the febrile action, and to preserve the powers of life from the noxious influence of the surrounding causes. But the effect of this substance should be carefully watched: as long, however, as the tongue is dry or rough, with the papillæ erect, the pulse hard or irritable, and the skin hot and harsh, the remains or unfavourable consequences of the previous morbid action are still unsubdued; and these the exhibition of bark would increase. In this case, local depletions, tepid or warm bathing, purgatives, diaphoretics, and external rubefacients are still required. If the symptoms and circumstances of the case warrant the use of bark, the decoction with the subcarbonate of soda and nitrate of potash, or with the liquor ammoniæ acetatis and muriate of ammonia, may be first employed, and subsequently the more active preparations of this substance; but, during its exhibition, the secretions and excretions must be promoted by purgatives with mercurials, &c. The decoction may be given for this purpose with the neutral purgative salts, or quinine with either of the sulphates, so as to keep the bowels freely open. If calomel has been freely given at the beginning, and the bowels well evacuated in the progress of the disease, blue pill, with the aloes and myrrh pill, and ipecacuanha, may be taken at night, and the bark or quinine in the day. It is chiefly in cases where depletions and purgatives have been too long delayed, or insufficiently prescribed, and where the latter have been laid aside too soon, that the bark either fails, or occasions congestion, or obstruction or consecutive inflammation of any of the abdominal viscera.

254. *C. The adynamic states* of remittent fever, occurring primarily, or supervening secondarily upon either of the other forms, are the scourges of intertropical countries; and present such a variety of characters in both hemispheres — the yellowness of the skin and dark grumous vomiting, predominating in the western hemisphere (the *yellow remittent fever* of Dr. CHISHOLM) — that methods of cure which shall be appropriate to their varying forms are often devised with as great difficulty as with want of success. In every condition, however, the removal of morbid secretions and accumulations from the prima via is a necessary preliminary. At the period of invasion, the sense of cold being prolonged, and the nausea not attended by free vomiting, and more especially if the formative stage be characterised by dysenteric symptoms, as sometimes observed in hot climates, the exhibition of an *emetic* will be useful. — *a.* In the more malignant states of this form, in which the stage of excitement commences with tumultuous vascular reaction concentrated chiefly in the viscera of the large cavities, and principally those of the abdomen, *bloodletting*, either general or local, or both, should be practised early in this stage, especially in persons of a robust, plethoric, and sanguine constitution; for, if this state of reaction be not speedily moderated, the vital tone of the viscera which chiefly experience it is soon exhausted, and collapse of the vital powers, with organic change and yellowish discolouration of the skin, supervenes as early as the third, fourth, fifth, or sixth days, in unfavourable cases, and later in those which are less so, followed soon after by dark, grumous vomitings, and all the symptoms to which the term malignant may be appropriately given. Emetics are beneficial only in the formative and invading stages of these cases, and are hurtful if administered in the irritated and inflamed states of the stomach and liver generally attending reaction. After free depletion, from ten to twenty grains of calomel should be exhibited, with one or two of opium, and be repeated according to the effect and the circumstances of the case. If the first bleeding has been insufficient, a second should be directed within twelve

or eighteen hours, and followed by the calomel and opium; and the bowels ought to be freely opened. In the worst forms of marsh fever, particularly in hot climates, the secretions of the liver are often interrupted or suppressed, large doses of calomel and active purgatives being especially required in them. If the mouth become affected, the circumstance is favourable, although we should hardly make this a specific indication unless other intentions be also fulfilled. The warm bath, followed by frictions of the surface, or by the terebinthinated epithem on the abdomen, and by diaphoretics, will also be of great service.

255. *b*. Whilst vascular depletions are thus necessary in the more concentrated and inflammatory states, which rapidly pass into the adynamic or malignant form, they are inapplicable to those in which the powers of the system are insufficient to produce vascular reaction; at least, they should never be employed until efforts at reaction are made, when a small or moderate general or local bleeding may be directed, especially after the warm or *vapour bath* and frictions of the surface, with the view of relieving the overloaded vessels of the large viscera, and of removing congestion of the venous trunks and auricles of the heart. If an adynamic state has continued from the commencement, the skin of the trunk being harsh and dry, the extremities damp, the pulse weak and rapid or irregular, the tongue dark and coated, the bowels disordered or costive, and the evacuations morbid, the vital energies of the frame should be roused by means of the hot or vapour bath; by assiduous frictions with stimulating liniments (F. 299, 300. 311.); and internal congestions removed by warm diaphoretics, stimulants, purgatives, and mustard poultices, or the hot turpentine epithem applied over the epigastrium and hypochondria, and, in extreme cases, on the insides of the thighs also. In this latter class of cases, calomel is still indicated, especially if the stomach be irritable; but it should be conjoined with large doses of either camphor, ammonia, or capsicum, with opium. Subsequently, the bowels having been very freely evacuated, and the states of the tongue, of the pulse, and of the skin not forbidding, bark in decoction, or sulphate of quinine, may be prescribed.

256. *c*. A similar treatment is indicated when an adynamic or malignant state supervenes on that of low excitement — when the skin becomes yellowish or dusky, and the irritability of the stomach urgent or disposed to pass into the dark grumous vomitings, indicating great danger. This affection of the stomach is much more violent when it is consequent upon excitement than when supervening in the course of a fever in which excitement has been imperfectly expressed; for, in the former case, the vital power of the organ is exhausted, and the organisation affected; in the latter, power is simply diminished or suppressed, restoration being more easy in it than in the former. In both circumstances, the external derivatives just mentioned, and calomel in the combinations specified, are chiefly to be relied upon. When the vomiting consists of a pumping up of the contents of the stomach, rather than of active retchings, cordial stimulants should be employed in addition to these; and aromatic spices, ammonia, ether, camphor, opium, &c., may be variously combined. Fluids evolving carbonic acid, as spruce beer, seltzer-water, soda-water, bottled stout, &c., may also be prescribed. In a few urgent cases, I have found from half an ounce to an ounce of the spirits of turpentine, taken on the surface of milk or any aromatic water, with half a drachm of magnesia, allay the irritability of the stomach, lower the pulse, and render the tongue moist, after other measures had failed; and I have exhibited this dose, or F. 216., as a purgative, three or four hours after a bolus consisting of ten or fifteen grains of camphor and calomel, with one, two, or three of opium, had been taken; promoting the action of the bowels by warm cathartic enemata, if necessary.

257. *d*. In low, miasmatous districts, bark or quinine, in suitable combinations, is often necessary in an advanced stage of the adynamic states. The former in substance, however, or the latter in large doses, generally irritates the stomach, and it then proves injurious. The infusion of bark, therefore, with the chlorate of potash, or with muriatic acid or ether; or the decoction with muriate of ammonia, or with nitrate of potash, and the solution of the acetate of ammonia; should be first employed: and subsequently, the quinine with acids. But while we thus endeavour to support vital power, morbid secretions and fæcal collections should be fully evacuated, either by mild purgative draughts, — and preferably by those of a stomachic or tonic kind, — or by enemata, or by both. If the combination of the mild preparations of bark with the antiseptics and refrigerants just instanced are inefficacious, the more energetic preparations with ether, or the preparation of ammonia, or with aromatics, &c. must be resorted to.

258. *D. The complicated states* must be treated with reference chiefly to the condition in which vascular action and vital power are manifested. The treatment of the more inflammatory complications has been already described; and those of the more adynamic states are so diversified, that the measures already recommended, as well as others about to be noticed, must be adapted to individual circumstances. If an irritable or dysenteric state of the bowels occur, morbid secretions or fæcal accumulations have probably caused irritation of the mucous coat. A full dose of calomel should therefore be given, if it have been neglected, and be followed by a common purging draught, by castor oil, or F. 181. 216. 266.; and, in a few hours, laxative enemata, and demulcents should also be administered. After the full operation of these, anodynes, with gentle alteratives and light tonics, or the preparations of bark or quinine in the forms above mentioned, may be exhibited. In the adynamic states, this complication is very unfavourable, especially when the stools are very dark, black, or otherwise morbid; and the abdomen swollen and painful. Calomel, with camphor and opium, is necessary in such; and large blisters, or the other external applications previously directed (§ 251.), are especially indicated. Tonic purgatives, &c. are also requisite; and bark or quinine in large doses, and in forms of combination most appropriate to this particular class of cases. The other complications either have been already noticed, or demand no material modification of the treatment. Whether seated in the head, thorax, or abdomen, the state

of vascular action, in connection with vital power, requires attention; local depletions, external derivatives and revulsants, active purgatives and diaphoretics, with diuretics, constituting the chief means of cure.

259. *E. A treatment has been strongly recommended by* Dr. Stevens for the advanced stages, and malignant or adynamic forms, of remittent and other fevers; but I am not aware that it has been satisfactorily or properly employed by other practitioners. One of the substances, at least, — the *chlorate*, or *oxymuriate of potash*, — I have often prescribed as a tonic and stimulant, and for a great many years, both at the infirmary for children, and in private practice; and I am quite convinced, from an extensive experience of its effects in low states of fever, of its very beneficial effects. It has often a remarkable and rapid effect upon the state of the tongue, rendering it more moist and clean. Dr. Stevens states that, when adynamic symptoms appear, after venesection, mercurials, cold affusion, and purgatives have been prescribed, no time should be lost in exhibiting non-purgative saline medicines, especially the carbonate of soda, the chlorate of potash, and common salt; and that these should be repeated every hour during the disease. These substances he believes to act beneficially upon the constitution of the circulating fluids, and to replace that portion of the saline constituents of the blood, which he supposes to be lost or changed in the early course of the disease.

260. *F. If the remissions become hardly distinguishable*, the states of morbid action being in other respects as above treated of, the method of cure must still be the same as recommended for the inflammatory, bilious, concentrated, and adynamic or malignant forms respectively; the nature of the disease being no further changed by *the continued type thus assumed*, than that the constitution suffers more decidedly, and the vital powers sink more rapidly under the unremitting state of disease induced. Hence the means of cure should be the same in kind, but administered, in warm climates especially, with greater promptitude and decision.

261. *G. Where remittents assume the intermittent type*, as they occasionally do in unhealthy localities, the liver, spleen, or mesenteric glands, or all of them. are more or less disordered, or actually diseased; and enlargement or obstruction of one or more of them generally soon afterwards becomes evident. In cases of this kind, although the active exhibition of bark or quinine is necessary to prevent the return of the paroxysms, which, by their continuance, would increase the mischief, yet the full operation of purgatives and deobstruent laxatives is equally requisite; for, without them, neither will the obstructions already existing be removed, nor the intermittent disease be safely arrested, nor the bark or quinine exhibited with permanent advantage to the patient. In cases of this kind, change of air is next in importance to the employment of suitable medical treatment; and, in all cases, the one should accompany the other. If *remittents pass into dysentery*, disease of the liver, and of the mesenteric glands, with the other changes in the large bowels, fully described in that article is a common pathological state; and the treatment must be directed accordingly, and as fully detailed under the above head. The *regimen* and *convalescence* of the patient, and the means proper for the *prevention of relapses*, differ in no respect from what has been stated on these topics under the treatment of intermittents (§ 223, 224.).

XIII. Chronic or Obscure Remittent. Syn. — *Anomalous or relapsing Remittent; Slight Nervous Fever*, I. Macculloch.

262. Charact. — *Slight febrile exacerbations, and remissions, with headach, &c.; recurring in daily, occasionally in reduplicating, paroxysms; continuing for an indefinite period, and giving rise to various disorders of the digestive organs and nervous system.*

263. This very slight form of remitting fever often continues a very long time when its nature is mistaken. It is by no means an infrequent disease: three or four instances of it have been treated by me very lately; and before my attention was directed to it by the writings of Dr. Macculloch, other cases had disappointed my anticipations as to their nature and treatment. It appears in delicate persons, and commonly arises from the less energetic action of the same causes which produce the more decided and acute forms of marsh fever, and generally in a primary mode; but it also may follow the simple remittent described above. It bears the same relation to the definite and severe disease, as the slight, anomalous, or masked intermittent does to regular ague. When it is so marked as to be esteemed a fever, it is often mistaken for hectic; and in its slighter modes it is confounded with what is commonly called debility, chronic debility, chronic dyspepsia, delicate health, nervousness, low spirits, hypochondriasis.

264. *A.* In the cases which have occurred to me, exposure to *malaria* was manifest; and to two patients the *cause* was assigned and explained, and a different residence recommended. Whether it may arise from other sources, is not determined; but I entirely agree with Dr. Macculloch in believing that malaria is far oftener present than has been imagined, more especially during late years, and around the metropolis. In those cases which have been traced to this source, the whole character of the disorder is that of remittents, as shown by its tendency to critical periods, and its diurnal remission, &c. It often, also, terminates in an intermittent as slight and obscure as the original disease; while it is not infrequently followed by local affection of the nervous system, especially periodical headach, toothach, intermitting rheumatism, and neuralgic pains. Its frequent recurrence or relapses, especially during north-east or easterly winds, and in the outskirts of the metropolis, thereby resembling anomalous or masked ague, is also a circumstance deserving of remark, and an argument for considering it, with Dr. Macculloch, as a modification of remittent, and as the effect of a slighter dose or different conditions of the marsh poison. By mistaking this fever for other diseases, the sufferings of the patient are often materially aggravated; whilst, having recognised its nature and cause, not only the means of cure, but also those of prevention become obvious. In many cases the cure and prevention are accidentally hit upon either by the practitioner or patient; and the state of ill health complained of removed by change of air, or a visit to a watering-place.

265. *B. The symptoms* consist chiefly of great muscular weakness, which often appears unaccountable, of sinking sensations, and disinclination to exertion. A slight chill is often present in the forenoon, or about midday, or a creeping cold down the spine. During the afternoon, evening, and night, a slight degree of febrile excitement is manifest, and the palms of the hands become hot or burning. The tongue is generally white, and the apex and edges are often somewhat red. The urine is often pale and abundant in the morning, and higher coloured, and more frequently voided, in the evening and night. The patient is sometimes unable to follow his occupations in the morning; he wakens unrefreshed, either from a feverish, restless, or disturbed sleep, or from a lethargic, dreamy, and prolonged sleep; he is fatigued all morning, without knowing wherefore; is depressed, anxious, and irritable; or complains of want of mental energy or ability, and of dull headach; and, as the chills and sinkings of this period pass into a gentle febrile excitement, he feels more restored in the afternoon or evening. In the case of a delicate, most talented, and accomplished female, subject to this disease, and liable to relapses of it during cold easterly winds, although the most distressing, sinking, and exhaustion were often felt in the morning, so that she was hardly able to dress herself, or to get up to breakfast; yet she often could in the evening exert and enjoy herself. The pulse is occasionally not materially disturbed: it is frequently accelerated and a little hard, in the course of the exacerbations, but is commonly weak and slow in the remissions. The bowels are generally sluggish; the evacuations slightly disordered; and the appetite, when the heat is considerable, and the exacerbations very marked, is much diminished, and generally capricious. The patient loses flesh during the attacks, and various anomalous symptoms referrible to the stomach, bowels, and other abdominal viscera, often present themselves; and, when they become prominent, are liable to be considered and treated as the original complaint.

266. In many cases, although these ailments are both real and distressing, the patient is considered as either feigning, or hypochondriacal. In these more especially, and when the course of the complaint is less regular, the time of the day when the exacerbations and remissions occur, varies much. If they are tolerably regular, they often present a quotidian, tertian, or double tertian character, the symptoms being worse on alternate days. In the more chronic cases, the mind becomes irritable or despondent, and in some instances this latter feeling is most distressing. Dr. Elliotson confirms the remark of Dr. Macculloch, that the exacerbations are often unobserved from occurring in the night; increased heat, oppression of the head, and depression of spirits, amounting to hypochondriasis, being the chief symptoms. The nights are frequently the periods of greatest suffering. A gentleman, who consulted me in the summer of 1834, described them as being most distressing. In another case, an inability to think, with confusion of ideas, was complained of; an inflammatory dyspepsia, a burning sensation at the stomach, and other symptoms of irritation of the digestive mucous surface; sponginess of the gums, and soreness of the tongue, which often becomes smooth and divested of its papillæ, occasionally appear in the advanced course of the disease; and ultimately serious disorder of the abdominal organs, prostration of organic nervous power, and a state of ill health, amounting to general disease, supervene.

267. In some instances, this complaint assumes more of the intermittent character, and at different times it seems to vacillate between the remittent and intermittent types; but there is rarely any distinct cold stage or a greater feeling of cold than that above mentioned (§ 265.), excepting at the commencement of an attack, or of a relapse. Signs of functional disorder of the liver, and of torpid function of the colon, often appear, especially in this class of cases; and the disease is frequently considered a form of liver complaint; the heavy or dull headach sometimes attending it being imputed either to the same source, or to the accompanying affection of the stomach.

268. In conclusion, Dr. Macculloch describes this form of remittent as modified chiefly in degree and duration, it being often so slight as to require some attention in tracing its form, and even its existence. It is apt to become habitual, or to recur at frequent but variable intervals, during even an indefinite course of many years; varying in such a course its characters and symptoms, and being in some cases a marked chronic intermittent, in others remittent, and in some so brief and imperfect in its remissions as to be almost continued. Its accessions are of the ordinary duration of remittents, and they commonly observe the quotidian or double tertian periods. It is, moreover, often a primary disease: sometimes it is consequent upon ague, or the severe states of remittent, or even upon continued fever; and, whilst it is especially caused by malaria, in some of the slighter modes of this poison, it may possibly arise from other sources; or, after a first attack, a relapse may be caused by cold, moisture, atmospheric vicissitudes, the use of cold or drastic purgatives, vicissitudes of temperature, intemperance, bloodletting, and excessive evacuations.

269. Treatment. — *a.* The slighter, primary, and more recent states of this complaint are removed by the sulphate of quinine, the preparations of bark combined appropriately to particular cases, by Fowler's solution of arsenic and change of air; the bowels being duly regulated by laxatives, or mild purgatives combined with bitter tonics (F. 266. 562. 572.) But the more chronic states, especially when the nervous system is much affected and the patient has become desponding and hypochondriacal, are treated with much less success. If it degenerate into confirmed hypochondriasis, the case is one of the most difficult that comes before the practitioner. In some instances an active exhibition of *sulphate* of *quinine* is of great benefit. Dr. Elliotson alludes to a case in which five grains were given three times a day without benefit; but the dose having been increased to ten grains, relief was procured. When signs of inflammatory irritation of the digestive canal exist, the decoction of bark should be first employed with the nitrate of potash, or with the muriate of ammonia; and if the tongue be flabby, and the gums spongy, as in the case above alluded to, the decoction may be given with muriatic acid, or with the nitro-muriatic, or with the *chlorate of potash*. The combination of

aloes, or the aloes and myrrh pill, with sulphate of quinine and inspissated ox-gall, will be found the most successful purgative: it proved so in one of the cases I lately treated. The *kreosote* was employed by me in another case, in conjunction with quinine, in doses of from one to four drops three times a day. The patient was much benefited, but went on the Continent soon afterwards.

269. *b. Early change to a dry and wholesome air*, whenever the patient's residence is at all in fault, is the chief part of the treatment. Without this, relapses will be frequent. Healthy watering-places, travelling, and the rest of the means directed in *hypochondriasis*, must be resorted to when the disease has proceeded so far as to be attended by despondency. *Sea-voyaging*, which generally proves so beneficial to persons recovering from the remittents of warm countries, is also very serviceable in this complaint. It is a much more safe mode of enjoying change of air than that too often adopted by patients of this kind; for many of them, preferring to travel on the Continent, are in numerous places and on many occasions much more exposed to the efficient cause of the disease than if they had remained in England. Indeed, the worst instances which I have seen, or of which I have heard, have been those who had experienced attacks of ague or of remittent fever in Italy and in warm countries; and, on their return to this country, had suffered from the slighter causes occurring in it, or from the east winds of spring, and then blamed the climate of England for a disease which, if not contracted, had at least its seeds sown, in the countries which have been objects not only of their preference, but of their eulogies.

XIV. REMITTENT OF CHILDREN. SYN.—*Infantile remittent Fever*, BUTTER; *Febris verminosa* of various authors; *Spurious Worm Fever*, MUSGRAVE; *Febris mucosa verminosa*, GOËLIS; *Hectica infantilis*, SAUVAGES; *Febris lenta*, HOFFMANN.

270. CHARACT.—*Exacerbations and remissions of fever in children, with loaded tongue, loss of appetite and flesh, unnatural evacuations, pains in the abdomen and head, and much irritability; generally chronic in its duration.*

271. i. REMOTE CAUSES.—This disease usually affects children from nine or ten months to twelve or thirteen years old. It was very generally imputed by writers in the three last centuries to worms, which are rather a complication than a cause of the complaint; but a complication of remarkable frequency on the Continent, particularly in the unhealthy localities where this affection is most common, and often misunderstood; both this complaint and worms in the prima via, being occasionally concomitant effects of one and the same cause, which has been very generally overlooked. The remarks of HOFFMANN, BAGLIVI, DE HAEN, BRERA, and GOËLIS, as to the influence of the latter disorder in causing the phenomena of infantile remittent, should, therefore, be considered merely as proofs of the frequency of this concomitancy; whilst our experience of the disease, in this country in particular, demonstrates its independent nature. Dr. MUSGRAVE, in his "*Essay on the Worm Fever*," was the first who distinctly stated this; but a nearly similar opinion had been given by Professor SINCLAIR, of Edinburgh, long previously, and had also been entertained by Dr. MUSGRAVE's contemporary, Dr. WILLIAM HUNTER. Dr. CLARK confirmed the statement of MUSGRAVE; and the subject was soon afterwards set at rest by the publication of Dr. BUTTER's work on the "*Infantile remittent Fever*."

272. Dr. BUTTER assigned debility of the digestive organs, errors in diet, accumulations of morbid matter on the prima via, and the peculiar irritability of childhood and proneness to fever, as the principal causes of the complaint. I believe it to be often caused by improper food, by collections of mucous sordes in the digestive canal, owing to a neglect of the bowels; and by too cold or thin clothing; in connection with debility of constitution, and morbid irritability of the frame. But, having observed it most commonly in situations evidently productive of humid exhalations; in low, cold, and moist localities; and after exposure to a cold air after rain, particularly at night or in the morning, or during easterly winds; I am led to infer that it arises most frequently from the same causes as produce other periodic fevers; namely, terrestrial exhalations, or miasmata, and that less intense or concentrated states of these exhalations, than are required to produce either agues or remittents in adults, will often occasion the latter in children.

273. ii. DESCRIPTION.—This complaint usually commences gradually; the bowels being irregular, generally costive, but sometimes relaxed or irritated. Febrile exacerbations, with drowsiness, occur in the course of the day and evening, the child often evincing little disorder during the remission, excepting a loaded tongue and peevishness. The pulse varies in frequency with the exacerbations, and ranges from 100, to 140. The appetite is variable. These are often the chief symptoms of several days, when the complaint becomes aggravated, and a distinct chill or rigor is sometimes observed; followed by vomiting, and a more violent paroxysm of fever, drowsiness, flushed cheeks, and shooting pains through the abdomen and head. The child constantly picks its lips, nose, and eyes; and even pushes substances up the nostrils; and occasionally stiffness of the neck, great sensibility of the general surface, and tenderness, in the course of the spine, are observed. After some time the, functions of the digestive canal are almost entirely destroyed, the ingesta being either thrown off unchanged, or passed undigested from the bowels. In older children, the evening or night exacerbations are often attended by delirium. In some instances, particularly in very young children, convulsions occur, and render the diagnosis a matter of difficulty, unless the patient be carefully observed during the remissions. Such is the most common form this complaint assumes. Dr. BUTTER has, however, distinguished three varieties, which he has denominated the *acute*, the *slow*, and the *low*. There are some grounds for this division; or, rather, the complaint presents numerous modifications, which may be arranged under these or similar heads.

274. *A. The acute variety* is generally preceded by symptoms of indisposition, but it may occur rather suddenly. The bowels are irregular — commonly costive; the evacuations are morbid and offensive, the urine turbid, pale, or milky; and the tongue is loaded, especially at

the root. Fever supervenes, and is ushered in by cold, rigors, or chills; the child being hot and restless at night. The febrile exacerbations generally recur in the afternoon, and during the night; but there are often three fits, one also occurring in the forenoon; and, in the most severe cases, the remissions are very indistinct. During the *exacerbations*, the child is drowsy; and, if it sleeps, starting, moaning, and even screaming, or incoherence, are observed; sometimes with vomiting, flatulent distension of the abdomen, accelerated respiration, and cough. The pulse varies from 120 to 160, according to the age. The cheeks are usually flushed; the abdomen and palms of the hands being hotter than other parts of the body. Occasionally, the paroxysm terminates in a slight perspiration, which is often partial; the child falls into a quiet sleep, and the pulse sinks in frequency. During the *remissions* he picks his lips or nose; is irritable, and without appetite. The bowels are acted upon with difficulty; the evacuations are generally unnatural, but present no constant character; and worms are occasionally voided. The urine is now transparent, of an orange colour, and its quantity in relation to the fluids taken; and all the other symptoms noticed above are present in an aggravated form. As the disease declines, the exacerbations become mild and short, and often terminate in a gentle perspiration, with a sound or refreshing sleep; the urine deposits a sediment, and is pale; the appetite returns; and the stools assume a healthy aspect. But the pulse remains frequent, and the flesh and strength are regained very slowly, unless change to a mild dry air is adopted. If this form of the disease is either neglected, or improperly treated, or if the child remain in a moist or miasmatous situation, organic change, in some important organ, supervenes; or the complaint passes into the chronic form, hereafter to be described; or degenerates into marasmus from mesenteric disease. It usually terminates in from two to four weeks in the more favourable cases.

275. *B. The more adynamic variety*, or state of the complaint, is the least common; excepting in low, humid, and miasmatous situations. It is sometimes prevalent at the same season with the CHOLERIC FEVER OF INFANTS (see this Article), evidently depends upon the same causes as it, and is a very closely allied complaint, differing from it merely in the type of the fever, and the degree in which the digestive canal is affected. This variety commonly begins more suddenly than the others; the earlier exacerbations being attended by the same symptoms as the preceding, but by greater affection of the head, and by delirium in the older children; and quickly passing into more or less exhaustion. When this change takes place, the child becomes quiet, or indifferent to external objects, and indisposed to the least exertion. He dozes, and is incoherent in the exacerbations; and, in the remissions, he lies in one position, constantly picking his face, particularly his lips and nose, until they become sore; or keeping his hands in continual motion. He usually, however, takes both food and drink, although sparingly. The countenance is anxious, pale, and unhealthy; the eyes reddish, especially the edges of the eyelids; the lips are covered with dark, ragged crusts, or exfoliations of their epithelium; the tongue and teeth are loaded with dark sordes; the bowels are much disordered — often irritable; and the stools are very offensive, watery, greenish, or otherwise morbid, and preceded by much griping and flatulence: both the stools and the urine are frequently passed involuntarily. When a favourable change takes place, the symptoms gradually subside; the voice, which was nearly lost, is regained or becomes stronger; the eyes are more lively; the tongue is cleaner, and the evacuations improve; the exacerbations being shorter, and the remissions more perfect and prolonged. This variety is generally more chronic than the preceding, but less so than the next. It usually continues from one to two months.

276. *C. The chronic form of remittent* in children either makes its approach gradually and insidiously, or follows the acute. The child wastes; the abdomen enlarges; the breath is offensive, and the strength fails. There is commonly only one exacerbation in the twenty-four hours, and it seldom appears before evening, lasting till morning, and terminating in sweats. The pulse is usually about 100 in the day, but rises to 140 in the evening. The tongue is white or loaded, but moist, and has often a strawberry appearance; the bowels are generally costive, and the stools always morbid. The child commonly keeps up, but is disinclined to move, or complains of aching in the limbs on exertion. There is little or no appetite or thirst; and the other phenomena characterising the complaint, in its common form, are present in various grades of severity. If the disease is not removed, tympanitic distension of the abdomen, emaciation, harsh discolouration of the skin, enlarged mesenteric glands, aphthous sores on the lips and tongue, chronic diarrhœa, and lientery supervene. When the disease declines, all the symptoms gradually amend; the nocturnal exacerbations abate; and convalescence is established after a period varying from two to four or five months.

277. This disease is generally sporadic, but is also sometimes epidemic. It is endemic in unhealthy localities; and many of the children born of European parents in hot or unhealthy climates are cut off by it before they reach their sixth or seventh year. When it occurs epidemically, it usually assumes the first or second of the above forms; and proves both more rapid in its course, and more dangerous, than in the ordinary states. — Dr. SIMS, after describing the fevers prevalent in London in the years 1769 and 1770, which seemed chiefly to result from the endemic sources surrounding the metropolis and the state of the seasons, gives a very graphic account of this complaint, as it appeared epidemically during these years, and simultaneously with these fevers. As his description very nearly represents the disease as I have seen it in very low and miasmatous situations, I shall abridge it at this place. He remarks, that it was called by some a worm fever, though worms were seldom the cause; but as that apparently lay in the stomach and intestines, the error did not materially affect the practice. It was most common in children of a sallow complexion and thin habit, who had been over-fed, with the mistaken view of supporting and nourishing them. — The leading symptoms were, heat, thirst, quick, full pulse, vomiting, coma, and sometimes slight convulsions,

an universal soreness to the touch; a troublesome phlegmy cough, and great peevishness when not comatose. The fever was constantly of the remittent kind, the cheeks often appearing highly flushed, at other times pale. It lasted for several days, but seldom beyond a week; nor was the fatality attending it very considerable. Many of those who were seized by it had been subject for some time to symptoms which are thought to point out the existence of worms in the *primæ viæ*, as picking of the nose, grinding the teeth, starting out of sleep, swelling of the belly, white urine, short dry cough, &c.; yet worms scarcely ever appeared. These symptoms were evidently, as stated above, the early stage of the complaint — those described by Dr. SIMS its fully developed state.

278. iii. DIAGNOSIS. — This complaint is most liable to be mistaken for *hydrocephalus*, in its acute or subacute forms. Dr. PEMBERTON has pointed out the differences between them with tolerable accuracy. In the latter, there are occasional screamings in the sleep, tossings of the hands above the head, continual endeavour to thrust the head backwards, and an intolerance of light, with more or less strabismus. But in this fever there is seldom screaming or intolerance of light, and never strabismus; the hands being brought to the head merely to pick the lips and nose. In hydrocephalus the faculties are totally destroyed, and the patient cannot be roused to an exertion of sense, reason, or even of consciousness. But in the delirium of this fever, he can be at any time recalled to his senses, which he will often retain for a few minutes. In the former, food, or any thing given, however nauseous, will be taken; but in the latter, often neither food nor medicine is taken. The stools in this disease are more easily procured, more curdled, and contain more shreds of coagulable lymph than in hydrocephalus. Convulsions seldom occur, excepting at the commencement of the disease; or at its invasion; and when they disappear, the faculties are perfectly restored.

279. Dr. SIMS considers that there is the utmost difficulty in distinguishing between both these diseases, in children under five or six years of age, until hydrocephalus has proceeded to the second stage. There is much truth in this, especially where symptoms of cerebral irritation coexist with those of disease of the digestive mucous surface, in the infantile remittent, as is sometimes the case, and as I have several times observed. Yet, in most instances, this disease may be distinguished from hydrocephalus with considerable certainty: more particularly by the remissions; by the absence of distinct stages; by its prolonged course; by its affecting delicate, phlegmatic, and over-fed children; by the pains in the belly and head being indistinct, dull, or but little complained of; by the paleness of countenance and sluggishness of manner; by the heaviness and soundness of the sleep; by the perspirations after the exacerbations, and after eating and drinking; by the free state of the excretions, especially the urinary; and the comparative ease with which stools are procured; by the perfect condition of the senses, and tolerance of light; by the unceasing itching of the nose; by the rare occurrence of vomiting; by the little wasting of the body, and the fulness or flatulent state of the abdomen; by the absence of palsy of any part: by the constant peevishness; and by the absence of any expression of pain or distress of countenance. — (See also DROPSY *of the Head*, § 246.)

280. iv. TERMINATIONS AND PROGNOSIS. — The most common *termination* of this complaint is a return of the healthy functions; but, owing to original fault of constitution, to great debility, to the influence of an impure air, to improper diet, to injudicious treatment, and to neglect, obstruction and enlargement of the mesenteric glands, lienteric diarrhœa, chronic hydrocephalus, and tubercular disease of the lungs may supervene. The *prognosis* is, however, favourable when the child comes early under treatment; and more especially if the symptoms subside, and the remissions are prolonged and distinct. An unfavourable prognosis should be formed only when the disease is not benefited by the use of suitable remedies; when the exacerbations become severe, more frequent, or prolonged; when the abdomen is tense and swollen; and when indications of any of the organic diseases just mentioned appear.

281. v. The NATURE of infantile remittent fever may be inferred from the causes producing it, the circumstances in which it appears, and the early or premonitory symptoms. These indicate impaired organic nervous power, and imperfect performance of the functions actuated by the organic nervous system. Most recent writers have imputed this complaint either to derangement of the digestive canal, or to a depraved condition of the secretions of this part — which amounts to the same thing. The French pathologists view it as symptomatic of inflammation of the digestive mucous surface: but of the truth of this doctrine there is no conclusive evidence. *Post-mortem* appearances certainly lend it no support. The few instances in which I have observed them, presented chiefly enlargement of the mesenteric glands and of the spleen, with a few tubercles in the lungs. The digestive organs were not inflamed; but the intestines were distended by flatus, and their coats attenuated. Similar changes of the bowels and mesenteric glands have been remarked by HOFFMANN and PEMBERTON. From an extensive experience of this disease, I infer — *a*. That it proceeds from causes which impair the energy of the organic nervous system, and of the organs which this system more immediately actuates; — *b*. That, in consequence of this morbid condition, whether it arise from impure air, or proceed from unwholesome food, the excreting functions, particularly those of the digestive canal, are imperfectly performed; consequently mucous sordes, &c. accumulate on its internal surface, and become both a source of irritation and a nidus for the generation of worms; and hence the complication of this complaint with vermination occasionally takes place; — *c*. That the disease is frequently long in forming, preliminary changes being required, as in other fevers, to develope the more acute symptoms; — *d*. That it does not consist of inflammation, is shown by the character of its early symptoms; by its course, termination, and consequences; and by the *juvantia and lædentia*; — *e*. That it does not altogether arise from a depraved state of secretions of the digestive organs, nor from irritation of these organs, although these changes are very probably induced in its early course, is

proved by the facts that such depravation must itself proceed from anterior disorder, and that a treatment based solely upon the above doctrine is not generally successful; a free and healthy state of the alvine evacuations being often brought about without the complaint being removed; — *f*. That, in order to cure the complaint with the least delay and the greatest certainty, it is necessary to evacuate morbid secretions from the *primæ viæ*, to impart energy to the organic nervous system, and to change the morbid states of the various related or dependent organs.

282. vi. Treatment.—*A*. The practice advised by Musgrave, Butter, Sims, Pemberton, and others, although furnishing valuable hints, is more or less defective; for, whoever trusts to it alone, or those whose resources extend no further, will occasionally find the disease by no means so easily managed as they expected, and will see it prolonged until the treatment is taken out of their hands, and, by the common sense of the parent, limited to change of air, and light nourishment; which, although amongst the most efficient remedies, have been very generally overlooked by writers. In all cases the treatment should be commenced with a moderate dose of *calomel* and *James's powder* at night, and a sufficient quantity of the bitter aperient mixture (F. 266.), or of *rhubarb* and sulphate of potash, or of rhubarb and magnesia, to act upon the bowels. If these are inefficient, an enema should be thrown up; and, from an experience of many hundred cases, I would recommend for this purpose equal quantities of castor oil and spirits of turpentine in water-gruel. At first, the above powder should be repeated every night, or on alternate nights, and the purgative in the morning, the injection being also employed every third or fourth day. At a more advanced stage of the treatment, and when the evacuations have improved, they may be prescribed less frequently. The choice of other means must depend upon the peculiar features of the case.

283. *B*. If the disease be of the form in which it usually presents itself (§ 273.), and the evacuations have been improved by the above means, an *infusion of cinchona*, or of *cascarilla*, or of *valerian*, with liquor ammoniæ acetatis, will be found of great service. If the bowels be still disordered and torpid, the *sulphate of quinine* may be given in a solution of any of the neutral sulphates; and the abdomen rubbed assiduously with a warm *stimulating liniment* (F. 311.), light nourishing diet, or a course of ass's milk, and change of air, being afterwards ordered.

284. *C*. If the complaint be of the acute form (§ 274.), and the child be plethoric and strong, a few *leeches* may be placed over the epigastrium at the commencement of the treatment, and afterwards a mustard poultice, or any *rubefacient epithem* may be applied; but the purgatives just mentioned, or similar medicines, should be prescribed; and the solution of acetate of ammonia with sweet almond emulsion, and camphor mixture, should be taken in the course of the day. After the more acute symptoms have abated, the infusion or decoction of *cinchona*, or the infusion of *cascarilla*, or of *calumba*, may be given with small doses of liquor potassæ, or of the muriate of ammonia, or the nitrate of potash, or with liquor moniæ acetatis, sweet spirits of nitre, &c.

285. *D*. When the disease assumes the adynamic state, above described (§ 275.), and when it has been of long standing, or considerable exhaustion has supervened, a further modification of the treatment is requisite. If the bowels have not been sufficiently evacuated, the above means should be employed for the purpose; and either the sulphate of quinine, or the preparations of bark, or of other tonics, especially cascarilla, ought to be taken during the remissions. In all the varieties of the complaint the remissions should be selected for the exhibition of bark, quinine, or other tonics, commencing at the subsidence of the exacerbation. In this state of the complaint, I have prescribed, for many years, the *chlorate of potash* in an infusion of *valerian*, or of *cinchona*, with great benefit, keeping the bowels moderately open, and directing the above liniment (F. 311.) to be rubbed along the spine, or over the abdomen.

286. *E*. When much pain is felt, and the belly becomes distended with flatus, the enema advised above should be administered; and either an anodyne fomentation applied to the abdomen, or the liniment rubbed upon it. Musgrave recommends poultices, or *fomentations* with the warm decoction of *rue and aromatic herbs*. A decoction of chamomile flowers, poppy heads, and rue, in the form of fomentation; and a little spirit, or oil, of anise-seed, added to the medicine, will generally give relief. A warm bath at bed-time, or the semicupium, some salt, or mustard flower, or both, having been added to the water, will also be serviceable, especially in the low or advanced states of the complaint.

287. Dr. Butter placed much dependence upon the *extract of conium*, in doses of one grain in the day for every year that the patient was old, in conjunction with saline aperients. It is of little service of itself; but is often an useful adjunct to the medicines already advised, especially if the child be very peevish, the abdomen pained, or the bowels irritable. Dr. Cheyne relied most upon calomel with antimony at bed-time, and the common purgatives, giving the former more frequently if the complaint seemed liable to pass into hydrocephalus. Dr. Clarke and Dr. Pemberton insisted chiefly on tonic infusions, after the bowels were freely evacuated. These are generally serviceable in the circumstances and combinations pointed out, and the addition to them of the extract of conium is also beneficial. In some old cases, in which there was reason to suppose that, in connection with debility, there was some degree of obstruction of the mesenteric glands, I have given the *hydriodate of potash* internally, in small doses, with great advantage; but care should be taken not to prescribe it in doses large enough to irritate the stomach and bowels, otherwise it will increase the disorder.

288. *F*. The *regimen and diet* constitute a principal part of the treatment. Change of air, as early as possible, especially to a mild and dry air, and elevated situation, is always most serviceable. Warm clothing, frictions of the surface after the warm baths, and light but nourishing diet, are also very beneficial, particularly when convalescence has commenced. During the complaint, ass's milk, rusks, and weak broth, are suitable food. But, in the acute form, or at the commencement of the disease, even these may be

too exciting. The effect of whatever is given should be carefully watched; and the articles of diet selected accordingly. When convalescence is established, the preparations of *iron*, and due attention to the states of the bowels, are most necessary.

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XV. HECTIC FEVER. SYN.—Ἑκτικὴ (from ἑκτικὸς, constitutional, and this from ἕξις, habit of body); *Febris hectica, Febris marasmodes, Febris tabida, Febris lenta, Febris amatoria, F. ampherina Hectica, Atrophia, Tabes*, Auct. Var.; *Epanetus Hectica*, Young and Good; *Das schleichendes Fieber, Hektisches Fieber*, Germ.; *Fièvre Hectique*, Fr.; *Etica Febbre*, Ital.; *Hectic Remittent, Decline, &c.*

289. DEFIN. — *Chronic, remittent, or subcontinued fever, with loss of strength and flesh, generally depending upon some evident or concealed source of irritation.*

290. This disease is *characterised* by its slow and insidious approach; its prolonged duration; by emaciation and frequency of pulse; by febrile exacerbations at noon and in the evening, or after a meal, with heat in the palms of the hands and soles of the feet; and lastly, by colliquative sweats and diarrhœa. — The question, as to whether this fever is ever idiopathic, or always proceeds from some evident or concealed local irritation, has been much discussed. The greater number of systematic writers contend that it is occasionally a primary affection, or independent of local lesion. Amongst these are SAUVAGES, SAGAR, LINNÆUS, STOLL, PARR, PINEL, WILLAN, GOOD, &c.; whilst VOGEL, CULLEN, HEBERDEN, and others, entertain a different opinion. Believing that it is, *in very rare cases*, not assignable to any local lesion or irritation, but is owing rather to debility or exhaustion in irritable constitutions, — that, although not a primary affection, it cannot *always* be attributed to any local lesion, the nature and seat of which can be recognised, — I have introduced it at this place. But, whilst I admit this, I must confess that the arguments adduced by those who consider that hectic is sometimes independent of local irritation, are by no means conclusive. Dr. PERCIVAL, in his remarks, published by Dr. GOOD, states that he has seen idiopathic hectic last three months "without any pulmonary affection, and then to break out in the lungs." But the lungs may be diseased for a long time without their functions being manifestly disordered, otherwise than in causing the hectic fever, which may be thus erroneously considered idiopathic. There cannot be the least doubt that various changes may take place in parts possessed of a very low grade of sensibility and imperfect powers of reparation, as the parenchyma of several viscera, particularly the lungs, liver, kidneys, mesenteric glands, bones, &c., unattended by any phe-

menon which will enable us to recognise their precise seat and nature, and yet give rise to hectic fever.

291. Mr. J. HUNTER contended for its idiopathic existence, by supposing that the constitution may fall into the same mode of action, without any local cause whatever, as proceeds from such cause. This is, however, no argument. He further observes, that nothing is more common than for hectic to exist in patients in whom no local disease whatever can be traced; and that, in such cases, either random suspicions are to be thrown upon the lungs, liver, kidneys, heart, or mesenteric glands, as casual symptoms may suggest, or its idiopathic nature must be inferred. Admitting that there is some truth in this, it should still be contended, that improved means of diagnosis, and a more intimate acquaintance with the origin and relations of morbid actions, have greatly abridged the number of instances in which no local lesion can be detected; and that, instead of this circumstance being common, it is remarkably rare. It is somewhat singular, that the same author, — M. BROUSSAIS, — who has written so ably against the existence of fever as an essential or idiopathic disease, should have produced, in 1803, a work on hectic fever, in which its idiopathic nature is strenuously contended for, and its various forms very minutely described — the least idiopathic of all fevers having been considered by him chiefly as such; — M. BROUSSAIS had, however, not then changed his opinions as to the nature of fever.

292. i. DESCRIPTION. — The early symptoms of hectic are — emaciation with a pale, and often fair, skin; increased frequency of pulse, especially at noon and evening, with some degree of hardness or sharpness; rapid or short respiration on any exertion; and increased heat of skin. — The exacerbations are at first very slight; but they soon become more evident, particularly in the evening; are preceded by a slight or marked chill; are attended by increased heat, which is most evident in the hands and face, the skin being at first dry; and terminate in a free, profuse perspiration, especially the evening paroxysm, which usually subsides in this manner early in the morning. The bowels are costive, but afterwards readily acted upon; ultimately they are relaxed, and colliquative diarrhœa supervenes. The urine is various, but most frequently pale and without deposit; more rarely high-coloured, and with a lateritious sediment. As the disease advances, the delicate circumscribed bloom on the cheek, which was at first only occasional, is more constant and general, especially during the exacerbations; the throat and fauces are red, dry, and irritable; the tongue is often clean, red, smooth, without papillæ, and glazed, and ultimately, with the lips and fauces, is covered by aphthous exudations; the eyes are sunk in their orbits, from the absorption of adipose matter, but are brilliant and expressive, their whites pearly and clear; the whole frame is emaciated, and the temples excavated; the hair falls out; the ankles and sometimes the legs are œdematous; sleep is unrefreshing, feverish and disturbed; and debility with a sense of lassitude is constant, but the patient's spirits are unbroken or even sanguine. At last the diarrhœa and colliquative sweats become daily more abundant; the respiration short and precipitate; and the debility so great, that the patient often expires when attempting to speak, or on assuming a sitting posture, &c. During the course of the disease, the sensorial functions preserve their integrity; but sometimes, towards the close, slight delirium occurs. In those cases especially which depend upon organic change in the respiratory organs, there are more or less dyspnœa, cough, and expectoration; the nails become incurvated; the last joints with the extremities of the fingers fusiform, and the expectation of recovery gains strength with the progress of disease. (See TUBERCULAR CONSUMPTION.)

293. MM. BROUSSAIS, FOURNIER, VAIDY, BOISSEAU, COUTANÇEAU, and some other writers, have divided hectic into *three stages*: the *first* continuing as long as the appetite and strength are not materially impaired, and the remissions are distinct; the *second* consisting of a small, quick, and frequent pulse, accelerated during the exacerbations, with debilitating perspirations, burning heat of the palms of the hands and soles of the feet, and rapid emaciation; the *third* supervening with the colliquative diarrhœa, œdema of the lower extremities, extreme emaciation and prostration of strength.

294. ii. The CAUSES of hectic fever are remarkably diversified.—It most commonly proceeds from suppuration, ulceration, chronic inflammation, excessive action, and irritation of a secreting organ or surface; from caries, necrosis, or structural change of osseous parts; and from slow inflammatory action of any part whatever of the frame. It also attends upon various adventitious and malignant productions. But in all these, it is merely a symptom of the extent to which the constitution is influenced by the local change. M. BROUSSAIS has distinguished several varieties of hectic according to the nature and seat of its principal causes; as, the *Gastric*, the *Pectoral*, the *Genital*, *Hæmorrhagic*, *Cutaneous*, *Moral*, &c. HILDENBRAND enumerates the following: the *Inflammatory*, *Putrid*, *Nervous*, *Gastric*, *Atrabilious*, *Pituitous*, *Verminous*, *Entero-mesenteric*, and *Suppurative*, to which may be added the *Puerperal*. As each of these varieties attaches to itself more or less importance, and as the division adopted by M. BROUSSAIS has been very closely followed by numerous recent writers, I shall offer a few remarks in illustration.

295. *a. Gastric Hectic* is distinguished by anorexia, thirst, dryness of the mouth, prolonged and difficult digestion, and more or less of the usual concomitants of indigestion, especially eructations, flatulence, acidity, cardialgia, &c. Sometimes the appetite is unimpaired, or is even increased, but digestion is faulty. The tongue is loaded, the mouth clammy, and the taste disordered. There are often uneasiness at the stomach, tenderness of the epigastrium, and frontal or sub-orbitar cephalalgia. The complaint is exasperated by heating food, and the abuse of stimulants, which occasion a sense of heat in the stomach, or pain and cardialgia, with acid or acrid eructations. Ultimately the patient becomes pale; the breath fœtid; the bowels costive, irregular, or even irritable; and the symptoms of hectic fully developed. In *children*, picking of the nose, mucous diarrhœa, and occasionally the expulsion of worms, are also observed; and the disorder is almost identified with, or is merely a

modification of, the remittent of children (§ 270.). This form of hectic is very probably connected, as **Broussais**, **Boisseau**, and others believe, with chronic irritation of the digestive mucous surface; but debility, more especially of the organic nervous system, is the primary and most important constituent of the disorder. The hectic sometimes observed to follow lactation, particularly when prolonged, is often of this kind. M. **Broussais** has distinguished the connection of hectic with cutaneous eruptions, by the denomination of *Cutaneous Hectic*. But the constitutional disturbance is less the effect of the affection of the skin than of the disorder of the digestive organs, with which the latter is very generally associated as a symptom.

296. *b. Pectoral Hectic* consists of the constitutional disorder consequent — 1st, upon inflammation or ulceration of the larynx, and irritation of the epiglottis; — 2dly, upon the various forms of bronchitis; — 3dly, on the several lesions of the lungs; — and, 4thly, upon chronic alterations of the pleura. It should, however, be recollected, that any of the various kinds of pectoral hectic may be associated with gastric disorder; indeed, the advanced stages of the former are always attended by more or less of the latter. Hectic arising from these lesions is fully treated of under the respective heads.

297. *c. Genital Hectic* consists of debility, associated with febrile exacerbations, caused by excessive sexual indulgences, or by masturbation; by irritation and mucous discharges from the sexual passages; and, occasionally, by irritation of the urinary organs.—These phenomena not merely occasion, but also accompany and perpetuate, the hectic symptoms, until other viscera are drawn within the vortex of morbid action; the digestive organs, especially the mucous surface, or the lungs, or even both, becoming also diseased, and ultimately evincing the most prominent affection. The ill-regulated or excessive indulgences and dissipations of youth are often productive of irritation of the sexual and urinary organs, attended by more or less discharge; by debility, febrile exacerbations, and indigestion. If the indulgences which induce this disorder are continued, organic nervous power is prostrated further still; digestion and assimilation are rendered more imperfect; circulation through the lungs more irregular; and ultimately tubercular formations are developed in this organ, especially if the diathesis or other causes conspire with this in forming them.—It is an important fact, and one which is too generally overlooked, that hectic fever, induced either by irritation of the sexual organs, or by disease of the lungs, is attended by a remarkable propensity to masturbation, which counteracts but too generally every means of cure.

298. *d. Puerperal Hectic* is that form of slow fever which sometimes affects delicate females during *lactation*, and which, if the cause be continued, may superinduce pulmonary disease. It also sometimes follows protracted or excessive lactation, and passes either into pectoral hectic, or into a chronic state of debility, with especial disorder of some one of the abdominal viscera.

299. *e. Hæmorrhagic Hectic*, or the slow fever consequent upon loss of blood, is to be attributed rather to the pathological state giving rise to the hæmorrhage, than to the debility caused by the loss of blood. Hectic, even in its slighter forms, seldom follows large bleedings from wounds; whilst it is a very common sequence of hæmorrhage from the pulmonary and digestive mucous surfaces; for there is generally antecedent disease, either of the mucous surfaces themselves, or of parts intimately connected with them, that sooner or later would very generally be productive of hectic fever, if no hæmorrhage had ever taken place. When hectic follows the suppression or disappearance of hæmorrhages, either occasional, habitual, or periodic, chronic inflammation or irritation of some important viscus, more especially of the lungs, the liver, the uterus, &c., should be suspected.

300. *f.* Some authors have distinguished a form of hectic from *mental or moral causes*.—There can be no doubt, when the mind becomes possessed by a predominating passion or desire, or constantly ruminates on some depressing sentiment, or continually regrets the loss of endearing objects, that the powers of life will gradually languish, and that, in delicate constitutions especially, many of the symptoms of hectic or slow fever will be produced; and, although the mental affection may not induce more than the earlier stage or slighter grade of the disease, in sound constitutions, it will frequently occasion, especially in the weak, and in those endowed with a morbid diathesis, structural change in the lungs and other susceptible organs, owing to the continued depression of organic nervous power which it causes, and to the changes resulting therefrom. Every observer must have remarked the series of changes following the loss of loved objects, disappointed or abused affections, unmerited neglect, &c.; and recognised the influence of the mental impression upon the functions of digestion, assimilation, circulation, and respiration successively, until a predisposed organ—most frequently the lungs, the heart, or the liver — indicated a predominance of disorder and fatal tendency. In these cases, the slighter forms of hectic, the pallor, emaciation, febrile exacerbations, sleeplessness, and debility, advance slowly, and become imperceptibly associated with shortness of breath, dyspnœa, short cough, hectic flushes, and morning perspirations; the lungs very frequently evincing most serious disease. In all instances of this kind, it is important to ascertain the changes more immediately consequent upon the exciting cause. In every case which I have seen sufficiently early, the vegetative or organic functions were in a debilitated or blighted state; the appetite was diminished; digestion impaired; the pulse languid, slow, and weak; the circulation through the lungs imperfect and impeded, as indicated by frequent sighing, and oppression in the thorax; and the impulse of the heart very deficient, or at times either irregular or excessive, as if this organ were labouring to overcome the congestion consequent upon the impeded circulation through the lungs. The tubercles which generally form in the course of these affections cannot be ascribed to inflammatory action, as they originate when the organic nervous power of, and circulation through, the lungs, are most impaired; but are rather a result of these latter pathological states.

301. *g.* As to the other varieties mentioned by **Hildenbrand**, a few remarks may be necessary.

— α. *Inflammatory Hectic* is merely that form of symptomatic fever which usually attends chronic inflammation of an internal viscus, or of a deep-seated part. — β. *Putrid hectic* is the fever sometimes attending scorbutic affections, or gangrenous and spreading ulceration, &c.; or arising from unwholesome and innutritious food. — γ. *Nervous Hectic* is the constitutional disturbance observed in persons labouring under mental afflictions, &c. (§ 300.), or chronic disorder of the nervous system, and in chlorotic and hysterical females. — δ. *Atrabilious Hectic* presents itself in persons long subject to disorder of the liver and other digestive organs — whose portal circulation has become congested or obstructed, their biliary and intestinal secretions morbid, and their digestive canal torpid or overloaded. Such persons are morally and physically depressed; are melancholic and hypochondriacal, sallow, squalid, and thin; are often affected with shortness of breath, colicky pains, disordered bowels, tenesmus, and hæmorrhoids; the stools are dark, fœtid, and scybalous, and the abdomen frequently hard or tense. — ε. *Pituitous Hectic* is merely a modification of the gastric (§ 295.), attended by pituitous colluvies in the prima via, owing to imperfect power of the organic nervous system. It is common in children, and is characterised by pallor, leucophlegmatic indolence, and torpor; swollen lymphatic glands, increased secretion of mucus; tumid abdomen; fluor albus; the collection of viscid mucous on the tongue and teeth; coryza, mucous diarrhœa, and obscurely remitting and slight fever. — ζ. *Verminous Hectic* is a modification of the foregoing, or the association with it of worms in the intestinal canal. It is occasionally observed in delicate and relaxed, or rickety, or scrofulous, children; and in those who live in low, damp, close, and unhealthy localities and apartments, and who are subject to chronic bronchitis or winter catarrhs. — η. *The Entero-mesenteric* is a modification of the *pituitous* and *gastric*, particularly when occurring in children; or is rather the association of enlargement of the mesenteric glands with the affection of the digestive mucous surface, chiefly constituting these varieties. It is hence closely allied to the affection already described under the head of *Infantile Remittent* (§ 278.). — (See also art. MESENTERIC DECLINE.)

302. *h.* The varieties of hectic which arise, from the formation of matter in internal viscera, from tuberculous ulceration, from carious bones, &c., from the irritation of foreign substances, and from chronic inflammation affecting parts possessing a deficient power of reparation, possess general features of resemblance, but vary in the more minute details, and differ not materially from the general description given above (§ 292.).

303. iii. PROGNOSIS. — The *duration* of hectic varies from a very few weeks to a number of years; but, however long, the tendency of the disease is fatal, unless circumstances occur or medical means be used to arrest its course — unless the causes on which it depends are removed. — The *danger* is owing entirely to these causes, and is great according to their nature. — In cases of caries, or of other local diseases which admit of removal, the fever disappears soon after the separation of the morbid from the healthy parts. When the disease depends upon the continued or repeated irritation of a secreting surface or gland, as in its *sexual* and *puerperal varieties* (§ 297, 298.), and in the chronic forms of bronchitis and diarrhœa, it generally disappears with the cause which produced it, unless serious disease of some important viscus, as of the lungs, has been superinduced in its course. But when chronic inflammation continues to destroy, or to alter the structure of, some vital organ or deep-seated tissue, or when the substance of an internal viscus is in a state of suppuration, or when hectic proceeds from tuberculous formations, recovery seldom takes place. Yet, in some of these cases, the powers of life continue long to resist the progress of disorganisation; and occasionally at last are successful, not only in limiting it, but also in removing the chief of whatever changes had taken place. This is demonstrated in the adhesions of serous surfaces, in the absorption of purulent collections from the substance of internal viscera, or in their discharge, and in the subsequent cicatrisation of the parts affected. Both the liver and lungs furnish proofs, although in rare cases, of such occurrences. Even a lobe of one of the lungs may be entirely destroyed by suppuration, and the patient recover. Where the cause is obscure, and we doubt whether the disorder is idiopathic or the consequence of some lesion that eludes detection, the patient being young, and vital power not far reduced, hopes should be entertained. But when strength is far reduced, emaciation extreme, and colliquative diarrhœa or perspiration is present, there is little or no chance of recovery.

304. iv. PATHOLOGY. — *A.* The *Lesions post mortem*, consist — 1st, of those which *caused* the fever (§ 294.); — 2d, of alterations of the mucous surface of the digestive canal, upon which the diarrhœa present in the last stage mainly depended; — 3d, of disease of the lymphatic and mesenteric glands; — and, 4th, of redness and inflammatory discolouration of the lining membrane of the heart and large vessels. — The various lesions from which this fever may proceed, require no further notice than has been taken of them in other articles; but those which are evidently consequent upon its early stages, which aggravate it in its course, causing the more severe symptoms characterising its latter periods, are deserving of attention. — The changes in the digestive mucous surface consist chiefly of tubercular depositions, and of ulceration seated more especially in the lower part of the ileum and in the cæcum, with softening, and frequently with superficial redness, of the mucous membrane. The ulcers, however, are often unattended by redness, thickening, or unequivocally inflammatory appearances; and are entirely similar to those described in the article DIGESTIVE CANAL (§ 36. *et seq.*). The changes in the absorbent glands are the same as those described in the article LYMPHATICS.

305. The lesions of the circulating system have been overlooked, until notice was directed to them by BOUILLAUD, who has given the details of a number of cases of hectic, in which the internal membrane of the heart, and large vessels, both arterial and venous, presented more or less of inflammatory redness; the substance of the heart itself being often soft and flaccid, and atheromatous depositions being sometimes found in the internal membrane of the arteries. — Several years ago, I observed the internal lining of the pulmonary vein, and of its principal branches, of a

dark red and reddish brown colour, in a patient who died with tuberculous excavations in the lungs; and I have seen similar appearances subsequently in two or three cases of this disease. — But whether these appearances are the result of inflammatory irritation induced in the internal surface of the circulating system, or depend upon the action of the blood upon this surface after death, has not been satisfactorily ascertained.

306. *B. Nature, &c. of Hectic.* — Pathologists have supposed that the disease depends upon the gradual absorption of purulent, sanious, or other morbid matters into the circulation; and others have believed that it arises entirely from the local irritation — no such absorption occurring. — It is necessary to keep in recollection a few facts, which will serve to elucidate the matter. — (*a*) Large excavations, &c. often take place in the lungs without much cough, and with little or no expectoration, but with severe and rapid hectic: absorption, in these at least, must exist to a certain extent. — (*b*) In such cases, the diarrhœa and night sweats are frequently very great. — (*c*) In caries, the hectic is also severe in proportion to the evidence of absorption. — (*d*) The glands in the vicinity of carious, suppurated, ulcerated, or tuberculated parts, often become affected. — (*e*) Irritation, excessive pain, foreign substances, &c. may long exist in deep-seated or internal parts, without inducing hectic, or causing more than the symptoms of its slighter forms or early stages, as long as these causes do not give rise to morbid secretions in the substance of the affected tissue; but, as soon as matter is collected, or a fluid is formed from the destruction of the surrounding organisation, the usual signs of confirmed hectic appear. — (*f*) Purulent matters have evidently formed in the liver, and occasioned hectic: the patient has recovered; and, having afterwards died of some other disease, has presented proofs, in the changes observed in this organ, that an abscess had existed in it. — (*g*) Lesions of the blood-vessels are not infrequent in the advanced stages of the worst forms of hectic, or those caused by tubercles and suppuration. — These facts induce me to infer — 1st, that absorption actually takes place; — 2d, that it proceeds slowly — the depurating viscera, especially the kidneys, bowels, and skin, generally removing the morbid matters, or preventing their accumulation in the blood to the extent of causing very manifest or rapid changes in it; — and, 3d, that the absorbed matters ultimately affect the blood, and not improbably the vessels also in which they circulate. I believe that the diarrhœa characterising the last stage of hectic, is caused as much by the disordered state of the blood affecting the mucous follicles and membrane, as by inflammatory irritation; and that, when this latter condition exists, it arises chiefly from the blood, and the morbid secretion poured out by these tissues. The alteration in the blood may readily be supposed to discolour, or otherwise affect, the internal surface of the vascular system, or even to inflame or disorganise it, in those vessels which proceed from the part which is the seat of caries, suppuration, or of tubercular ulceration. — As to the softening and flaccidity of the heart, upon which M. **Bouillaud** places some stress, I have seen nothing beyond what is presented by other muscular parts in these cases, the heart having participated in the emaciation or deficient nutrition of the rest of the body. — From these considerations I therefore conclude, that hectic fever is most frequently the result — 1st, of local irritation, of a slow inflammatory kind, either latent or manifest, and generally consequent upon, and associated with, debility; — and, 2dly, of the passage of morbid matters into the circulation, where they occasion most of the severe phenomena uniformly and contingently present in the last stage.

307. v. **Treatment.** — The means of cure must have immediate reference to the cause or pathological state on which the hectic depends. — During the first and second stages, they may be often employed with success. But when the third stage has supervened, we can expect nothing from them beyond alleviating the more distressing symptoms. — *a.* When the disease proceeds from the association of *disease of the digestive mucous surface*, with debility (§ 295.), the treatment should consist chiefly of strict attention to diet — the farinaceous and easily digested articles of food being selected; of attention to air, gentle exercise, and to the state of the excretions; of gentle tonics conjoined with small doses of ipecacuanha and anodynes; of the infusion of cinchona with the solution of acetate of ammonia, or with small quantities of the nitrate of potash and sweet spirits of nitre, of bitters associated with laxatives, or of emollients with mild narcotics, according to the circumstances of the case. The bitter infusions may likewise be given with prussic acid, or with the extract of hop. When we suspect the existence of alterations of structure, they may be conjoined with the liquor potassæ, or **Brandish's** alkaline solution and conium. If the preparations of *iodine* be tried, very small doses only should be exhibited. A weak solution of the hydriodate of potash, or of the ioduret of iron, is most appropriate in such cases, either alone or with a narcotic, as hyoscyamus, conium, or extractum humuli. (See **Stomach** — *Diseases of.*)

308. *b.* The treatment of the *pectoral and laryngeal forms* of hectic is so fully stated in the articles on the individual chronic diseases affecting the respiratory organs and passages, that nothing need be advanced on the subject at this place. It is only in the early stages of these forms of hectic especially, that material advantage can be hoped from medicine. The means just enumerated will often be found of service; but they require to be modified according to the peculiar features of the case. Gentle astringents and tonics, mineral acids, &c. are sometimes also useful. Of these, the infusion of roses with sulphate of zinc, sulphuric acid, and narcotics, is most appropriate.

309. *c.* The *sexual and puerperal forms* of hectic generally soon disappear upon the removal of their respective causes, if serious changes in remote organs have not been superinduced by a continuance of the irritating and exhausting discharges, in which the hectic originates — by the practices inducing and perpetuating the disease. In these forms, the recovery depends much upon the patient himself. Early rising; mental and bodily occupations; low regimen; the avoidance of stimulating beverages, heating foods, and of warm condiments; travelling or voyaging; change of air; and a prudent regulation of the imagin-

ation; are among the most effectual means of cure. Seltzer water, soda water; the mineral waters of Pyrmont, Carlsbad, of Gielenau, of Ems, of Vichy, of Bath, of Tunbridge, &c., are severally useful, if appropriately prescribed. — When the disease is occasioned by suckling, the cure is generally speedy, if the cause is relinquished before an important organ becomes affected; and if a restorative regimen, with change of air, be adopted. In such cases, the mistura ferri composita, and chalybeate waters, or the mineral waters just mentioned, are very serviceable.

310. *d.* The treatment of the other varieties of hectic is not materially different from that now stated. — When the disease follows *hæmorrhages*, the means of cure should be directed especially to the pathological state of which the hæmorrhage is the result. (See that article.) — If it be connected with *cutaneous eruptions*, the state of the digestive organs, and of the frame generally, ought to claim an especial notice; and if it originate in *mental emotions*, such measures as are the best calculated to divert the mind from contemplating the sources and relations of its misery should be prescribed. — The *atrabilious*, *pituitous*, and *verminous* varieties require the combination of tonics with warm purgatives (F. 557—563. 572—576.), chalybeate mineral waters, and vegetable and mineral deobstruents.

311. *e.* When the *irritation and absorption of morbid matter* are the causes of hectic, their sources should be removed; especially when they consist of carious bones, diseased joints, puriform collections, &c. But when this indication cannot be accomplished, or when the preservation of a limb requires that every means should be tried, the treatment ought to be directed with the view — 1st, of diminishing irritation; and, 2dly, of counteracting or resisting the contaminating influence of the morbid secretion on the circulation. — The *first* of these is to be fulfilled by a judicious use of opium, morphine, hop, henbane, hemlock, &c.; — the *second*, by medicines which support vital energy, and thereby resist the extension of disease, or promote the powers of reparation; as digestible nourishment, dry and pure air, gentle tonics, antiseptics, absorbents, and astringents. These may be variously conjoined, according to the peculiarities of the case — anodynes and narcotics with tonics, and tonics with antiseptics and absorbents. Thus, the infusion of cinchona may be prescribed with muriatic acid and the muriate of morphine; the infusion of cascarilla with the solution of the acetate of ammonia and the acetate of morphine; the tonic infusions or decoctions with the alkaline sub-carbonates, or with the solution of potash, or with the chlorates, and the extract of hop or of hemlock, &c. Camphor may likewise be conjoined with narcotics, in cretaceous and absorbent mixtures. When vascular action becomes much excited, the nitrate of potash, or the muriate of ammonia, may be given with such of the foregoing as are chemically compatible with them; and digitalis or tartarised antimony may be prescribed in the more inflammatory cases, and when the bowels are not irritated.

312. *f.* Various *urgent symptoms* require to be palliated during the advanced progress of the disease. Great *heat of skin* will be relieved, and consequent perspiration diminished, by cold or tepid sponging the surface with equal parts of spirits, of solution of the acetate of ammonia, and of rose water. — *Restlessness* may be diminished by the anodynes already enumerated, or by prussic acid, combined with gentle tonics and refrigerants. Camphor, henbane, and the nitrate of potash, or muriate of ammonia, are the most generally useful in this state, excepting when the bowels are relaxed, when opium, hop, or the extract of poppy should be substituted. When *diarrhœa* supervenes, the pathological conditions to which I have attributed it (§ 306.) should be kept in view, as a treatment founded upon them is the most successful in practice; — we should endeavour, in these cases especially, to counteract the contaminating influence of morbid secretions upon the circulation, and to impart tone to the digestive mucous surface. The means that are calculated to fulfil these intentions, are also restorative of vital power, enabling it thereby to resist the extension of disease. The tonics and narcotics already mentioned (§ 311.) may be employed with these views; or certain of them may be conjoined with the chlorates of lime, potash, or soda; or with Kréosote; or with cretaceous mixtures; or these latter may be given with the compound tinctures of camphor or of opium; or with tonic and astringent extracts.

313. *g.* The *Diet and Regimen* are most important parts of the treatment of hectic; but they should be varied, or even different, in its different states. In most cases the *food* should be digestible and moderately nourishing. The milk of asses, or milk warm from the cow, goat's milk or whey, fresh butter-milk, warm milk with one or two tea-spoonfuls of very old rum in it; shell-fish, especially oysters; farinaceous and mucilaginous articles of diet; jellies, particularly those made with Iceland or Carrageen moss; and grapes in considerable quantity; have severally been recommended, and are more or less beneficial, according as they are appropriately prescribed. In most cases, the patient should take very gentle exercise in the open air, when it is mild, and expose himself to the sun and air as much as possible without the contingent risks. In some instances, especially those caused by debilitating discharges, by caries, &c., old wine, especially sherry, port, hermitage, and Burgundy, may be allowed with much benefit; and either old Madeira or sherry may be taken in Seltzer water. It is in such cases, especially, that the mineral waters recommended above (§ 309.) are most serviceable. (See also the articles ABSCESS (§ 55.), ABSORPTION (§ 15.), BLOOD (§ 143. *et seq.*), MESENTERIC DECLINE, TUBERCLES, TUBERCULAR CONSUMPTION, &c.)

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XVI. FEVER, CONTINUED. SYN.—Πυρετὸς συνεχὴς; *Febris continens; F. continua; Febris continua continens*, Burserius; *Enecia*, M. Good; *F. Septenaria*, Auct. Lat.; *Anhaltendes Fieber*, Germ.; *Fièvre continue*, Fr.; *Febbre continua*, Ital.

314. DEFIN.—*The changes constituting fever proceeding in one series, frequently with a tendency to exacerbation and slight remission.*

315. i. *Of the Division of Continued Fevers.*—Fevers of a continued type are so remarkably modified by the circumstances stated above (§ 43.), by varied combinations of causes, states of constitution, predisposition, and by epidemic influence, each form insensibly passing into the one nearest allied to it, that every attempt at arranging them must necessarily be more or less conventional, and depend upon characters, which, although the more prominent and universal, as respects certain species, yet occasionally disappear, or blend with others distinguishing correlative forms and varieties. Owing to this, circumstance, the divisions of continued fevers adopted by writers have been arbitrary and varied. STOLL arranged them as *Inflammatory, Putrid, Bilious*, and *Pituitous*,—a division not materially different from that previously made by SYDENHAM HOFFMANN, and BOERHAAVE.—CULLEN, PARR, and others distinguished three species—namely, *Synocha, Synochus*, and *Typhus*: J. P. FRANK, also three—the *Inflammatory, Gastric*, and *Nervous*. RICHTER, four—the *Inflammatory, Nervous, Putrid*, and *Gastric*. BORSIERI, five—the *Ephemera, Simple Synochus, Putrid Synochus, Slow Nervous Fever*, and *Hectic*. J. FRANK, four—the *Typhoid, Gastric* or *Bilious, Rheumatic* or *Catarrhal*, and the *Inflammatory*: and HILDENBRAND, five—the *Inflammatory*, the *Septic, Nervous, Gastric*, and *Hectic*. Dr. FORDYCE, in his dissertations, attempted no arrangement beyond that into the *regular* and *irregular* forms. PINEL, desirous of giving precision to his descriptions, divided fevers of the continued type, into *Inflammatory, Bilious* or *Gastric, Mucous* or *Pituitous, Putrid* or *Adynamic*, and *Malignant* or *Ataxic*; and has justly considered the plague and puerperal fever as distinct from the fevers belonging to these orders. A nearly similar arrangement has been followed by BOISSEAU and BOUILLAUD. Dr. WILSON PHILIP has described only two species—*Synocha* and *Typhus*. Dr. M. GOOD, three—*Inflammatory, Typhous*, and *Synochal Fever*. HUFELAND, four—*Inflammatory Fever, Nervous Typhus, Putrid* or *Infectious Typhus*, and *Gastric Fever*. Dr. TWEEDIE has divided continued fever into *Simple, Complicated*, and *Typhus*. Dr. ARMSTRONG, into the *Common Simple, Common Congestive*, and *Typhus*: and Dr. BURNE, into the *Inflammatory* and the *Adynamic*, either of which he believes may be simple, or associated with local inflammation. Dr. ARMSTRONG, having recanted his former opinions respecting fever, and discarded the influence of infection in causing it, has denied the existence of a synochal or simple inflammatory fever; has considered congestive fever to pass into simple fever, or inflammation, when excitement supervenes; and has argued, that typhus always arises from malaria, is essentially the same disease as intermittents and remittents, and differs from them only in type. The various fallacies into which he has fallen respecting the diseases under consideration, will appear more fully hereafter.

316. Dr. SOUTHWOOD SMITH has viewed continued fevers, "as one great malady never differing in nature, but in every two cases differing in intensity, and giving rise by these differences to various forms of disease"—that this difference alone is the cause of the different forms it assumes. He accordingly admits only of grades of intensity—the *first* or lowest grade being *Synochus mitior*; the *second, Syn. gravior*; the *third, Typhus mitior*; the *fourth, Typh. gravior*.

317. This view, as involving fundamental principles of pathology and practice, which, if implicitly followed, would lead to very series results, requires a few remarks. Dr. SMITH's position is that continued fever never differs in nature. Now, by the nature of a disease is understood its seat, the tissues affected by it, or the exact pathological condition, whether of vital function or of structure, constituting the malady. If therefore, it can be shown that, in the continued fevers, even of temperate climates, the state of function and organisation are always the same in kind—that the vital manifestations and structures are affected in them all in a similar manner, but in different grades of severity,—it will be conceded that fever never varies in its nature. As this position, however, is merely assumed, without any attempt at ascertaining its stability, it must still be doubted, until either it or its opposite be proved. If we closely observe the mode as well as the degree in which the vital manifestations, in the nervous system, in the muscular system, in the blood and vascular system, &c. are affected, in the various forms of continued fever, and the consequent changes in the various functions and structures, we cannot fail of concluding that, however nearly they all may approximate each other, they differ as essentially in nature as in grade.—What is the difference as to intensity between the continued fevers enumerated above (§ 44.), or even between the epidemics observed at different epochs and seasons, if intensity be the only source of distinction? In the paragraph just referred to, other essential differences, arising out of the prominent affection of particular functions, tissues, and systems, are stated; and from these, as well as from the very distinct and even opposite manner in which the vital manifestations, more particularly the organic nervous power, are affected, the varieties of continued fevers result. If fevers were modified in severity merely, they would be mutually convertible into each other, and either species indifferently would rise from one and the same cause. But no such occurrences are observed; for the nature, as well as the intensity, of

fever varies with the kind and combination of causes producing it. Will infectious typhus communicate simple continued fever, or bilious inflammatory fever, or gastric fever, or climate fever, or epidemic yellow fever; or will these species of continued fever arise from the same cause, and admit of being resolved into grades of intensity merely? No one capable of distinguishing disease ever saw the typhus miasm occasion any of these fevers, nor the causes usually giving rise to either of them produce typhus. Neither of them is convertible into the other; and however closely allied or equally severe certain varieties of each may be, something more than difference in intensity is to be recognised. The causes of each are distinct, the features of each different, the course and duration different, the external appearance and internal lesions different, and yet no difference as to severity or intensity may often be ascertained by the ablest pathologist. Is it to this assumed difference of intensity merely that we are to impute the admitted fact, that, in the very same period or stage, the treatment which is beneficial in the one fever is death in the other,—that large depletions are required at the commencement of one species, and most injurious at the same period of another? The very varied, and even opposite, treatment required in several epidemics, even when the same organs are prominently affected, cannot be referred to grades of severity; for fevers, even of this climate, may be equally violent or severe, and terminate fatally after the same duration, and yet be aggravated, or ameliorated, by opposite measures. The great pathological truth,—which ought never to be overlooked, and without a full recognition of which, in estimating the nature and treatment of fevers, our experience will be worse than useless — will be deceptive, and our knowledge worthless empiricism,—namely, that the vital manifestations may, all or severally, be variously affected by the causes productive of fever —may be lowered or heightened, or otherwise changed; and that these changes, whether as to *kind* or as to *degree*, should be made the basis of distinction, in arranging the varieties and forms of fever, and in devising indications for their cure. In the following inquiry, something more than intensity of action will be recognised and made the grounds of arrangement and treatment, inasmuch as each of the several kinds of fever presents characters having stricter reference to the nature, than to the grade, of disorder—to the state of vital manifestation in the several systems and structures, and to the seat and grouping of the predominant lesions, much more than than intensity of morbid affection. The arrangement, therefore, about to be followed, will not materially differ from the sketch already given (§ 44.). But all the kinds of fever there enumerated cannot be treated of under this head; their importance, and, still more, certain peculiarities of character, as well as of the circumstances in which they occur, requiring, conformably with the form of this work, that they should be discussed in separate articles. In considering, therefore, the various kinds of continued fever, those only which are most intimately related to each other will be comprised under this head; the more simple states being first described, and the more complicated and dangerous forms successively reviewed.

318. ii. *Of the Prognostic Symptoms in Continued Fevers.— a. The countenance.* —When the expression is serene, confident, clear, and animated, the disease is of a mild and uncomplicated kind; in the advanced stages this state indicates a favourable crisis. If the face is large, injected of a crimson or dark colour, with prominence of the eyes, or is agitated and anxious in the early stages of fever, the morbid excitement and determination to the head occasioning this appearance will speedily exhaust the powers of life, and, in a later period, will soon be followed by malignant symptoms, or fatal collapse. When the countenance is tinged of a yellowish or earthy hue, or is withered-like or sunk, or constricted, and especially if it exhibit distress, or want of serenity and confidence, extreme danger may be apprehended. A full, bloated, waxy, or livid countenance, particularly if it assume a tawny or mahogany tinge, indicates very dangerous congestion and approaching death.

319. *b. External surface.*— If the skin be soft and perfect in its sensibility, its heat not excessive, although augmented, but without a feeling of pungency or burning; and if its temperature be equally diffused; a mild attack may be expected. But when the skin is dry and harsh, as if thickened, and the heat is ardent, caustic, or unnatural; if the surface be little sensible, not readily acted upon by rubefacients or blisters; or if vesicated parts assume a dark or black hue; if the heat be ardent in the head or trunk, particularly at the epigastrium, and lowered in the extremities; if the skin be thickened, apparently withered, dusky, dark, or livid in parts, or yellowish, flaccid, tawny, streaked of different shades, lurid, or otherwise changed from its natural hue; if it be damp, greasy, puffy, or bloated, or studded with very dark petechiæ, vibices, or blotches, or unusual eruptions; or if parts pressed upon show any tendency to gangrene; great depression of the vital powers, with contamination of the circulating fluids, should be inferred, and the danger considered great. The more florid, however, the spots are, the less is to be feared; and when the black or violet petechiæ assume a brighter tint, a more favourable opinion may be formed. Large black or livid spots are often attended by dangerous hæmorrhage from the bowels. Small dusky brown spots, like freckles, are very unfavourable signs. Large livid or dark greenish marks seldom appear till very near the fatal period. (Huxham.) — If the skin be covered by warm, general, fluid and copious *perspiration*, attended by an open or free pulse, a favourable issue may be expected. But, if the perspiration be cold, clammy, scanty, or partial, with a nauseous or disagreeable odour, especially if the pulse be weak, small, very frequent, oppressed, or irregular, there is much danger. The occurrence of erysipelatous or erythematic inflammation in the seat of sores or of abrasions; the breaking out of old ulcers, or the opening of cicatrices; or a foul, gangrenous state of old sores; denote sinking of the powers of life, and a tendency to a dissolution of the textures. — *Emaciation*, when moderate, and in due relation to the duration of the disease, is rather favourable; but, when it is excessive or rapid, it indicates ulceration in the bowels. Little or no wasting, or a bloated and a soft or tumid state of the surface, is very un-

favourable, and, with discolouration, indicates a malignant malady. — The supine *position*; inability to turn or remain upon the side; falling down in the bed; or the head being buried deep in the pillow, from frequently throwing it back, or rolling it about; are indications of great danger.

320. *c.* The *abdomen* should be carefully examined, in order to form an idea of the probable state of the stomach, liver, spleen, and bowels. — Tension, oppression, and pain in the hypochondria and epigastrium, indicate predominant affection of the liver, stomach, or spleen; and, if to these be superadded sickness and vomiting, or a sense of internal heat or burning, tumefaction or tenderness, a harsh or caustic heat of the surface of these regions, with a parched skin, great thirst, dark-coated tongue, or great anxiety at the præcordia, a very severe form of fever, which will probably pass rapidly into exhaustion, with various malignant symptoms, should be anticipated. — A tympanitic or distended abdomen; soreness, tension, intolerance of pressure; or a sense of heat or burning; with a hot, harsh, and dusky skin; or with watery, foul, and morbid alvine discharges; or with a dark-coloured tongue; are most unfavourable signs. If any of these be accompanied with irregular or irritable bowels, and the state of the discharges just mentioned, or with mucous or bloody stools, asthenic inflammation, frequently with ulceration, or some equally dangerous lesion of the intestines, is present. If, at an advanced period, or after any of these symptoms particularly indicating disorder of the bowels, very acute pain suddenly occurs in the abdomen, extending from a circumscribed spot, with vomiting, collapse of the features, increased frequency and smallness of the pulse, abdominal distension, tenderness, &c., perforation of the intestines, and its consequences, have taken place.

321. *d.* *Anxiety* at the epigastrium and præcordia, with intolerance of pressure, depends upon the affection of the nerves of organic life, and serious lesion of the stomach and heart, and accompanies the worst forms of fever. — When attended by great restlessness, it is a most unfavourable sign. It often ushers in, and accompanies, dark, grumous vomiting in malignant and disorganising fevers. — *Singultus* is also often consequent upon this sensation, especially when the stomach, or superior and posterior parts of the liver, or both organs, are much affected. When it appears late in the disease, and has been preceded by pain, or by a sensation of heat or burning at the epigastrium, or by distension, oppression, and tumefaction in the hypochondria, dissolution is generally impending, particularly if the singultus be obscure or suppressed, and attended by anxiety or tension at the præcordia.

322. *e.* *Sensibility and excitability* vary much in different forms and stages of fever. — During moderate excitement, or reaction, when there is no disorganising tendency in any viscus, these manifestations of life are increased and equally diffused. But when the disease evinces at its commencement, or at an advanced stage, depression of the vital powers, with signs of contamination of the fluids, and tendency to a solution of the vital tone or cohesion of the tissues, the excitability or irritability is evidently diminished, either by the exciting causes, or by previously increased action, or by both; and, in such cases, it is often unequally manifested, or concentrated in those viscera which are most severely affected. Morbidly increased sensibility and excitability, especially when so great as to give rise to spasms or convulsions, or augmented activity of all the senses, and of cutaneous sensation, are indications of affection of the membranes and surface of the brain and spinal chord, with a tendency to exhaustion, great in proportion to the degree of sensibility displayed. — In many of the forms of fever characterised by severe cerebral affection, followed by stupor, black tongue, low delirium, or coma, the vital manifestations under consideration are suppressed by the cerebral congestion, as well as unequally diffused or manifested. In all such instances the prognosis should be very unfavourable. But, when these vital states seem neither suppressed nor much lowered, nor very inordinately excited, nor unequally manifested, the surface of the body, the senses and nervous system generally, still retaining their susceptibility of external and internal impressions, a favourable issue may be expected. When the extremities are cold or clammy; the skin thick, dry, loose, or hide-like; the countenance sallow or collapsed, with increased or caustic heat at the epigastrium; we may infer the excitability to be unequally manifested; to be diminished in the periphery of the body and augmented in the more central parts, particularly if irritability of the stomach and bowels, with morbid discharges, be also present.

323. *f.* The *cerebral functions* are more or less disturbed in most continued fevers, and require, as well as the state of the *senses*, the close observation of the physician. — If the *sleep* be sound, undisturbed by frightful dreams or sudden startings, unattended by stertor, or moaning, and especially if the patient awakens in a more rational or refreshed state, a favourable issue is indicated. But, in proportion as the sleep deviates from this, are severity of disease and danger to be apprehended. An agitated, unrefreshing sleep indicates increased vascular action in the brain; and this is still more to be dreaded, if there be continued watching. Want of sleep often precedes delirium in its worst forms. Stupor, or a desire of sleep, without obtaining it, indicates great danger. — Violent and furious *delirium*, or early delirium, with great excitement of the circulation, irritable or rapid pulse, crimson-coloured and injected countenance, prominent eyes, and rending headache, indicate a state of vascular excitement, which will soon be productive of dangerous exhaustion, even if the brain escape immediate or irremediable mischief. — If delirium be attended by convulsions, startings of the tendons, or tremors, the danger is great, and often near. It is not less certain, although somewhat delayed, if followed by profound coma, relaxation of the sphincters, unconscious or involuntary discharges, &c. A mild delirium is not unfavourable when unattended by signs of malignancy, or extreme exhaustion of the powers of life; and if it appear in the advanced course of the disease, and chiefly in the evening. When it follows a state of stupor, it is often indicative of recovery. Very lively or very low delirium, the latter especially, is unfavourable. If the delirious patient states himself to be dying, he is generally right, although there may not be many signs of

danger present. Indifference to death, with an apparent desire of it, and a firm persuasion of being perfectly well, are also unfavourable.

324. *g.* If the *eyes* be calm, or slightly animated, in the early stages, a mild form of fever may be expected,— at advanced periods, a favourable change has commenced. Agitated, wild, terrified, confused, muddy, painful, prominent, turgid, or suffused eyes, indicate a most severe disease, at an early stage, and great danger in advanced periods, especially if the whites of the eyes become of a dusky or dirty yellow. Intolerance of light attends cerebral excitement; and rolling of the eyes, with a wild, unfixed stare, often precedes severe delirium or convulsions. A dull, sluggish state of the eyes, want of animation, sinking in their sockets, a dark hue of the conjunctiva, with a sad expression, are unfavourable. A pearly whiteness, with agitation and prominency, is a symptom of dangerous congestion of the lungs and liver; and, if succeeded by a dirty yellow hue, or dulness of the cornea, indicates approaching dissolution. Partial paralysis of the retina, indicated by black spots, or other dark objects floating before the eyes; closure or falling of the upper eyelid, or dosing with the eyelids half closed; are dangerous symptoms. — Slight *deafness*, without pain in the ears, is not an unfavourable sign.

325. *h.* The *tongue and mouth* furnish important indications in fevers. — In the course of the milder forms the tongue is foul, coated with a yellowish or cream-coloured mucus, and generally furred; it is sometimes a little red at the sides and apex, and rather dry, or moderately moist, in the centre. In proportion as it departs from these states, the danger is increased. If it be covered by a milky, whitish, or mealy coating, and if it be also large, flabby, or swollen, early in fever, an adynamic or malignant state of disease may be expected. If it become rough, dark-coloured, with prominent papillæ, and not particularly coated, but dark red, especially towards the sides, serious affection of the alimentary canal, or of the liver, should be feared; more especially if the symptoms referrible to the abdomen and these viscera be also urgent. If to these appearances be superadded dryness, and contraction of its breadth, serious or fatal changes within the head, or large cavities, have supervened. When the tongue is white, or coated with the papillæ, erect or excited, and the edges red and fiery, vascular action is then inordinate in some internal organ, although no other symptom may indicate this state; and vascular depletions are required. If it be covered by a deep yellow coating, congestions of bile in the biliary ducts and gall bladder are evinced; and if this pass quickly into an excited, dry, and brownish state, the supervention of congestion, or inflammatory action in the substance of the liver, or the digestive mucous surface, or in both, with diminished vital power, may be inferred. A dark or brick-coloured, or livid redness of the tongue, with a glossy surface, or a surface partially covered by a partly detached coating, or black crust, or with a dark, scanty, tenacious mucus in the mouth, or on the teeth, or lips, show extreme prostration of vital power, with contamination of the circulating and secreted fluids. A leaden-coloured, sodden, or parboiled-like, flaccid, smooth, enlarged, tremulous, or diminished or shrunk, tongue, are all unfavourable signs. If this organ become, in the progress of fever, thickly covered by a dark or fuliginous coating, or exhibit, in addition, deep fissures, the apex and sides being of a brownish or dark hue, the adynamic state is extreme, and the digestive mucous surface will readily pass into ulceration or sphacelation, if, indeed, the former lesion have not already commenced. — Vital exhaustion, contamination of the fluids, and solution of the soft solids — the constituents of marked malignancy — are evidently present, if the gums readily bleed when touched, if they and the teeth are covered with a black viscid mucus; if the former discharge a dark dissolved blood, or ichorous bloody sanies; or if a similar fluid escape from the nostrils or posterior fauces. An inky state of the surface of the tongue sometimes ushers in these symptoms, and also evinces the malignant condition. On the other hand, if the tongue becomes cleaner at its edges or apex, or moister round the margin, particularly if other favourable signs appear, a salutary change has commenced.

326. *i. Thirst* is often very urgent, or even insatiable; but, although indicating the intensity of disease, it is not of itself a dangerous symptom. — The absence of thirst, especially when the tongue and fauces are dry, rough, and parched, is always an unfavourable sign. A constant desire of drink, yet the patient drinking little when it is given him, and a difficulty of deglutition, are very dangerous symptoms.

327. *k.* The *evacuations from the bowels* furnish important signs to guide the practitioner in the treatment and prognosis.—In the milder forms of fever the bowels are readily acted upon, and the evacuations are generally feculent, but varying in colour and consistence, according to the state of the biliary and other secretions, and the purgatives employed. When the stools give relief from uneasiness in the abdomen, or reduce fulness of it, a mild disease may be expected. If the most active cathartics are required to produce evacuation, the stools being watery, scanty, or otherwise morbid, and voided with a sense of confinement or difficulty, the abdomen being full, or tense, or hot and uneasy, a severe fever may be anticipated, and general or local depletions, or both, are indicated. If copious feculent stools follow this state, a favourable crisis may be looked for. Frequent, scanty, bilious evacuations, presenting every variety of colour, from a light green, or greenish yellow, to a greenish black, sometimes watery, at other times mucous and streaked with blood, occasionally feculent and extremely offensive, often accompany the worst forms of bilious or autumnal fevers, and indicate danger, particularly if they assume a pitchy appearance. When the stools are smooth, dark brown, or blackish, like treacle, the danger is great. When they are intimately mixed with blood, or bloody sanies, or purulent mucus, or are ochrey, very frequent and exhausting, organic changes in the mucous surface of the intestines, or in the liver, are evinced. If discharges of blood are found in the stools, especially if unmixed with other matters, ulceration in the large bowels may be inferred. If the

blood be grumous, black, and mixed with the fæcal matters, it has generally proceeded from the small intestines. If the stools consist chiefly of a light yellow or serous fluid, or are passed involuntarily or unconsciously, great danger may be apprehended.

328. *l.* The *urine* is always more scanty in fevers than in health, excepting during the premonitory and invading periods, when it is often pale and copious. As reaction is developed, it is diminished, and higher coloured than natural. In proportion to the extent of these latter changes, may the disease be considered as severe. — In the most dangerous forms of fever, particularly those characterised by morbidly increased action, rapidly passing into the malignant or adynamic states, the urine is extremely scanty, and its secretion nearly suspended. If it also present a muddy, or greenish brown, or greenish black hue, great danger exists. A greenish or dark urine is often observed in severe inflammatory, bilious, and gastric fevers, sometimes with a muddy appearance, or with darker clouds in it. When this kind of urine becomes paler, deposits a sediment, especially if it assume a brick colour, and is abundant, a favourable change is taking place. If this secretion become more copious and more natural, with a due deposit, the fever is declining. But if it be more scanty, or suppressed, or passed involuntarily, or if retention occur, extreme danger exists.

329. *m.* The *respiration* is generally frequent or irregular in all severe forms of fever. When it is also attended by a sense of constriction or oppression, or when it becomes short, hurried, difficult, and laborious, or suspirious, great danger is evinced. A still, quiet respiration, the motions of the thorax being scarcely perceptible, is also unfavourable, especially when stupor or torpor is present. A slower state of respiration than natural, occasionally interrupted by deep sighs, or by convulsive heavings of the chest, is a sign of danger. A very hot state of the expired air early in the attack indicates an inflammatory or malignant fever. A coldness or rawness of the expired air, particularly if it have a fishy or otherwise offensive odour, indicates either a malignant disease or approaching dissolution. In all cases of disordered respiration, especially if cough be present, the stethoscope should be used, unless there be any dread of infection.

330. *n.* The *pulse*, to the experienced and observing physician, furnishes the chief indications of danger, as well as of treatment. If it be under 100 or 110, at the same time free, energetic, and regular, the disease will be mild and tractable. But if it rise above the latter number, if it become also irregular, tumultuous, or oppressed, then danger is to be dreaded. If it reach 120, and especially if it rise above this number, the danger is very great. If it mount to 130, recovery seldom or never occurs, unless in cases of hysterical and irritable females, or those in the puerperal state. Smallness, weakness, irregularity, intermissions, or startings of the pulse; or a too open, broad, and very soft pulse, the pulsation ceasing upon slight pressure of the finger; are all indications of great danger. If it become less frequent, more free and expanded, a favourable change may be hoped for. An intermission every fifth or sixth beat, at the acme of the disease, is sometimes an indication of crisis.

331. *o.* The *blood* taken from a vein furnishes very important indications, both as to the means of cure and as to the result. — If it be not materially different from natural, or if the crassamentum be merely slightly cupped, a favourable opinion may be formed. But if the clot be loose, gelatinous, or imperfectly separated from the serum; or if it be dissolved or broken, and tinge the serum; or if the serum be of a brownish or greenish hue; or if the more remarkable changes mentioned in the article BLOOD (§ 129. *et seq.*) be present; most dangerous disease obviously exists, depending no less upon the alteration of this fluid than upon depression of the vital manifestations with which this alteration is associated, and of which it is usually the consequence.

332. *p.* The prognosis, moreover, depends very much upon the *form of the fever*; at least one third of the more malignant kinds of fever terminating fatally, according to the usual modes of treating them, and not more than one case in fifteen or twenty of the milder forms. — The *nature of the prevailing epidemic* must be taken into account, in connection with the *circumstances* that seem to favour or extend it. Of these the most remarkable are full living, and a plethoric state of system. Although the epidemic fevers, lately prevalent in Ireland, have been produced by the wretched circumstances of most of the lower classes, and have readily spread, owing to these and other allied causes, the mortality has not been generally great in these classes, in proportion to the number affected; whereas, amongst the higher orders, the extension of fever has been relatively less, but the proportion of deaths to the affected much greater, than in the lower. Persons who live chiefly on animal food, or who partake of it very largely, are in greater danger from continued fever than those who live abstemiously, or chiefly on vegetable diet.

333. *q.* The *age and strength* of the patient should also be taken into the calculation.—Early age and strength do not furnish the protection from fever, nor yet from an unfavourable termination, that is very generally supposed. Indeed, in some malignant fevers, the young and strong are placed in the greatest jeopardy; as in epidemic yellow fever and plague. The continued fevers of this climate are most prevalent from the fifteenth to the thirtieth years. The proportion attacked during this period may be reckoned, as to the other periods of life, as three are to two; whilst the number of deaths in the former, compared with the latter, may be considered as ten to nine; showing that, although the predisposition to fever is greatest at this particular period, the danger is somewhat less.

334. *r.* *Sex* has but little influence as to the prognosis of fevers in this country. But, in warmer and more unwholesome climates, and in certain epidemics, it should have considerable weight.—In fevers proceeding from infection, marsh exhalations, and suppressed perspiration, and in various epidemics, a larger proportion of males is generally attacked, owing chiefly to the circumstance of their being exposed more than females to those causes. The latter are, also, upon the whole, less severely affected, owing — 1st, to their much less exposure, and the consequently less intense

action of the causes; — 2dly, to the less rigidity of their fibres; — and 3dly, to the periodic discharges to which they are subject.

XVII. **Fever, Ardent**; *Febris Ardens*. **Charact.** —*The stages or series of febrile phenomena proceeding with rapidity and regularity; the period of excitement being very acute, and attended by greatly increased vascular action; no morbid seminium or infectious miasm being generated in their course, as observed in modern times.*

336. Under the generic denomination of *Ardent Fever* may be comprised those more acute forms of fever which are attended by great vascular excitement, and which, owing to their nature and severity, generally run their course in from one to fourteen days, and are but seldom prolonged beyond nine or eleven days. They may be divided into the more ephemeral and the inflammatory.

i. **Ephemeral Fever. Syn.** — *Diary Fever, Febricula, Ephemera, Febris diaria*, Auct. Var.; *Simple Fever*, Fordyce; *Das eintägige Fieber*, Germ.; *Fièvre ephemère*, Fr.; *Effimero*, Ital.; *Efemera*, Span.

337. **Charact.** — *Increased frequency and strength of pulse; with heat of skin, headache, thirst, and white excited tongue; terminating in perspiration generally within twenty-four hours.*

338. *Simple Ephemeral Fever* may occur in a very mild and slight form, — the *Ephemera mitis* of Dr. Good; or in a much more acute state, — the *E. acuta* of this writer. But intermediate grades between these may also present themselves.

339. *A. Causes.*—The *mildest variety* is usually caused by excessive or prolonged muscular exertions; by the more violent passions and emotions of the mind; by protracted study and mental occupations or excitements; by vicissitudes of temperature, and exposure to a warm sun; and by disorder of the digestive organs, proceeding generally from the quantity and nature of the ingesta.— The more *acute states* usually arise from the above causes, from a surfeit, from temporary obstruction or congestion of the biliary organs, from the presence of fæcal collections and morbid excretions in the prima via, and from violent exercise under a hot sun.

340. *B. Symptoms.*—*a.* The *milder form* of ephemeral fever is rarely preceded by chilliness or rigors; but it generally commences with lassitude, yawning, stretchings, and a sense of irritation or of undue excitement. The pulse becomes frequent, the skin hot, and the head pained. The patient tosses in bed—is restless; cannot sleep, or sleeps in a very disturbed and interrupted manner; and his tongue and mouth are dry. These symptoms frequently commence in the afternoon or evening, and subside, in the course of the succeeding morning, in a gentle perspiration; thus terminating in from eight to fourteen hours. But often, also, when the cause has been more severe, and the disorder has come on at a later hour, the patient continues feverish in the morning after a restless night; is indisposed to leave his bed; feels unrefreshed, and unable to make any exertion; and passes the day in disquiet. Towards evening, the restlessness and other febrile symptoms increase; but in the night, or at an early hour in the morning, he falls into a quiet sleep; a perspiration breaks out; and he awakens refreshed and restored.

341. *b.* The *more acute form* often begins—especially when it is caused by disorder of the digestive organs, or by cold—with chilliness or rigors, succeeded by great heat of skin and throbbing pain of the head. The pulse is frequent, strong, and full; the face is flushed; the urine high-coloured; the tongue is white, the papillæ erect; and the secretions and excretions are diminished. These, and the usually attendant symptoms—as restlessnese, languor, want of sleep, and general uneasiness—having continued from twelve to twenty-four hours, a free perspiration supervenes, generally towards morning; the urine deposits a sediment; and the disorder disappears. When this form of fever proceeds from mental emotions or excitement, and from exposure to a hot sun, or from muscular exertions in warm weather, or from a rapid transition to a hot climate, it is seldom or never preceded by chills or rigors, and, if not actively treated by antiphlogistic remedies, is often prolonged beyond the period just mentioned, and assumes all the characters of the next species -- *Inflammatory Fever*.

342. *C. Diagnosis.*—These states of disorder may be mistaken for the commencement of some one of the more serious forms of fever. But they may readily be distinguished by ascertaining their causes; by the absence of the usual premonitory signs of fever; by the sthenic and acute vascular excitement, nervous energy being very little impaired; by the rapid increase of the heart's action; by the slight depression of the muscular powers; and by the circumstance of pain being either hardly complained of in the loins and limbs, or altogether absent.

343. *D. Treatment.*—The febrile symptoms soon subside after the digestive canal is freely evacuated, especially when they have arisen from the irritation produced by retained excretions. When they are caused by the ingesta, an *emetic* should be given immediately, and its operation promoted by the usual means; but it is contra-indicated in all other cases. Afterwards a dose of calomel ought to be administered, and allowed to act upon the secretions for five or six hours. Cooling *saline purgatives*, conjoined with small doses of antimony, or of ipecacuanha, as advised by Vater and Gianella, or of the spirits of Minderer, repeated at short intervals, will then hasten recovery, and remove the morbid secretions which have disposed the frame to these febrile attacks.— When the disorder has been occasioned chiefly by atmospheric vicissitudes, *diaphoretics*, especially after the bowels have been freely evacuated, and a tepid or warm bath, are more particularly indicated.

344. If the febrile attack have been caused by inordinate mental excitement and exertion, or by fits of passion, by anxiety or other affections of mind, *cold* should be applied to the head, in the form either of affusion, of cold water, cold sponging, evaporating lotions, &c.; the bowels freely evacuated, and diaphoretics prescribed.—If it be produced by exposure to, or by muscular exertions under, a hot sun, and whenever vascular action is excessive, or the patient plethoric, full *bloodletting* ought to be practised previously to the last specified means, which should be assiduously employed, and accompanied by cold sponging of the surface, and the internal use of refringerants and saline medi-

cines. The febrile attacks which follow exposure to the sun in warm climates, or even the quick transition from a cold or temperate to a hot country, when treated thus actively at their commencement, generally subside within twenty-four hours. But it is comparatively rare that a seasoning or climate fever runs its course in so short a time, unless in delicate or thin persons, and when the attack is very slight. In these cases, particularly when the stomach is irritable, much benefit will accrue from the frequent exhibition of small doses of the nitrate of potash, or of it and the muriate of ammonia, in solution, as prescribed by HILLARY, nearly as follows:—

No. 221. Potassæ Nitratis gr. xx.; Ammoniæ Muriatis gr. xij.; Mist. Camphoræ ℥ vj.; Aquæ ℥ x. Misce; fiat haustus, quartis vel sextis horis sumendus.

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ii. INFLAMMATORY FEVER. SYN. — Καῦσος, Hippocrates; Σύνοχος, Συνεχὴς φλεγματῶδες, Græc.; *Synochus Imputris*, Galen; *Febris Sanguinea*, Avicenna; *Synocha Biliosa*, Sennert.; *Febris septenaria*, Plater.; *Synocha simplex*, *F. acuta Sanguinea*, Hoffmann; *Febris continens vel Synocha*, Stahl; *F. continua non Putrida*, Boerhaave; *Synocha simplex*, Juncker; *Febris Inflammatoria*, Stoll; *F. Inflammatoria simplex*, Huxham and Hildenbrand; *Synocha*, Sauvages, Cullen, &c.; *Febris continua Inflammatoria*, J. P. Frank; *F. continens Inflammatoria simplex*, Selle; *Febris Sthenica*, Brown; *Enecia Cauma*, M. Good; *Dynamic Fever*, Stoker; *Calentura continua*, Span.; *Fièvre Angioténique*, Pinel; *Fièvre Inflammatoire continue*, Fr.; *Synoshische*, *Entzündliche Fieber*, *Entzündungsfieber*, Germ.; *Febbre Inflammatoria*, Ital.

345. DEFIN. — *Pain in the head, back, and limbs; heat generally and greatly increased; pulse full, hard, and accelerated; thirst urgent; urine in small quantity and high coloured; the bowels constipated, with restlessness and anxiety.*

346. *A.* CAUSES. — *a. Disposition to, and predisposing causes of, inflammatory fevers.* — If we view these fevers as affections of the vascular system chiefly, we may impute the disposition to become affected by them to the high irritability of the heart and arteries. As respects symptomatic fevers, this explanation may be conceded, inasmuch as the irritability of the different parts of the vascular system is derived from the same source, namely, the ganglial nervous system; and as all causes of irritation, which act with sufficient energy, relatively to the state of irritability, upon a single part of the system, affect the whole. — I here refer the operation of the irritating causes to the state of the irritability because their action is merely relative: therefore, where the susceptibility to irritation passes beyond the usual standard, slighter causes will induce inflammatory and symptomatic fevers, than when it is either below or at the natural state. The condition of the irritability may vary not only in different individuals, but also in the same person at different epochs of life, and in the different organs of the body; the irritating causes thus exciting a relative action on different individuals, on the same person at different periods, and on the different viscera. But, although the disposition to be attacked by inflammatory and symptomatic fevers depends greatly upon the state of irritability, yet the disposition to be seized by other continued fevers does not appear to arise from the same circumstance. Indeed we perceive that increased irritability of the vascular system has little or no influence in favouring the operation of the exciting causes of several continued fevers; and that other manifestations of the living organisation, besides this, dispose more remarkably to them.

347. The predisposing causes of inflammatory fevers consist, *first*, of high irritability and tonicity of fibre, more especially when conjoined with vascular fulness and imperfect performance of any of the secreting or excreting functions — of an inflammatory diathesis, or of rude health, or of a gross habit of body; — *second*, of those states of season, climate, or atmosphere, which tend to produce this diathesis. — Hence these diseases occur chiefly in young adult men; in the plethoric, florid, and robust; in persons of a sanguine and irritable temperament; in those who have experienced the suppression of an accustomed evacuation, or who live fully and richly, or intemperately, or who pursue healthy occupations in the open air, or who habitually take invigorating exercise: and they are most prevalent in cold and dry, or very warm and dry, seasons and climates; in highly elevated localities; and amongst mountaineers, sailors, soldiers, and persons living in the country.

348. *b.* The *exciting causes* are — (*a*) Whatever *directly* stimulates, in an inordinate manner, the nervous and vascular systems; as, change of climate, especially migration from cold or temperate, to very warm, or dry, countries; exposure to the rays of a warmer sun than has usually been experienced; exercise in the sun's rays; the influence of dry winds; and very dry and cold states of the air; sudden vicissitudes of weather or of season; the accumulation of electricity in the frame; a heating or very full diet, warm condiments or sauces, and stimulating liquors; change from a low to a rich or full diet; the intemperate use of wines or spirits, especially in connection with atmospheric heat or vicissitudes; great bodily exertion; violent mental excitation and emotion; — (*b*) Whatever *indirectly* induces great excitement or vascular reaction; as, the impression of cold when the body is overheated and perspiring; sleeping on the ground, or in the open air, especially when exposed to the night dews, or to the moon's rays, particularly in warm and intertropical countries; the operation of marsh effluvia or malaria, especially under similar circumstances, or after intemperate indulgences; an overloaded state of the digestive organs, and obstruction of the excretions.

349. *c.* The chief causes of the varieties of this fever, which attack Europeans after their mi-

gration to warm climates, are—their early age, plethoric habits, and phlogistic diathesis; inattention to their bowels during the passage, and their use of salt provisions and spirituous or vinous liquors; increased intemperance, and incautious exposure to the sun and to the night air; excessive fatigue, or alternations of indolence and great exertion; and suppresed perspiration. Dr. Jackson remarks that persons thus circumstanced rarely escape an attack of fever during the first year of their residence in a tropical country; and that the fevers that occur from these causes are often of the most aggravated kind, and rapid in their course, more especially among troops crowded in barracks or transport ships, where the heat of the climate is augmented artificially; the excess of heat influencing the febrile form, increasing the violence of the symptoms, and retarding the progress of recovery.

350. A question has arisen, as to whether or not the inflammatory states of fever in warm countries are caused by malaria, or by the other causes now instanced. There can be no doubt that malaria very frequently produces, in the plethoric, young, and robust, who have recently arrived in a hot climate, fever of an inflammatory and continued kind. But it must also be conceded that this fever chiefly occurs, even in persons thus constituted, during the dry season, and at times and in places where the existence of malaria is doubtful, or, at least, by no means proved. It is notoriously admitted that the inflammatory states of continued fever, in both the East and West Indies, appear among those soldiers, sailors, and civilians, who have not been long in a warm country, and who have not suffered from disease since their arrival; and that they take place chiefly during the dry and warm seasons, and in situations where the usual effects of malaria are never observed. This is the result of the experience of Jackson, Annesley, Boyle, Twining, Conwell, and of other experienced practitioners in warm countries. It agrees with my own observations; and is even admitted by Dr. Ferguson, who has gone much further than any one else in assigning malaria as the cause of intertropical fevers. I believe that the other causes assigned above (§ 346—348.) will, in these countries especially, produce fever of an inflammatory or bilio-inflammatory kind, in unacclimated Europeans; but that, when those causes are not associated with malaria, the fever resulting from them will generally subside, under judicious treatment, without evincing those dangerous symptoms which characterise fevers proceeding chiefly from terrestrial exhalations. Although some of the causes, especially those which relate to atmospheric temperature and climate, are very different as to their nature and action, yet they are mainly instrumental in producing fevers having many common features, but differing in severity and duration.

351. *B.* Forms.—*a.* Mild Inflammatory Fever.—*α.* The fever which usually arises from cold and dry states of the air, in cold climates, in elevated situations, or in temperate countries, from atmospheric vicissitudes or other causes, assumes either *simple* or *complicated* forms, and is generally sporadic. Its epidemic occurrence is comparatively rare, especially in its simple state. It appears chiefly during winter and spring, or during north and north-east winds. In its complicated states, which are most frequent, it forms a connecting link between idiopathic fever, and visceral inflammation; the local affection appearing in the early or advanced course of the former, the general disorder, or symptomatic fever, being consequent upon the latter. Thus inflammatory fever, and local inflammation, arise most frequently from the same causes acting upon different constitutions, habits of body, and states of local or general predisposition; — the simple form of inflammatory fever appearing in the young, plethoric, and robust, and in those possessed of no local predisposition; the complicated form taking place in persons whose previous ailments, habits of life, or avocations, have induced a disposition to predominant action in some important viscus, or from a concurrence or succession of external causes tending to the more especial disorder of one or more organs; and the primary local inflammation occurring from a predisposition of some part so great as to experience the onus of morbid action from the commencement, or soon after the impression of the exciting causes, or from the kind and concurrence of these causes. — In the *first* case, the whole frame seems to participate equally in the disordered action from the beginning: in the *second*, the disorder is also general from the first, with predominance of it evinced in some organ, either at a very early period, or in some advanced stage: in the *third*, the earliest symptoms of disease are referred to a particular viscus, and with the increase of such disease the whole system sympathises.

352. *β.* The *symptoms* of this variety are uniform in kind, but vary in severity. The premonitory signs are usually slight, or of brief duration. Hence the attack seems sudden, and is commonly ushered in with rigors or chills which are of short continuance; and, although often well marked, are occasionally so slight as to escape observation or recollection. The rigors or chills seldom recur, and are rapidly followed by general vascular reaction: the skin and integuments become full, injected, dry, hot, and burning; the countenance full glowing or red, and animated; the eyes injected, intolerant of light, but lively; the pulse frequent, strong, bounding, and full, sometimes hard or oppressed; respiration is frequent, and the expired air hot; the nostrils and mouth are dry; the tongue white, its papillæ excited or erect; and the lips full and red. The external appearance of the body evinces increased vital action; the whole surface appears glowing and animated; the internal sensations indicate generally increased vascular activity; and all the secretions and excretions are diminished or obstructed. The patient complains of great thirst and heat; of a severe or throbbing headache and vertigo; of anxiety at the præcordia; of increased sensibility, especially in respect of light and noise; of restlessness, watchfulness, and of frightful dreams; and of nausea or sickness. Taste and smell, owing to imperfect secretion on the surface of the organs, are impaired or abolished. The pulse seldom reaches 110 beats in a minute: and the heat of skin, although greatly increased, is in due relation with the activity of the circulation; and does not impart the harsh and unpleasant sensation to the hand of the observer, that characterises the more

unfavourable kinds of fever. Upon issuing from the vessel, the blood is usually red or florid, viscid, and thick; and separates perfectly into serum and coagulum: the former of which is limpid, watery, and in small quantity; the latter firm and sometimes cupped, but it seldom exhibits the buffy coat unless local inflammation have supervened.

353. The symptoms commonly increase in severity: the tongue becomes red and dry; the urine more scanty, and of a higher colour; the bowels more constipated, and the watchfulness more prolonged. In children, heaviness, drowsiness, or sopor, is frequently observed; and in adults, delirium or reverie sometimes occurs. All the phenomena usually are exasperated in the evening; their mitigation in the morning being attended by partial perspiration, or a relaxed, moist, and warm state of the surface. On the third or fifth day they reach their acme. At this period they often appear somewhat mitigated; but generally continue from two to four days longer, with manifest efforts at a critical change, which usually takes place about the seventh or ninth day, and rarely later than the fourteenth. The crises commonly observed are—hæmorrhages from the nostrils or from the hæmorrhoidal vessels, more rarely from the uterus; a copious and general perspiration; and a free secretion of urine, depositing a sediment. After the natural evolution of one or more of these evacuations, the symptoms rapidly subside, and convalescence speedily advances.

354. Although the *epidemic* occurrence of this form of fever is rare, instances have been recorded by Ingrassias, Hoyer, Heister, Van Swieten, and Navières. In these, the symptoms and progress of disease coincided entirely with the description just given. — Bloodletting, and the rest of the antiphlogistic regimen, were adopted in these epidemics, and recovery took place in nearly all the cases.

355. γ. This fever may be said to be *endemic* in warm countries, during dry seasons, especially amongst Europeans who have recently removed to, or who reside in, these countries. But in them it frequently either assumes a severer form than that now described; or, after an imperfect effort at crisis, subsides into a state of dangerous collapse. *Relapses*, also, from errors in diet, or from intemperance and premature exposure, are much more common in them, than in persons residing in northern and temperate climates, generally owing to the concurrence of malaria in producing the fever, which, however, more usually assumes the form noticed hereafter (§ 366.). — Mild inflammatory fever is seldom protracted beyond seven days, unless it assume an unfavourable and complicated form. The continued fever, which occurs, during the hot and dry season, in the more southern parts of Europe, in the East and West Indies, and in other places within or near the tropics, particularly among the natives of cold and temperate countries who have recently removed thither, is generally either of this kind, or of the complicated or severe forms about to be described. The modifications it presents in different climates, result chiefly from the difference in the constitution and habit of the affected, from the intensity and concurrence of the causes, and from the association of malaria with high grades of temperature, and the other circumstances already insisted on.

356. δ. *The complicated states of inflammatory fever* are more common than the more simple form, whether observed in warm, or in temperate and cold, regions. They depend chiefly—(*a*) on the season and climate;—(*b*) on the habits and occupation of those affected;—(*c*) on the concurrence and succession of the remote causes;—and, (*d*) on the previous state of particular organs.—They generally appear sporadically; occasionally they may be said to be epidemic; and in some places they are endemic.—Their *epidemic* appearance is chiefly in temperate countries during dry and hot seasons, and to a limited extent. Their *endemic* prevalence is observed under the circumstances assigned above (§ 355.). The complications may be either almost coëtaneous with the developement of the fever, or consequent upon it, at any period of its course. They may be either so slight as to constitute merely an exalted affection of a certain organ, or a determination to particular parts; or so severe as to amount to a state of sthenic inflammation, rapidly passing into disorganisation.

357. (*a*) The *complication with predominant action or inflammation in the brain or its membranes*, occurs principally in very hot climates, in soldiers and sailors who have been exposed to a powerful sun, and been required to make considerable bodily exertion when thus exposed; in persons who have been intemperate, or have felt the exciting passions of the mind; and in those who have over-exerted their intellectual powers. In these, the fever is often very sudden in its attack; and the symptoms referrible to the head indicate every grade of affection, from active determination of the circulation to this part, to fully developed inflammation. In many of such cases it is difficult to determine whether the local or the general affection is the primary one, so early has been their co-existence. In these, the patient sometimes falls down from the suddenness and severity of the affection, with a red or tumid countenance, injected or suffused eyes, and hot scalp, but without loss of consciousness. In others, predominant disorder in the head appears only in the advanced progress of the fever; the patient complaining of severe throbbing and distracting headache, and of a feeling as if the cranium would burst from internal distension. In either case, violent delirium, or maniacal excitement, often supervenes, and rapidly passes into coma, or stupor, or is removed by treatment. In all, the secretions and excretions are impaired, and the bowels constipated.

358. (*b*) *Predominant affection of the lungs, or pleura*, forming the pulmonic complication, is observed chiefly in cold or temperate climates during dry and cold seasons, and high winds, and in elevated situations. In intertropical countries it occurs only in the cooler seasons, and in elevated localities. Sudden vicissitudes of temperature, damp clothes, and exposure to the night air, after experiencing heat and fatigue, are the most common exciting causes.—The affection of the lungs is frequently either not fully developed, or is latent at the commencement of the fever, and is, consequently, often overlooked after it is established, unless it extend to the bronchi on the one hand, or to the pleura on the other; and then

the symptoms characteristic of either will direct attention to the complication. The stethoscope should therefore be employed whenever the breathing is laboured or oppressed in the inflammatory states of fever observed in the circumstances just stated. — This fever may present also *prominent Hepatic, Gastric*, and *Enteric disease*; but, in such cases, it will very nearly resemble the forms of fever described under the names *gastro-bilious* and *mucous*.

359. *b.* Severe Inflammatory Fever. — The disease described by the names of *Synochus Causonides*, by Gilbert; of *Synocha Causodes*, by Manget; of *Synocha Ardens*, by Sauvages; of *Endemial Causus*, by Moseley; of *Inflammatory Endemic*, by Dickenson; of *Climate* or *Seasoning Fever*, by several writers; and of *Endemic Yellow Fever*, by others; differs from the foregoing or mild form of inflammatory fever (§ 351.) only in grade, as insisted on by Jackson, and proved by my own observation. This is the disease which most frequently attacks new comers into the West Indies, more especially sailors and soldiers; and which has, as already stated (§ 244—247.), been confounded by recent writers with the aggravated forms of bilious fever on the one hand, and with epidemic or pestilential yellow fever on the other. It was also prevalent during the last war among the British troops and sailors in the Mediterranean, and was described by Burnett, Irvine, Boyle, Brunton, Down, and others; but it generally assumed a milder form than in the West Indies.

360. Whilst the milder form of inflammatory fever is common among the white and assimilated European population of warm climates, the *severe* or *aggravated form* occurs among those who have more recently arrived in them, and more especially among the young, the intemperate, the robust and plethoric, and those who are exposed to the sun, to very high temperature, and to the night air. In most warm climates terrestrial exhalations are also frequently more or less concerned in the causation of the continued as well as of the remittent types of fever: the type being determined, as shown above (§ 43.), by the nature, intensity, and combination of the causes; and by circumstances peculiar to the patient, particularly the novel, or the habitual, operation of the endemic influences to which he is exposed. But, although malaria may be a concurrent cause of this fever, especially in respect of persons who have recently arrived in the West Indies, yet I believe that, where its operation is most unequivocal, the kind of fever produced by it is different from this, — premonitory and cold stages preceding reaction, which is much less violent than in this, the resulting fever being of the bilious continued form, about to be noticed. — My experience fully accords with the observation of Dr. Stevens, that, when a young Northern stranger is subjected soon after his arrival in the West Indies to the higher ranges of temperature, his clothes are soon drenched; and that, if he be exposed to a current of air in this state, the cold produced will constrict the vessels of the skin, and prove the exciting cause of fever, which, in favourable circumstances, will often be the mild form of inflammatory fever such as has been described above, and as is often observed in temperate climates. The causes which produce a severe affection in young and plethoric strangers, seldom affect the older residents, and never the natives of the country or the dark races. Women and children, the aged, and the weakly, are much less liable to it than the robust and plethoric.

361. *a.* The *history* of this form of fever has not been given with the requisite precision by the various writers on it; most of them having mixed it up, in their descriptions, with the inflammatory varieties of remittent, and with the more continued states of fever produced by terrestrial or vegeto-animal exhalations, concomitantly with the other causes of intertropical fevers. — The aggravated form of inflammatory fever is seldom preceded by very marked premonitory symptoms. The attack is usually sudden. Giddiness, faintness, and general uneasiness, sometimes, however, precede it for ten or twelve hours.[*] There is, occasionally, a slight and brief chilliness at the commencement, especially in the less violent cases, rapidly followed by a sense of universal heat; by flushed face, frontal headache, and vertigo; by inflamed, heavy eyes, and great sensibility to light and sound; by pain in the occiput, neck, back, and limbs; and by a strong, full, hard, and accelerated pulse. A sense of heat, oppression, pain, or anxiety, is felt at the præcordia, sometimes with a dry cough, and pain in the side; respiration is quick, laborious, suspirious, or anxious; the tongue is white, excited, and its edges red; the fauces are arid, thirst urgent, and skin hot and dry; the urine is scanty, the bowels costive; and there is generally nausea, but seldom vomiting until some time after the attack. If the disease be not mitigated by treatment, the patient becomes extremely restless; the headache is rending and intense; vascular action is excessive; and the heat very great. Vomiting now supervenes, and follows the ingestion of whatever is taken to allay the urgency of thirst. The matters thrown off are

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[*] Dr. Moseley states that there is a small degree of chilliness and horror, but never a rigor. Dr. Jackson remarks that there is more or less of horror and shivering, but the cold is rarely great: Mr. Dickenson, that there is increased excitement from the commencement, and that a slight chilliness at the onset is observed only in the slighter cases (§ 351.). Dr. Stevens observes in several places, that there is no cold stage at the beginning; and Dr. Brunton, that languor, debility, and oppression are complained of, with chilliness. — This discrepancy in the account of the commencement of a most dangerous disease, and on a point so necessary to a knowledge of its pathology, may be in some measure explained. Dr. Jackson has described this form of fever in connection with the more inflammatory states of remittent, from which it is perfectly distinct. The description of the other writers is more correct; for in several cases, in which I had an opportunity of observing the commencement of the disorder, no rigors, and hardly any chills, were remarked. Even some of those who complained of chills presented a warmer state of skin than natural. The pure climate fever I, therefore, infer does not commence with shivering or rigors, and seldom with chilliness, unless currents of air, cold, &c. have been concerned in causing it by suddenly checking the perspiration But the continued fever attended with high vascular action, arising from malaria and atmospherical heat and vicissitudes, that is frequently met with in warm climates and in hot seasons, is commonly preceded by manifest premonitory symptoms, and by a cold stage. These two diseases, which frequently resemble each other very closely, have been generally confounded with one another, more especially as they are observed in the West Indies. Nor should this be a matter of surprise, inasmuch as that very many of the instances of fever which present themselves in men in the public services, as well as in civil life, arise from a combination of malaria with climatorial influences, and that the cases which are produced by a concurrence of such causes are perhaps more numerous than those which spring from either alone — from marsh exhalations on the one hand, or from high temperature and its vicissitudes on the other.

generally tinged with bile; and a bilious yellow suffusion of the skin is frequently observed. Bilious vomiting and purging occasionally occur with the yellowness of the surface, and, in the slighter cases, become a favourable crisis. There is often great drowsiness, but no refreshing sleep. These symptoms of excessive excitement proceed with various degrees of violence, and occupy a period of from twenty-four to sixty hours, but most commonly from twenty-four to forty-eight hours. During this period, blood taken from a vein is remarkably florid, warm, and fluid. The fibrin coagulates firmly, but the crassamentum is without crust, and is rarely cupped.

362. *β*. The excitement, having reached its acme, is quickly followed by exhaustion. This is indicated by a subsidence of the most urgent symptoms: the pain and heat are lessened; the skin becomes damp or clammy; and the patient has a sense of cold or slight chilliness. This delusive remission is a state of great danger: in some cases, it passes into rapid sinking—into a speedily fatal collapse: but, more generally, irregular determinations of blood, or indications of especial lesion of particular parts, are evinced before death ensues. With the diminution of heat and pain, the pulse falls; the countenance becomes anxious and distressed; the eyes sunk, the pupil dilated; vomiting continues without intermission, especially if the cerebral affection has abated; sometimes delirium is present, at others there is great insensibility or tendency to coma, and in these cases the stomach is more tranquil.

363. *γ*. *Discolouration* of the skin generally takes place in this stage; appearing in yellow, yellowish brown, and livid patches. It never occurs in the period of excitement, for it is quite dissimilar from the bilious yellowness occasionally observed in that period. It is commonly attended by passive hæmorrhage from the nose, gums, eyes, ears, &c., and by black and grumous vomiting. The change of colour, and hæmorrhage, proceed from exhaustion of the vital influence in the extreme vessels, and from the changes induced in the mass of blood. The matters thrown off the stomach consist at first of ingesta and serous fluid, often coloured by bile. In a more advanced stage they are ropy, mixed with numerous small shreds, flocculi, or films, which soon acquire a dark brown, purple, or black colour; but do not, at first, communicate much of the same tint to the fluid containing them. Afterwards, the matters vomited are more intimately mixed; and, from dark-coloured blood which has been effused into the stomach, vitiated bile, and other morbid secretions, assume a dark or coffee-grounds appearance. At the same time, dark-coloured matter, resembling tar mixed with black blood, is freely discharged from the bowels.

364. The other symptoms characterising this stage, and preceding dissolution, are—soft, quick, intermitting, or irregular pulse; clammy, cold, or partial sweats; deep and heavy respiration; coldness of the extremities; black urine, or suppression of urine; singultus, convulsive sighs; tremors and subsultus tendinum; faltering speech: low muttering or raving delirium; strugglings to get up in bed; dark or raw appearance of the tongue; livid blotches over the body, particularly the præcordia; faintings or coma, and glazed eyes.—The *blood* at this period is black, thin, and dissolved, its fibrin seems diminished, and it does not separate into crassamentum or serum; or if it does, the former consists of a thin dark jelly, with the black colouring matter precipitated towards the bottom of the vessel.

365. Such is the usual progress of severe inflammatory fever, as it fell under the author's observations, and as observed by the most eminent writers, under circumstances which seemed to preclude the influence of marsh exhalations. It has been a most prevalent and destructive disease in the West Indies and Mediterranean, during hot seasons, amongst sailors and soldiers unseasoned to these climates. It is not liable to recur; and, unlike the continued form of fever caused chiefly by malaria or marsh exhalations, it is neither preceded by, nor passes into, disease of a periodic type, nor is followed by enlargements of any of the abdominal viscera, unless the patient has been exposed to such exhalations during convalescence. A first attack prevents a second, if the individual continue in the climate which caused it; but if he return to a cold country, and reside there until the energy of his system is restored, he becomes liable, upon his return to the hot climate, to a second attack, although less so than before, and in a milder form. Numerous proofs of this position have come under my observation. The fever will not prevent those diseases which proceed from marsh exhalations; but, if the person who has been seasoned by it, be seized by fever from this cause, the periodic type will be assumed, and visceral disease will frequently supervene.

366. Of a number of persons whom I treated in this fever in 1817, and who soon afterwards were exposed to marsh exhalations in their concentrated form, not one escaped agues, remittents, or dysentery.—I do not believe that this—the climate or seasoning fever—will exempt from pestilential yellow fever, although it may lessen the susceptibility to it, when the individual has not intermediately changed the climate.—Instances are numerous of seasoned persons—of those who have suffered this, the climate, or severe inflammatory fever—afterwards being seized with endemic or remittent fever, or with the pestilential disease.

367. *δ*. The *complications* of the grade of ardent fever are not so distinct as those presented by the milder form.—Some cases occur in which the *cerebral symptoms* are of greater intensity than usual, and closely resemble those of the most severe phrenitis. Such are most common in persons who have undergone much exertion whilst exposed to a very hot sun, shortly before the attack. But these symptoms, even when most violent, subside upon the supervention of exhaustion, and of the constant vomitings attending that stage.—In almost all instances, the *gastric affection* is excessive, particularly at an advanced period; but this is so characteristic of the malady, that it can hardly be called a complication. Often, however, when the cerebral affection is very great, the gastric irritability is not remarkable; and when the latter is excessive, the former is but slight.—*Biliary disorder* is sometimes very prominent, especially during the period of excitement; but it seldom amounts to more than functional disturbance—than an evacuation of bile, often in great quantity, and of morbid quality. There is evidently excited vascular action in the liver, as well as in other

important viscera, but it is not actual inflammation—at least, suppuration is never observed in dissection of fatal cases. (For *Diagnosis*, see § 243—247.; and YELLOW FEVER.)

368. ε. *Terminations and Prognosis.*—(*a*) Ardent or severe inflammatory fever, if not arrested by an early and energetic antiphlogistic treatment, rapidly *terminates* in exhaustion of vital power, with alteration of the blood, and organic change of the internal viscera, manifested especially in certain tissues.—1st. A resolution or subsidence of the excited action, without the supervention of the stage of collapse or exhaustion, seldom occurs, unless an appropriate treatment has been adopted. When the period of excitement is early and duly moderated, the severe symptoms of exhaustion either do not appear, or are very slight, debility of short duration being only present; and the patient rapidly recovers without any visceral disease. The stage of exhaustion is great in proportion to the violence of excitement, and in it the more unfavourable terminations occur.—2d. Organic change of some important organ may supervene during excitement, but rarely to an extent sufficient to produce death: it consists chiefly of vascular injection; discolouration and softening of parts; effusion of serum, lymph, or blood; and takes place most frequently within the head, and in the digestive organs. Purulent matter is never formed in this period, nor subsequently.

369. (*b*) In the stage of collapse, several changes occur; but death is owing rather to their conjoint influence, than to either singly.—1st. Exhaustion of vital power is always present, but not to an extent sufficient of itself to arrest the organic functions.—2d. Deterioration or change of the blood obviously takes place, and is shown by the state of this fluid both during life and after death; but the nature of this change is not fully ascertained; whatever may be its nature, it is merely consequent upon the altered state of organic nervous influence.—3d. It is very probable that exhaustion of this influence, and the resulting changes in the blood, so affect the irritability and tonicity of fibrous and contractile structures as to impair these vital manifestations, and thereby to favour or even to induce the alterations observed towards a fatal close, particularly those affecting the capillary system and mucous tissues; for the vital tone of the extreme vessels and of the digestive mucous surface being thus impaired, and the blood being more fluid and dissolved, as well as otherwise altered, hæmorrhage readily occurs, with discolouration of the skin and of membranous parts; the blotches, &c. observed during the latter stages, proceeding from these pathological states. That the head should appear to suffer especially during the period of excitement, is a necessary consequence of the physical relations of this part, in connection with general vascular excitement; and that the stomach and digestive mucous surface should evince predominant disorder at an advanced stage, may be ascribed to the irruption of acrid or vitiated secretions, particularly the biliary, to the state of organic nervous power, and to the changes induced in the blood.

370. ζ. The *Prognosis* entirely depends upon the period at which the disease is subjected to appropriate treatment, and upon the violence of the seizure.—When the stage of excitement has but tly commenced, the treatment about to be recommended will generally arrest the disease; but the nearer this stage approaches its acme, or that of exhaustion, the greater is the danger, as those changes in the organic nervous influence, in the blood, and in the vital tonicity of contractile parts, may be considered as having begun; and active depletions are then not so well endured, nor productive of the same effects, as at an earlier period. When symptoms of collapse appear, the danger is very great; and in proportion to the progress of this stage and the urgency of its characteristic phenomena, particularly discolouration of the skin, black vomit, and passive hæmorrhages, it becomes extreme; recovery seldom taking place when these symptoms are fully developed.—When the cerebral affection is very remarkable at an early stage, the danger is even then great, as the effects of the treatment imperatively required, conjointly with the exhaustion consequent upon excessive action, will induce a state, which, although much less dangerous than that which would indubitably follow unrestrained action, is still attended by much risk, and often requires the prudent exhibition of restoratives, &c.

371. The *Duration* of this fever varies from two to six or seven days. A fatal termination commonly takes place on the fourth or fifth day.—On examination, *post mortem*, more or less evidence of increased vascular action, often amounting to inflammation, or its consequences, is observed in the membranes of the brain, in the internal surface of the stomach and bowels, and more rarely in the pleura and serous membranes of the abdomen. The digestive mucous surface is studded with numerous dark or ecchymosed spots, from which a fluid black blood seems to ooze. The liver is frequently congested, sometimes larger and softer than natural, and of a dark colour, owing to the quantity of black blood in its vessels. The spleen is somewhat enlarged, soft, and friable; and the omentum injected.—The serous as well as the mucous surfaces, especially in the abdominal cavity, often present livid or dark patches. The *blood* is every where fluid, black, and dissolved. The internal surface of the heart and large vessels, both arteries and veins, was of a dark red or livid tint in a few cases which I examined; but this point requires further investigation, as my opportunities were not sufficient for the satisfactory examination of it in respect of the universality of its occurrence, and the exact changes on which this appearance depends.

372. C. *Nature of the Disease.*—Fevers produced by paludal miasms, or by infectious emanations from living or dead animal matter, are universally preceded by well-marked symptoms, characteristic of the stages of *premonition* (§ 33.) and of *invasion* (§ 35.). But inflammatory fever, especially in its more severe form, is seldom preceded by more than chills, unless cold, or other causes which suddenly arrest the cutaneous excretions, have been concerned in producing it. In these fevers, a poisonous agent has infected the frame, and more or less depressed its vital energies, particularly as they are manifested in the organic nervous system; vascular reaction being consequent upon such depression, as shown above (§ 95, 96.). But in this fever, the injurious agent, or primary pathological change, is generated within the system from the action of new and unwonted in-

fluences, generally climatorial or atmospheric. That this agent is not of a depressing kind, as respects its primary operation, is manifest, from the general absence, at the commencement of the disease, of those phenomena which indicate this kind of action. That it is of an irritating or exciting kind, may be inferred, not merely from the character of the invading symptoms, but also from the changes primarily induced by the remote causes. — If we inquire into the nature of these changes, we shall find them — 1st, As respects the *mild inflammatory fevers* of cold or temperate climates, to consist — (*a*) of the organic and nervous excitement consequent upon the rapid and increased oxygenation of the blood during cold and dry states of the air, probably aided by the accumulations of the electro-motive agencies in the system which these states manifestly favour; — (*b*) of the super-abundance of irritating matters in the circulating fluids resulting from casual interruptions to one or more of the eliminating or depurating processes constantly going on in the animal economy; — (*c*) of the combination of these circumstances or primary pathological conditions. If we grant that the former of these obtains, it is very obvious that the occurrence of the latter will further excite and increase it; even a susceptibility to the former, as marked by high irritability of fibre, may be readily kindled into morbidly increased action, by causes of irritation which may have accumulated either within the vessels — in the blood itself; or external to them — in excreting organs and surfaces. These pathological states are the obvious results of concurrent causes, which primarily excite the sensible and susceptible parts of the frame, and which retard or prevent the discharge of irritating materials from the vital currents which supply and sustain these parts; the accumulation of these materials either increasing the excitement, or giving rise to it. It must necessarily follow that the excitation thus induced will exhaust itself to a degree, and with a rapidity, co-ordinate with its intensity, and thereby induce the phenomena characterising the advanced periods of the disease, which are especially remarkable in the severe or climate fever of warm countries.

373. 2d. As respects the *severe inflammatory or climate fever*, the procession of phenomena must necessarily be different, as it generally arises from causes different, or even opposite, to those just instanced — from a very high temperature, often conjoined with rich, nutritious, and heating food, stimulating drinks, and suppressed perspiration. Either of these is alone sufficient to induce the disease; but, when they co-operate, the effect is more certain and severe. They all act in a similar manner; — they excite the organic nervous system inordinately; increase the actions of the liver, and irritate its vessels; alter the constitution of the blood, causing it to abound with stimulating and injurious materials; and render the secretions and excretions acrid or morbidly exciting. Thus the most violent states of this fever often proceed directly from these causes, without any evidence of primary subaction or a cold stage, unless depressing agents, such as cold, human effluvia, or malaria, concur with them in producing disease; in which case the consequent fever will present features modified accordingly. If cold act upon persons who are under the influence of these exciting causes, a slightly cold stage will often be directly induced thereby. If animal or vegetable miasms concur with them, the fever will present adynamic or malignant characters in proportion to the activity of either of these agents. But when the above direct causes of excitement act solely or principally, their influence upon the organic nervous system is very energetically expressed, and manifested throughout the vascular system, especially that of the brain, liver, and digestive mucous surface. Thus, inflammatory fever differs from the other varieties of idiopathic fever — 1st, in its proceeding from causes, the primary action of which is exciting or irritating; 2d, in excitement or irritation being more or less evinced by it from the commencement.

374. Of the changes that take place in the advanced period of the disease, the most remarkable are those affecting the blood, and the digestive organs. As the stage of excitement merges into that of exhaustion, the *blood* changes from a florid to a dark colour; loses its property of separating into crassamentum and serum, and of firmly coagulating; becomes more fluid; and seems deprived of much of its fibrinous and albuminous constituents. (See art. Blood, § 128.) According to Dr. Stevens, its saline ingredients are also greatly diminished. The chief cause of these alterations is evidently exhausted organic, nervous, or vital power; and this is further evinced by a loss of the tone of the extreme vessels, and of the irritability of the moving fibre, always co-ordinately observed in cases presenting this change in the blood. Among the most striking consequences of exhaustion of vital power, as thus manifested in the extreme vessels and blood, are, discolouration of the skin, and passive hæmorrhages from mucous surfaces — phenomena characterising the last stage of the most unfavourable cases of the intense disease. The gastric disturbance in the early stages generally proceeds from excited vascular action, and from the passage of irritating secretions into the stomach, in connection with an increased susceptibility and irritability of the organ. In the latter stages, it more especially results from the morbid secretions poured into the stomach, and the irritated or inflamed state of its villous surface.

375. The source of the black matter passed from the stomach and bowels in the last stage of this and of other severe fevers of warm countries, has been variously stated. Some consider the black colour to proceed from the exudation of dark blood, which, in mixing with the secretions of the stomach, liver, and bowels, imparts to them a still darker tint. Some ascribe it chiefly to the bile, and secretions from the digestive mucous follicles, which are often both very dark and thick, in the last stage of the more malignant kinds of intertropical fevers; and others believe it to arise both ways. There is no doubt that all the secretions poured into the digestive canal are more or less diseased, particularly in the latter stages: but it is as clear, that the black colour mainly depends upon the state of the blood; and that all the matter ejected upwards and downwards, presenting this appearance, does not consist of altered secretions merely, — a great part of it probably being an exudation of blood from the mucous surface. I believe, also, that these matters vary very remarkably in the ardent climate fever, in the more malignant forms

of marsh or endemic fevers, and in the pestilential yellow fever — the diseases thus characterised. Dr. Jackson remarks that the secretions from the digestive mucous surface are ropy and clear during the early periods, and are brown or black in the latter — sometimes black as soot; and that the sooty or ink-like colour is chiefly observed where the head and stomach are simultaneously attacked. When we consider that the blood becomes darker than natural, as well as otherwise changed, early in the period of exhaustion, and that the liver and mucous follicles of the digestive canal, with the kidneys, are the principal organs of depuration, or channels by which the elements producing these changes are eliminated from the circulation, we need not be surprised at the secretions, which these elements go to form, and which these organs excrete, presenting somewhat similar characters. It must however be admitted, that the share which the secretions perform in producing this phenomenon, or that which the exudation of blood has in giving rise to it, will vary much in different varieties or cases of intertropical fevers. — The rapidity with which a dissolution of the tissues takes place after death, in the severe forms of climate fever, deserves notice, as marking the rapidity of vital exhaustion, and as resulting from the changes of the blood; these changes commencing with the stage of exhaustion, and advancing until this fluid is no longer capable of influencing the nervous system, and of preserving the irritability of contractile parts — or until it poisons, instead of exciting, the sensitive and moving tissues.

376. iii. Treatment.—The means that should be employed in the *mild* and *severe* forms of inflammatory fever are the same — the only difference being in the promptitude and energy with which they ought to be administered. In the mild diseases, particularly in cold or temperate climates, the febrile excitement is much more prolonged than in the severe, which rapidly exhausts itself by its violence. The necessity, therefore, of restraining it at its commencement is great in proportion to its activity. In the milder forms, vascular excitement may continue several days, and depletions may be practised with advantage as long as this state persists; but, in the severe, the period in which they can be employed with benefit passes away sometimes in a few hours; and continues seldom beyond the third, and rarely beyond the fourth day. As in the state of excitement, so in that of exhaustion, the treatment is the same in all the varieties of this fever — the only difference being in the choice of means, in the activity with which they should be employed, and in the appropriation of them to the varying circumstances of the case.

377. *A.*—*a. During excitement*, and especially at its commencement, vascular *depletions* should be practised, and carried as far as the state of the pulse and other circumstances will permit; and in the manner described in the article Blood (§ 64.). The observations already made on this subject (§ 128—138.) will guide the inexperienced practitioner; but it should not be overlooked, that, in the intense climate fever, vascular depletion should be prompt, from a large orifice, large, and repeated, to be successful; and that the quantity of blood abstracted should depend chiefly upon the effect produced. Dr. Jackson justly remarks that it should be taken in quantity sufficient — whatever may be the amount — to relax the surface, and set free the secretions. Less than three pounds is rarely sufficient to produce this effect; and six have not been more than sufficient on some occasions: but whatever the amount may be, it will do comparatively little good if we stop short of the quantity which is requisite to effect a decided change. If delayed until the excitement is about to terminate in exhaustion, no benefit — or even mischief — may result from it; for the tonicity of the vascular system will have then become too far weakened to admit of the vessels accommodating themselves to a considerable loss of blood. When, therefore, the symptoms indicating the passage of excitement into collapse, or the deceptive abatement of the febrile action indicating this state, is observed — and particularly if yellowish blotches appear about the mouth, face, or breast — the time for bleeding with advantage has passed. If, however, headach is still urgent, the pulse still strong, and the features have not collapsed, blood may yet be abstracted cautiously and in moderation. When the cerebral affection is considerable or persistive, and is unattended by marked symptoms of exhaustion, depletion, general or local, may be repeated. Where the headach is particularly intense — rending, throbbing, &c. — with hot inflamed eyes, one bloodletting, however large or early, will seldom be sufficient. In such cases, the body should be immersed in a tepid, or slightly warm, bath, and well scrubbed with brushes, &c., until the cutaneous circulation is rendered free. Cold should also be applied to the head, both during the bath and subsequently, the hair having been cut off. After the patient is removed to bed, the vascular action and headach will often become again excessive; and, although a very few hours only may have elapsed, will require the repetition of very large depletions. Spontaneous hæmorrhage during excitement should not be arrested. In the most severe cases, especially when determination to the brain is great, epistaxis often occurs, but is generally slight, or almost instantly disappears. In these, vascular depletions, aided by the other means appropriate to this state, ought to be most energetically practised; for nothing else will save from fatal changes taking place within the brain, or from as fatal exhaustion, and its effects.

378. *Purgatives*, in one form or other, are a material part of the subsequent means. *Calomel* with *jalap* and *James's powder* may be given, in the form of pill, from time to time; and, after a few doses have been taken, a cathartic enema should be administered, and repeated. As to the choice of the enema, the practitioner should be guided by the progress the disease has made. At an early period, *sea water*, with or without the addition of castor oil, or of extract of colocynth, is appropriate: subsequently, olive oil and oil of turpentine may be substituted for the latter. — *Emetics* are not suited to any state of this fever; although they are often serviceable in fevers which have been confounded with it, more especially at the commencement of the various forms of marsh fever.

379. *b. Refrigerants*, when judiciously exhibited, are valuable adjuncts in the period of excitement. Those already enumerated, both *internal* and *external* (§ 139—141.), should be perseveringly em-

ployed. Of these, the *nitrate of potash*, the *nitrate of soda*, and *muriate of ammonia*, and injections of *cold sea water*, as recommended by Mr. Dickenson, are most deserving of notice. Hillary prescribed a scruple of nitre and twelve grains of muriate of ammonia three or four times a day, in water; and Dr. Conwell has recently shown the propriety of the practice in his instructive work, and its applicability to other states of febrile action. In the more ardent climate fever, this medicine should be very frequently exhibited during excitement; cold applications to the head, and the cold affusion, being also assiduously employed. The refrigerants just mentioned may likewise be taken frequently in conjunction with the *liquor ammoniæ acetatis* and *spiritus ætheris nitrici*. After depletions, they will often prevent the distressing irritability of the stomach, which increases with the unfavourable progress of the disease, and allay it when present. Although this is the most violent form of fever which comes before the physician, yet it may be arrested at an early period with greater certainty than any other, by the decided employment of the foregoing measures.

380. *c. External derivatives*, and more particularly *blisters*, have been very much employed against the inflammatory forms of fever, with the view of allaying the irritability of the stomach, and protecting it and other viscera from impending injury. But I believe that they have been as often injurious as beneficial; and that, owing to a too early use of them, they have increased the general excitement, and not derived from internal parts. It is only after vascular action is subdued as low as may safely be attempted, by the foregoing treatment, that *blisters** should be employed in this disease; but they ought never to be applied on the head, unless in the stage of exhaustion, when coma or lethargy is present, and the pulse becomes weak and intermittent. The exhibition of *mercurials* with the view of inducing salivation should not be attempted in this fever; for this effect has never been produced unless in the milder cases, which would have recovered nevertheless.

381. *B.* The *period of exhaustion* presents comparatively few chances of recovery, especially when far advanced, and in severe cases; but these few should not be thrown away, either by a temporising or a trifling practice; or by the use of means already known to be unavailing. There can be no doubt, that the change commencing in the blood with the accession of this stage is one of the chief pathological states which should attract the attention of the practitioner; but the exact nature of that change has not been satisfactorily demonstrated. That it partly consists of diminished crasis, or a weakened vital attrac-

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* The following case will show the progress of the disease, as well as its cerebral complication, in its most severe form; and the little effect which a depletory practice short of what it requires produces upon it.

A soldier of a full and gross habit of body, aged 28, just arrived in the West Indies, during the hot and dry season, was attacked, at six o'clock in the morning, with giddiness, severe headach, and pain in the back and limbs. He came under treatment at six in the evening (twelve hours after the attack), and then these symptoms were violent; the face was flushed, the eyes heavy and injected; the breathing was laboured; the pulse frequent, sharp, and contracted; the heat great, and skin dry; thirst vehement; tongue white and foul. He was anxious, restless, and complained of oppression at the præcordia. He was bled to thirty two ounces: a purging bolus was given immediately, repeated in four hours, and accelerated by an enema. He seemed a little faint from the bleeding, and expressed ease, but no decided relief. He passed the following night in much distress.

Second day of disease, in the morning, he complained of anxiety and uneasiness at the præcordia; sighed frequently, and breathed with catching and difficulty at times. Pulse quick, hard, and strong; the skin very hot and dry; intense pain in the head and loins. Bowels not freely opened by the purgatives. Was bled to fourteen ounces: the skin became moist; the pains remitted, but did not cease. Blisters to the head and epigastrium; calomel and James's powder every third hour; inunction with mercurial ointment; saline diaphoretics. He sweated copiously in the afternoon, had some evacuations by stool, and seemed relieved.

Third day. — Anxiety and sense of burning at the præcordia; nausea and vomiting; ineffective motions downwards; skin dry; pulse strong, not frequent; thirst urgent; eye and countenance lurid; temper irritable and impatient; alarmed at his situation; complains of the blisters on his head, which give sensations of burning. The skin is dry, and the heat rather above natural. The tongue is somewhat rough and foul.

Fourth day. — Symptoms more unfavourable. He vomits occasionally, and his nose bled in the act of vomiting: anxious, restless, and very uneasy. Pulse regular, full, and strong; ideas confused; countenance irregularly tinged yellow.

Fifth day. — Somewhat delirious; extremely restless and anxious; eyes red and muddy; gums red and hot; no salivation; pulse regular, full, but not weak; skin dry and of a deep yellowish shade; the blistered surfaces dry and of a dark red approaching to a livid hue. He was washed with salt and water. Frequent small dark viscous evacuations.

Sixth day. — Delirious, with extreme restlessness; pulse soft, full, and slow; skin damp and clammy; heat moderate; vomits glutinous matter of a black colour; dark blotches in the skin; and a black sanies exudes from the nose and mouth. — He died in the afternoon, five days and twelve hours from the attack.

Dissection. — The vessels on the surface of the brain were remarkably turgid, giving a livid appearance to several places. Considerable effusion of lymph, and adhesions between the membranes had taken place, particularly near the falx. The stomach and intestines contained a large quantity of black matter. In the latter, it was thick as tar, and viscous as birdlime. The gall-bladder was half full of black bile.

Remarks. — The above case was not treated by the author. Twelve hours were lost before the patient received assistance. On the second day the bleeding was insufficient, and should have been carried further and repeated. The pulse evinced the necessity of it. In this disease, as in many others, the pulse may be safely followed. If the pulse become an unsafe guide, the fault is most generally that of the observer, who cannot interpret it aright. The application of two blisters at this time, before vascular action was sufficiently reduced, and more especially the application of one of them to the head, during predominant action in this quarter, was sealing the fate of the patient, — the bleeding in the first instance being just sufficient to give freedom to the circulation, but not adequate to reduce it; the blister adding fuel to the fire when it was about reaching its height. The inunction of mercurial ointment with the view of affecting the system was as fruitless, and just as rational, as respects this fever, as to attempt to extinguish a conflagration by a surgeon's syringe. On the *third day*, the great strength of pulse, and burning sensations in the head and præcordia, clearly indicated that large bloodlettings could alone have saved the patient, although late in the disease. The local complication, having prevented the sudden accession of this stage, and prolonged vascular excitement, admitted of a later recourse to depletions than in other circumstances. Even on the *fourth day*, owing to the cerebral complication, the pulse retained its strength, and, with all the other symptoms, evinced that bleeding should even then have been practised. After the first day, nothing appropriate was done; but much to aggravate the disease. As to the *dissection*, the usual routine only was gone through, and which, if pursued in a million of cases, would not advance our knowledge of the disease one step. The symptoms on the second and third days ought to have suggested a minute examination of the vascular system and blood; but these, as well as the digestive mucous surface, were unexplored. In this case, as in many others, the name of the disease, contradictory opinions as to its nature and origin, and empirical reports of successful methods of cure, mistified the practitioner, and paralysed the treatment, when he ought to have been guided by a knowledge of morbid actions, and of rational means of removing them.

tion between the globules of the blood, and consequently of a defective power of coagulating, and of altered colour, has been shown by Towne, and by every writer since his time, and is generally admitted: but the observations of Dr. Stevens, as to the progressive loss of saline ingredients, which the blood undergoes with the progress of exhaustion, although now published several years, have not received that confirmation, for which there have been sufficient time and opportunity. They are not, however, therefore, altogether to be thrown aside, more especially as my experience has furnished me with facts calculated to support them in some measure. The exhaustion in this disease arises, — 1st, from the previous excitement; and, 2dly, from the changes induced in the blood in the course of this stage, especially at its acmé, manifestly depressing the organic nervous influence, the tonicity of the vascular system, and the action of the heart itself, to an extent often incompatible with the continuance of life. It is in this manner that death generally takes place in the intense climate fever; for, however considerable the lesion which the early excitement may have occasioned in the brain, or digestive organs, death is seldom the result of it in either of those parts. It should, moreover, be recollected that the disease cannot be cured by bloodletting alone, however necessary it may be to the subduing of excitement in the early stage; for although this state may be lowered by it, still dangerous exhaustion may nevertheless supervene with the characteristic changes of the blood, and all the consequent phenomena described by the earlier writers on this fever, particularly by Towne, Warren, Home, Lining, Hillary, &c.

382. *a.* From these considerations it is manifest that the *intentions of cure*, in this stage of the disease, should be — 1st, to support or rally the manifestations of life in the different organs — to oppose the progressive vital exhaustion; 2dly, to counteract those changes which take place in the blood and vascular system. These indications should be simultaneously carried into effect; for the alterations in the state of vascular action and tone, as well as in the constitution of the blood, are more or less dependent upon the change in the organic nervous influence. — At the commencement of this period, and when vascular action still continues high in the encephalon or digestive mucous surface, a moderate local depletion may precede measures calculated to fulfil these intentions: but even this form of depletion can seldom be carried far; for the tonicity of the vascular system generally, and especially of the capillaries supplying the mucous surfaces, is too far exhausted to admit of that accommodation of the vessels to a considerable diminution of their contents which is so requisite to the restoration of a healthy state of circulation. The characteristic phenomena of the last stage — the hæmorrhages and discoloured blotches — are manifestly owing as much to the exhaustion of organic nervous influence and of irritability, as to the attendant changes in the blood. It is to these latter changes almost solely that Dr. Stevens directs his means of cure in this stage; but it is evident that the vital conditions on which they depend should receive equal attention. He states that the quantity of the muriate of soda is greatly diminished in the last stage of this and other malignant diseases; and that, in order to supply the deficiency, he at first gave a strong solution of this salt with nitrate of potash. He subsequently found that the chlorate of potash and other active saline agents answer the purpose equally well, especially those which do not irritate the stomach; and he now seems to prefer a combination of the muriate and carbonate of soda and chlorate of potash. The basis of this pathology and treatment is the relation subsisting between the colour of the blood and the saline matters contained in it. The power of certain salts, particularly the muriate of soda, the nitrate of potash, the tartrate of potash, &c., as well as of the alkaline carbonates, to render the venous blood florid, and to affect its fluidity and coagulating powers, was long since fully demonstrated by Verheyen (vol. ii. p. 29.), Schwenke (*Hæmatologia*, p. 190. *et passim*), Hales (*Hæmastat.* p. 154.), Eller (*Mém. de l'Acad. des Sc. de Berlin*, t. vii. p. 13.), Boerhaave (*Elementa Chymiæ*, t. ii. p 378.), Petit (*Lettre Seconde*, p. 34.), Haller (*Elementa Physiol.* t. ii. p. 74.), Sauvages (*Sur l'Effet des Médicamens*, p. 37.), and others. A combination of the *nitrate of potash* and of the *muriate of ammonia* was always employed by Hillary in this disease, and is applicable to every period of it. *Sea water* has long been a popular remedy for it and other West Indian fevers, and is very strongly recommended by Arejula and Mr. N. Dickenson as an enema. Dr. Chisholm employed, in 1798, the *chlorate of potash*, and remarked its effects upon the blood; but, as Dr. Stevens justly states, he exhibited other substances calculated to counteract its influence on the disease. But granting that the colour of the blood is changed to its healthy state by these salts, it does not follow either that they shall be absorbed into the circulation during the advanced stage of this fever, or that they shall have the effect of rallying the exhausted powers of life. As to both these circumstances, the sanguine expectations of Dr. Stevens require confirmation. There can be no doubt that, to be serviceable, these medicines should be given sufficiently early in the exhaustion to allow time for their absorption; and that substances which irritate the digestive mucous surface, and prevent or delay absorption, should not also be exhibited. In the present state of our knowledge, and judging from some experience of the effects of these salts in the advanced stages of other severe fevers, I infer, that they ought not to be confided in alone, but should be conjoined with such other means as are calculated to rally or support the vital manifestations, and promote the excreting functions — always recollecting that, in order to preserve the blood in a state suitable to the continuance of life, the depurative actions of the various emunctories require to be promoted.

383. *b.* In the early stage of exhaustion, Hillary's saline mixture may be prescribed; or the same salts — the *nitrate of potash* and *muriate of ammonia* — may be given in camphor julap; the quantity of camphor being regulated according to the grade of depression. The *chlorate of potass* may likewise be given in the same vehicle; or the *citrate* or *tartrate* of *potash* or *soda*, with an excess of the alkali. It is very important, to avoid such means as will increase the irritability of stomach characterising this stage of the disease;

and I believe that these medicines are much less likely to have this effect than almost any other. A full dose of *calomel* will often have the effect of allaying for a while the irritable state of this viscus; but, when exhaustion is very considerable, its sedative influence on the organic nervous energy will be injurious, if it be not combined with camphor or ammonia. During the course of this stage, little benefit will accrue from such purgatives as irritate the stomach. An occasional Seidlitz powder, or the saline medicines just mentioned, assisted by frequent injections of sea or salt water, with the addition of an ounce or two of sweet oil, will prove much more serviceable than more active means, which will only increase the inflammatory irritation of the digestive mucous surface, and exhaust its vitality. Dr. Jackson most frequently prescribed a combination of calomel, James's powder, nitre, sulphur, and soda, in the form of bolus, which was given every fourth hour; and afterwards the infusion of senna, with liquor ammoniæ acetatis, so as sufficiently to promote the action of the bowels.

384. *c.* In a further advanced state, and more especially if the pulse become irregular or intermittent, the more energetic restorative and nervine medicines should be prescribed, variously combined with one another, or with the saline substances just mentioned. Warm or rubefacient epithems, or sinapisms, should be also applied over the epigastrium, or to the lower extremities; and hot wine with spices; or champagne; or large doses of camphor with nitrate or chlorate of potash; or brandy and water, as the vehicle of effervescing salts; or half-drachm doses of turpentine, every two hours, in milk, or in spruce or ginger beer, may be resorted to, according to circumstances. But, before the exhaustion has proceeded thus far, these remedies, in more moderate doses; the preparations of ammonia, conjoined with saline or other medicines, the warm bath, &c.; may be employed, with a cautious observation of their effects.—Upon the whole, the principles developed above, in respect of the treatment of exhaustion of vital power in fever (§ 143—148.) should be adhered to.

385. *d.* During the progress of the stage of exhaustion, much attention ought to be directed to the beverage of the patient. Spruce beer, soda water, Seltzer water, bottled porter, bottled small beer, may be allowed, but only in small quantity at a time, as a considerable draught is generally followed by vomiting. These beverages may, moreover, be made the vehicle for the exhibition of refrigerant, antacid, or saline medicines, as the nitrate of potash, the alkaline subcarbonates, &c. During *convalescence*, the diet should be carefully regulated, and confined at first to farinaceous articles, in moderate quantity.

386. *C.* The modified form of *inflammatory continued fever*, arising from the concurrence of terrestrial exhalations, with climatorial influence, must be treated, in the periods of excitement and of exhaustion, conformably with the views explained above. This form of fever, after the inflammatory excitement is subdued by copious depletions, sometimes assumes a remittent character. In this case, the exhibition of bark or the sulphate of quinine during the remissions will be necessary. Whatever *complication*, also, which may either characterise this fever from its commencement, or appear in its course, must be treated by depletions, local especially, and derivatives, according to the principles already advocated.—(See Bilio-Gastric Fever.)

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XVIII. Bilio-Gastric Fever.—Syn. *Febris Biliosa*, Hippocrates, Stahl, Selle, Finke, Tissot, and Stoll; *Synochus Biliosa*, Galen; *Febris Gastrica*, Baillou, Lentin; *F. Gastro-Hepatica*, Hildenbrand; *Febris Cholerica*, Auct. var.; *Fièvre Meningo-gastrique*, Pinel; *Gastrische Fieber*, Richter; *Gastric Fever*, *Gastro-bilious Fever*, *Bilious Fever*, *Bilious Continued Fever*, *Endemic Fever*, *Gastric Inflammatory or Bilio-Inflammatory Fever*.

387. Defin.—*Vascular reaction following chills or rigors and other symptoms of premonition and invasion, with predominant affection of the biliary functions, and of the digestive mucous surface, frequently with yellowness of the skin, in the severer cases.*

388. This fever is either sporadic, endemic, or epidemic.—It is *endemic* in warm countries and marshy situations among Europeans, particularly those who have not been long resident in these parts; and in marshy localities in the summer and autumn, in temperate climates.—It is *epidemic* in some seasons, particularly in autumn when the summer has been hot, after a wet spring, or after great falls of rain, or after inundations, and when great numbers of predisposed persons, especially from high latitudes, visit such localities. In these circumstances and persons, it proves the

seasoning fever. It is observed chiefly in adults of the bilious or bilio-sanguine temperaments, and in persons addicted to spirituous liquors. It is a very prevalent fever in the countries bordering on the Mediterranean, in the East Indies, and in America, and consequently in fleets and armies in these parts.

389. Gastro-bilious fever is *caused* chiefly by exhalations from the soil, or from vegetable and animal matter undergoing decomposition, in connection with atmospheric heat; by exposure to the sun; by the night airs or dews, and the influence of cold following such exposures or excessive exertion or high ranges of temperature; by intemperance and errors of diet or of regimen; by excesses in vinous or spirituous liquors; by great exertions following inactivity; by over-eating, or by a sudden transition from a very poor to a very full or rich diet, as in the case of soldiers and recruits; by anger and other mental emotions; and by the causes already enumerated (§ 330. *b*.) — It most frequently, however, arises from the concurrence of two or more of these causes. The influence of infection in producing it has been doubted; but the experience of Drs. Denmark and Boyd, in ships and hospitals in the Mediterranean, has demonstrated its occasional origin in the cause — or at least the power infection evinces in producing a severe modification of it.

390. i. Description.—This fever, in robust and plethoric persons, approaches severe inflammatory fever on the one hand, and the more inflammatory forms of remittent on the other: or it presents a predominance of the characters of either, according to the intensity of the causes and the peculiar circumstances of the affected. The chief difference between inflammatory fever and it, depends upon the causes whence they respectively proceed; the former arising principally from atmospheric vicissitudes and climatorial influence, in connection with suppressed perspiration; the latter chiefly from marsh and vegeto-animal miasms (see *Diagnosis*). Its similarity to, and connection with, remittents, are referrible to the origin of both in the same causes; the only differences between them resulting from the intensity and concurrence of the causes, and from individual predisposition — being differences chiefly of grade and of type, as shown by Dr. Boyd, and confirmed by my own observation. That it should therefore be confounded with these fevers, cannot be a matter of surprise, and is of little importance as respects the treatment. But when it is mistaken for the synochoid and adynamic species with predominant affection of the digestive mucous surface, then the results may be serious.

391. *Gastro-bilious fever* is generally preceded by lassitude, nausea or want of appetite; by dull pains in the back and limbs; and by flatulence and indigestion. The breath is fœtid; the tongue is covered by a yellowish mucous coating; the mouth is clammy, and the taste perverted; the bowels are costive, or relaxed, or irregular; and the countenance is pale or somewhat sunk. This state — the *premonitory stage* — may continue several days, the patient not being confined to bed; but generally in the morning he is seized with chills or rigors, preceded by a sensation of cold creeping along the spine. To these soon succeed severe frontal headach, vertigo, nausea, vomiting, burning heat of skin, restlessness, watchfulness, slight anxiety at the præcordia, pain and oppression in the epigastrium, and in one or both hypochondria, with more or less soreness, fulness, and tenderness. The eyes are moist and injected, the conjunctiva often yellowish; the face is flushed; the breathing oppressed and accelerated; the pulse full, large, quick, and strong, rarely hard; the tongue is clammy, moist, furred, and yellowish, with a bitter taste in the mouth; the thirst is urgent, the breath fœtid; the bowels are obstinately costive, or loose; the stools bilious, and the urine scanty and dark. When the stomach and bowels are inordinately affected, cerebral congestion very frequently supervenes at a later period. As the disease advances, the pulse feels less full, and is weaker than in health. The thirst and anxiety are increased; and the upper parts of the body are sometimes covered by a profuse sweat, whilst the skin still continues hot.

392. If the attack be very severe, or neglected at the commencement of reaction, the pain of the head is aggravated; and a disinclination to answer questions, stupor, and insensibility appear about the second or third day. The eyes are turgid or inflamed; a bilious yellow tinge spreads from the face downwards over the body; the tongue is covered by a thick yellow crust, is red at its sides, and dry and brown in the centre; the strength is diminished; nausea with bilious vomiting is often distressing; the pulse becomes weaker and quicker; and the patient has an insatiable thirst, and desire of cold acidulated fluids. The urine is very high coloured, voided often, and produces scalding in passing it. The bowels are either costive or loose.

393. If the disease has not been mitigated, a slight remission occurs on the third, fourth, or fifth day, generally in the morning; the face and chest being covered by perspiration, and the temperature of the surface reduced. But the symptoms are exasperated towards evening; the tongue becoming drier and darker; the epigastrium and hypochondria more painful, tender, and often also tumid and tense; the pulse more rapid, constricted, or weak. The anxiety at the præcordia is now changed into severe pain, aggravated on pressure, with oppression and frequent sighing; the countenance is sunk; there is vomiting of putrid or offensive bile; the stools are liquid, greenish brown, fœtid, slimy, and occasionally bloody or dysenteric; the skin is often deeply jaundiced, and emits a putrid bilious odour. The patient is now collected, but various adynamic and malignant symptoms appear from the fifth to the seventh or eighth day. These are — tremors of the extremities, and of the tongue when held out, startings of the tendons; pain about the pubes, with inability to pass the urine; vomiting of a dark, glairy matter; difficulty of swallowing; sometimes swelling and suppuration of the parotid glands; tympanitic distension of the abdomen; inexpressive, glassy eyes, dilated pupils; clammy sweats, difficult and anxious breathing, and black tongue. To these succeed delirium, coma, intermitting pulse, cold extremities, and death, sometimes with convulsions. Petechiæ, blotches, and passive discharges of blood from the nostrils, gums, fauces, &c., are but rarely observed.

394. *Modifications.* — All the above symptoms are not present in the same case, nor always run the same course. In the young, strong, plethoric,

and unseasoned, in the sanguine and intemperate, and in very hot and dry seasons, this disease approaches very closely to severe inflammatory fever (§ 359.) with predominant affection of the stomach and membranes of the brain, or of the digestive mucous surface generally. But in weak or elderly persons, and in colder climates and seasons, it is more mild, and approaches, or even runs into, some one of the varieties of remittent. Indeed, it may assume either *inflammatory* or *adynamic* characters, or present *complications* similar to those observed in that fever, from which it differs merely in type. When animal miasms and infection are associated with the other causes, as in crowded transports, ships of war, prisons, camps, &c., in warm climates, or in hot seasons, more or less adynamia or depression of vital power, with contamination of the circulating fluids, is evinced early in the disease — *malignant* and nervous symptoms predominating towards the close. In such cases, the premonitory and invading stages are very manifest: reaction is often low or imperfect, as in the more adynamic states of remittent, or rather in the malignant form of fever about to be noticed; and the type is perfectly continued. But when it arises chiefly from terrestrial exhalations, the circulating and secreted fluids are less vitiated, and it presents more of the remitting character. When these causes are very intense, and the predisposition great, the disease often assumes a very *concentrated* and *acute* form, runs its course rapidly, and often passes into the remitting type, or induces visceral disease. These violent states of bilio-gastric fever have been often met by Mr. Boyle and myself in Africa, and by Dr. J. Johnson, Annesley, and others in the East Indies. This fever thus may resemble, according to the nature of the causes — predisposing and exciting, — of the seasons, of the locality and climate, and of the epidemic constitution, either inflammatory, or remittent fever, or even malignant fever — may possess more or less of a gastric character in one case, of a bilious state in another, of an inflammatory condition in a third, of cerebral affection in a fourth, of an adynamic or malignant form in a fifth, or a predominance of any two or more of them. These modifications give rise to the appellations, gastric, bilious, yellow, gastro-bilious, gastro-inflammatory, bilious inflammatory, bilious continued, gastro-meningitic, &c., applied to it by modern writers, and cause it frequently to be confounded with the severe inflammatory fever on the one hand, and with pestilential yellow fever on the other.

395. ii. *Duration and Terminations.*—These depend upon various circumstances — chiefly upon the exciting causes and circumstances proper to the patient. — *a.* When judiciously treated at an early stage, a favourable change generally appears from the third to the seventh day, or even earlier. — *b.* But when the disease has been neglected, or aggravated by improper means, *death* may take place from the fifth to the eighth day, preceded by the unfavourable signs just enumerated (§ 393.). In these, the brain or its membranes, or the digestive mucous surface, or all of them, have suffered very considerably, and are more or less changed. — *c.* In some cases, and when it is occasioned by the concurrence of marsh exhalations with the other causes enumerated above, more particularly in hot climates, or in temperate countries during warm summers and autumns, the inflammatory action extends to the mucous surface of the small intestines and large bowels, the disease terminating either in enteritis or acute dysentery. As in the remittent type, so in this, the state of the secretions, particularly the biliary, and the nature of the ingesta, concur with the exciting causes in developing these complications (§ 237.). *d.* The fever may also pass into *inflammation* or abscess of the liver. This is a frequent complication and termination of the bilio-gastric fever of the East Indies, and of some other intertropical countries. When abscess forms in the liver in these cases, dysenteric symptoms are often superadded. — *e.* When the disease has not been entirely arrested, but only mitigated by treatment, or when it has been mild at the commencement, and caused chiefly by terrestrial exhalations, the patient continuing subjected to their influence, it may pass into a *remittent*, or even an intermittent type. In such cases, enlargements of the spleen, of the liver, of the pancreas, and even of the mesenteric glands, may ultimately supervene. — *f. Relapses* are more frequent in this than in almost any other fever, and are caused chiefly by a too early recourse to a full or stimulating diet, by irregularities in food or drink, by incautious exposure to the night air or to cold, by vicissitudes of temperature or of season, and by terrestrial or vegeto-animal miasms. — The *lesions observed in fatal cases* are altogether similar to those found in the more inflammatory and severe forms of remittent.

396. iii. *Diagnosis.*—*Bilio-gastric* fever nearly resembles — 1st. *Inflammatory fever*, in its milder states; — 2d. *Remittent fever*, in its severe forms; and, 3d. Epidemic or *pestilential yellow fever*. — *a.* From the *first*, it is distinguished by premonitory symptoms of considerable severity and continuance; by the marked chills and rigors characterising its invasion; by the early occurrence of nausea and bilious vomiting; by the less continued and violent state of vascular reaction; by the copious and early bilious evacuations and the bilious suffusion of the skin; and by the usually longer duration of the disease. In severe climate or inflammatory fever, on the other hand, the invasion is sudden, and vascular action more or less excited from the commencement — premonitory symptoms being hardly observed. Subsequently the blood undergoes a much more remarkable change than in gastric fever — the yellow and livid blotches appearing in the last stage, being very different from the bilious suffusion of this disease; and the hæmorrhage from the mucous surface, the black vomit, and dissolution of the fluids, &c., so frequent in the former, being neither so common nor so great in the latter. The pain in, and determination to, the head, is more severe in the first stage of inflammatory fever, and the disorder of the stomach much less than in gastro-bilious fever; but the affection of the stomach becomes more violent and unremitting at an advanced stage of the former, than of the latter.

397. *b.* Gastro-bilious fever is distinguished from *remittent fever* chiefly by its continued or imperfectly remitting course. In other re-

spects there is little difference between it and the severer forms (§ 230. 232.) of that disease, excepting that its severity is often greater, and its duration shorter. Indeed, this is but a variety of marsh fever, owing its continued and otherwise modified characters to high temperature and other concurrent circumstances.

398. As this fever varies from the ardent seasoning, to the distinctly remittent type, with the intensity and concurrence of the causes producing it; and as it may occur contemporaneously with the pure climate fever, and with the more inflammatory forms of remittent fever, as frequently observed in the West Indies and Mediterranean during the hot months, particularly among soldiers and sailors; so it is often difficult to distinguish between them. The chief circumstances, however, which will fix the attention of the practitioner, are — the manner of invasion; the distinctness, obscurity, or absence of remissions; the degree of excitement characterising the early period, especially as expressed upon the vascular system; the kind of excitement, particularly in respect of sthenic or asthenic action; and the state of the circulating fluid, and of the secretions and excretions.

399. *c.* From *epidemic or pestilential yellow fever*, this disease is distinguished — by passing into the periodic type in many instances, and by frequently leaving visceral disease behind it; by its attacking the same individual oftener than once, if he have intermediately undergone a change of locality or climate; by the more inflammatory or sthenic character of the period of excitement, and the much less remarkable change in the blood and soft solids from the commencement; by the headach being confined chiefly to the temples; by the yellowness appearing early, and first in the eyes, and being of bilious origin; by much less irritability of the stomach in the advanced stages; and by its longer duration — generally from five to fourteen days. In pestilential yellow fever, the yellowness of the skin is not frequent, and is of a pale lemon colour; the face has a putrid, bloated, or livid hue; its duration is from one to five days; it never passes into the periodic type, nor leaves visceral disease behind it; fatal cases always being attended by the black vomit at their close. Moreover, remittent, inflammatory, and bilious fevers are never infectious, unless under peculiarly favourable circumstances, when the latter may assume this character; but epidemic yellow fever is remarkably infectious; and, whilst these are generally benefited by vascular depletions during the period of excitement, the epidemic malady requires a different method of cure.

400. iv. The *Prognosis* depends upon the intensity and concurrence of the exciting causes; upon the severity of the attack; upon the treatment adopted at the commencement; upon the state of vascular reaction; and upon the complications that may arise. — *a.* It may be favourable, if the attack be mild or simple, the skin moist, the vomiting moderate, and the matters ejected consist chiefly of mucus or ingesta; if the tongue become moist, the bowels loose, and the stools bilous; if the nervous and vital powers be not much reduced; and if the yellow suffusion be slight or slow in its progress. — *b.* An *unfavourable* opinion should be formed, if any of the more dangerous symptoms enumerated above supervene (§ 393.); especially if the skin be either early or deeply yellow, or the sensorial functions early disturbed; if the period of exhaustion be attended by deep redness of the face, dulness of the eyes, much anxiety, or laborious respiration; by a feeble, creeping, or intermitting pulse; by very scanty and dark urine; great pain, tension, or fulness in the epigastrium and hypochondria; difficulty of swallowing; tremors of the tongue or of the extremities; by startings of the tendons; involuntary discharges of fæces, particularly if they be of a black colour; incessant vomiting, especially if the egesta be dark, or great in proportion to the ingesta; by petechiæ, enlargements of the parotids, and coldness of the extremities.

401. v. Treatment. — The *indications* are — 1st. To evacuate morbid secretions in the prima via, and restore the suppressed perspiration, in the stages of premonition and invasion; — 2d. To moderate the vascular reaction attendant upon the period of excitement; — 3d. To obviate determination to a vital organ, and mitigate urgent symptoms; — and, 4th. To support the vital powers in the consequent exhaustion. — The *first* indication is best fulfilled before reaction is developed. At this time an *emetic*, followed by diluents, by the *vapour bath*, or by warm fomentations, *sudorific drinks*, and by warm emollient enemata, will generally restore the suppressed perspiration, and moderate the consequent reaction. — *Bloodletting* is the next important means; but the utmost care should be taken not to resort to it before reaction has commenced, or when exhaustion is about to supervene. Dr. Denmark has insisted upon this, and my experience fully confirms the propriety of the advice. I have seen this fever most remarkably exasperated, and almost fatal syncope occasioned, by the abstraction of even two or three ounces of blood during the stage of invasion, before vascular excitement was developed. When this pathological state has supervened, depletions should be energetically and early practised, but with due regard to the state of the pulse, and to the complications and other circumstances of the case: and they ought to be aided by cold applications to the head, and purgatives. A full dose (from 10 to 20 grains) of calomel may be given immediately upon the first bloodletting, and afterwards the tartrate or citrate of soda or of potash may be taken, at short intervals, in the state of effervescence, with an excess of the alkali. — As long as vascular excitement is energetic, antiphlogistic remedies should be employed, as recommended above; and, in addition to those now mentioned, there are none more deserving of adoption, than small and frequent doses of the nitrate of potash and muriate of ammonia. Cold affusions, and cold spongings of the surface, are also useful auxiliaries. When internal viscera are oppressed, and reaction is not free and open, the tepid bath, or tepid affusions, will be serviceable.

402. The *second indication* is to be fulfilled by local depletions, in the first instance, followed by rubefacients, blisters, and the other means detailed when treating of the remittent form of bilious fevers (see § 251, 252—258.). — The *exhaustion* in the latter period requires the same

treatment as already advised for this state in the severer forms of remittent and inflammatory fevers (see § 253. 256, 257.).

403. The *mercurial plan* of cure in this fever has been very strenuously insisted upon by CHISHOLM, DENMARK, J. JOHNSON, BOYLE, BOYD, and various other recent writers. They advise *calomel* to be given after copious vascular depletions, with the intention of affecting the system, and in various forms of combination—with James's powder or other antimonial preparations, in frequent doses, or in larger quantities with opium. And they direct the mercurial unguents to be used externally at the same time. I have prescribed mercurials with the same intention, to the utmost extent, and in all these forms, in the more concentrated varieties of this fever in hot climates; but I have not satisfied myself that they have been actually beneficial to the extent supposed, even in the cases which have recovered during or after their exhibition. I would, therefore, prefer to use it in the manner I have advised in the severer forms of remittent (§ 250. *et seq.*).

404. The propriety of having recourse to *emetics* in this fever has been much questioned by writers, and especially by those of the school of M. BROUSSAIS. They are, in my opinion, quite inadmissible after excitement has commenced. They should be given only in the premonitory and invading stages, as above stated (§ 401.), but unfortunately the disease seldom comes under treatment until these have been superseded by reaction; and they ought to be aided, in these periods, by the means mentioned (§ 401.) in connection with them. They are contra-indicated even thus early, if great pain be felt at the epigastrium, with distension and tenderness; and if full and free vomiting have already taken place.

405. The *saline treatment*, so remarkably extolled by Dr. STEVENS, in the latter stages of this and other severe fevers, does not appear to have been employed to an extent which will warrant an opinion as to its effects. And, although several years have elapsed since it was so strongly recommended by this writer, for these diseases, I cannot find that any additional evidence of its efficacy has been adduced. It surely becomes this physician to furnish further proofs of its success, and it is morally imperative upon practitioners in warm climates to give it a proper trial.— It is unnecessary to offer further remarks on the treatment of this species of fever, as the observations already made in respect of the management of remittent and inflammatory fever will in a great measure apply to it; and the more so, as the severe states of these diseases, as well as of this, although commencing differently and evincing certain modifications in their early course, generally present very similar features in their advanced stages, or when they assume dangerous complications, and pass into exhaustion of vital power.

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Annesley* and *Author*, Researches into the Pathology and Treatment of the Dis. of India and of Warm Climates, &c. imp. 4to. vol. ii. *passim*. — *W. Stevens*, Observ. on the Healthy and Diseased Properties of the Blood, 8vo. Lond. 1832. — *W. Twining*, Clinical Illustrations of the Diseases of Bengal, &c. Calcutta, 1832, 8vo. *passim*. — *W. E. E. Conwell*, On the Funct. and Struct. Changes of the Liver, and on Hepatic Disease in India, &c. 8vo. Lond. 1835, *passim*. (See the REFERENCES to REMITTENT and INFLAMMATORY FEVERS, and likewise to PESTILENTIAL YELLOW FEVER, as this disease has been very frequently confounded with them, owing chiefly to the circumstance of *yellowness* of the skin being one of its chief characteristics; indeed, this symptom is more generally observed in it than in the other fevers just mentioned. The term *yellow fever* ought to be entirely discarded; as yellowness, being improperly viewed as a pathognomonic symptom of one kind of fever, all others, in which it is a contingent phenomenon, although not more frequently met with in one than in another, have been confounded with that fever. As respects *intermittents*, their periodicity and exacerbations sufficiently distinguish them, even although yellowness or signs of malignancy should arise in their advanced course. Besides, yellowness is a very indefinite symptom,— it not only is of various shades, but also arises from very different causes; — it is lurid or tawny in one case, brownish or mahogany-like in another, greenish in a third, orange-colour in a fourth, of a lemon tint in a fifth; and it is, moreover, either partially or generally diffused, or even mixed with different colours, as with greenish, livid, purplish, violet, or reddish blotches. And it may proceed either from the passage of the colouring parts of the bile into the circulation, or from incipient dissolution of the blood, with loss of the vital tone of the capillaries. When it arises from the former source, especial disorder of the biliary secretion is presupposed; in the latter, predominant affection of the circulating fluids and of the vascular system. It would be preferable, therefore, to adhere to the denominations *inflammatory*, *bilio-gastric*, and *pestilential*, as respects those species of fever which most frequently present the symptom in question as the result of these causes.

Those who have not seen the fevers incidental to intertropical countries, more especially to the West Indies, Africa, the Mediterranean, and the East, may consider the distinctions made above not to exist in nature, and that remittent, bilious continued, inflammatory, and pestilential fevers are merely modifications and grades of each other. They may even doubt the utility of the details into which I have entered, particularly as regards inflammatory and bilio-gastric fevers; for they will scarcely observe a case of either in temperate countries, particularly in the severe forms met with in warm climates, unless in very hot seasons, and in peculiar circumstances. But in those parts of the world to which I have just referred, and in others adjoining them, to which medical men may proceed to serve, it will be found that the unacclimated, according to their constitutions, will be affected by inflammatory fevers of various grades of severity, in healthy localities and in hot and dry seasons—with bilio-gastric and remittent fevers, of various forms, in miasmal situations and sickly seasons,—whilst the acclimated shall escape the first of these maladies, in the former of these circumstances, and the second in the latter, or, if attacked, they shall experience only remittents or intermittents. The pestilential yellow fever makes no such distinctions. As already stated, and as will be hereafter shown, its spread is limited only by a low range of temperate, by a previous attack, and by circumstances that circumscribe its infection. Whilst the former fevers are met with in all warm climates, and occur either sporadically or endemically in them, and are not infectious, this last appears only on the intertropical shores of the Atlantic, or parts adjacent, during hot seasons, rages for a time, and then disappears. Thus, it occurs after long intervals, prevails sometimes for years, and then takes its departure, as will be shown in another place. When we consider the very different constitutions—original and acquired—of those who inhabit European colonies within the tropics,—when we review the appearances of the new-comer, of the old resident, of the creole, of the mulatto of various grades, and of the negro, and take into account the modes of living, the exposures, and the various other circumstances connected with each class, and further connect all these with variety of situation, season, and temperature,—we cannot be surprised at the very different forms which fever assumes among them.

XIX. Mucous or Pituitous Fever.

— Syn. *Febris Mucosa*, *F. Mesenterica*, Baglivi; *Morbus Mucosus*, Roederer and Wagler; *Febris Pituitosa*, Stoll; *Febbre glutinosa gastrica*, Sarcone; *Fièvre Adéno-méningée*, Pinel; *Fièvre Muqueuse*, Fr.; *Schleimfieber*, Germ.

406. Charact.—*Slight febrile reaction following chills, with mucous evacuations, and pains in the back and limbs, and often with slight remissions.*

407. i. *Causes.*—This variety approaches bilio-gastric fever on the one hand, and the enteric form of synochoid fever, on the other. It may occur either sporadically, endemically, or epidemically; and, in either case, it may arise from, or pass into, fever of a periodic type. It may even run into dysentery; and, from the severity of the pains in the limbs attending it, may closely resemble an attack of rheumatism. Its characters, both constant and contingent, result from the various circumstances, both intrinsic and extrinsic to the patient, concurring to *cause* it. These are chiefly —*a*. The epochs of childhood and old age; the female sex; the lymphatic, leucophlegmatic, and nervous temperaments; prolonged watchings; excessive fatigue or indolence; languid, weak, delicate, and pale states of frame; chlorosis, intestinal worms, or a cachectic habit of body; the debility caused by previous disease, as by agues, mesenteric obstructions, or by excessive venereal indulgences.—*b*. Living in low, humid, cold, and marshy places; privation of light and of the sun's rays; the autumnal season, or prolonged wet and cold weather; want of cleanliness; the use of indigestible vegetables, of unripe fruit, of tainted animal food, or of unwholesome fish, particularly shellfish; of stagnant, marshy, or impure water; the privation of accustomed stimuli; the abuse of emetics or of purgatives; insufficient nourishment, &c. The most common of these are cold and humidity, unhealthy localities, and unwholesome ingesta. This fever is *endemic* in the situations just specified; and it has occasionally appeared epidemically during autumn and winter, particularly after much wet

408. ii. *Symptoms.*—Some of the older writers confounded mucous fever with *influenza*, with *caterrhal fevers*, and even with *bronchitis*. But more recent observers have, with greater propriety, confined their description of it to that form of general affection, which is characterised by slight febrile excitement and nervous depression, with predominant disorder of the digestive mucous surface, of a sub-acute form, accompanied with mucous or slimy evacuations—admitting, however, the occasional complication of bronchial irritation with it.

409. This fever is *preceded* by general uneasiness, by a sense of heaviness; or pains in the limbs, loss of appetite, disturbed sleep, acid or acrid eructations, and cold or chilliness, which is first felt in the lower extremities. To these succeed, marked dislike of food, slight thirst, nausea, sometimes with vomiting of a whitish, transparent, and viscid fluid of a nidorous or acid taste; a sense of weight at the epigastrium, with fulness; flatulent and colicky pains, with slight tenderness in the abdomen, and relaxed bowels. The tongue is usually moist, white, and covered by a mucous coating, with a sickly or unpleasant taste of the mouth; aphthous exudations are occasionally observed on the fauces and lips; the saliva is sometimes abundant; and the breath is fœtid and heavy. The evacuations are mucous, more frequent than natural, sometimes tinged with blood, voided with slight tenesmus, and, in children, often with *prolapsus ani*. In rarer instances, costiveness, or an irregular state of bowels is observed; —mucous diarrhœa and costiveness alternating; and, occasionally, worms are voided. The urine is either scanty or natural at first, of a citrine tint, and sometimes passed with pain; it deposits a mucous sediment of a greyish or brick-colour at an advanced stage. The temperature of the surface is not much increased, unless during the evening exacerbations; and, towards the acme and decline, a gentle perspiration breaks out, especially in the morning and during sleep. A slight eruption often occurs during the night, but generally disappears in the morning. The pulse is feeble and small, but seldom much accelerated, unless in the evening and night. The patient complains of a sense of weight or of pain in the sinciput and occiput; with vertigo upon sitting up; of confusion of ideas, and somnolency, without the ability to sleep; of depression, sadness, and restlessness; of pains and soreness in the hypochondria, in all the limbs, and in the joints; and occasionally of cough, noise in the ears, and deafness.

410. iii. The *Diagnosis* rests upon the circumstances connected with the origin of the disease; on the appearance of the evacuations; on the colicky pains in the bowels; on the softness, the very slight acceleration or slowness, of the pulse; on the little increase of the temperature, and the humidity of the skin; on the slight degree of thirst; and on the very moderate or sub-acute character of all the febrile phenomena. In its slighter forms, the complaint is commonly described as fever from cold, or as a cold in the bowels and limbs. In some cases, it presents either a dysenteric or a rheumatic character; and is with difficulty distinguished from dysentery, or from rheumatism in other instances, unless the history of the disease, and the state of the bowels and of the evacuations, be closely observed. It

may even pass into either of these affections, or into others about to be noticed.

411. iv. The *Duration* of this fever varies from two to five or six weeks. It often presents slight remissions, indicated chiefly by the pulse and skin. The more manifest the remissions, the longer is its duration, which may be extended even beyond the latter period. — *Relapses* are very common during convalescence; and are caused chiefly by errors of diet or of regimen, by premature exposure to atmospheric vicissitudes, or to cold and moisture, or to paludal exhalations. The relapse may assume either the same or aggravated features, or a purely remittent or intermittent type.

412. Mucous fever *terminates* — 1st, In a return to health, which most commonly takes place; and is frequently preceded either by vomiting, or by a moderate diarrhœa, or by an aphthous eruption on the lips, or by a miliary eruption on the skin, by a general sweat, by the urine becoming copious and depositing a sediment, or by a spontaneous salivation;—2dly, In the adynamic state of fever, with predominant affection of the intestines, and of the brain, or of its membranes; — 3dly, In a purely remittent or intermittent type, or in dysentery, particularly in marshy localities; and, in such cases, sub-acute or chronic disease of one or more of the viscera in the abdomen, with or without dropsy, may supervene; — 4thly, In unequivocal symptoms of rheumatism, or of peripneumonia; — 5thly, In death, after severe inflammatory affection of the intestinal mucous surface, attended by obstinate diarrhœa; or after excessive nervous exhaustion, or after obscure affection of the brain, or of its meninges, or of the respiratory organs. — The *prognosis* is generally favourable, unless any of the more severe changes just mentioned present themselves. This fever seldom terminates fatally when early and judiciously treated.

413. v. *On dissection*, the principal lesions are found — 1st, In the *intestinal canal*, which is usually greatly distended by a fœtid gas; its mucous surface presenting inflammatory appearances, consisting of vascular injection, thickening, softening, various alterations of colour, ulcerations, and even gangrene; — 2dly, In the *peritoneal covering* of the intestines, which is either partially inflamed or altered in colour, the abdominal cavity sometimes containing serum;—3dly, In the *mesentery*, which often presents lesions similar to those of the peritoneum, the mesenteric glands being enlarged, inflamed, or changed in colour; — 4thly, In the *liver* and *spleen*, which are variously altered in different cases, but most frequently congested, enlarged, or granulated; the spleen being generally softened, friable, enlarged — more rarely small and hard; — 5thly, In the *lungs*, which are congested or injected, hepatised, tuberculated, the bronchi being loaded with mucus, and the bronchial glands enlarged;— 6thly, In the *pericardium*, which sometimes contains a turbid or sanguinolent serum; the substance of the heart being flabby or soft.—Morbid appearances, consisting chiefly of congestion and effusion of serum between the membranes or in the ventricles, are occasionally observed in the brain. In every instance, the *digestive mucous follicles* have been found enlarged, inflamed in various degrees, and ulcerated; presenting the various lesions, affecting these follicles, described in the article DIGESTIVE CANAL (§ 36.); the cæcum, large bowels, and small intestines, being the parts chiefly diseased.

414. vi. *Treatment*. — SELLE, STOLL, and J. P. FRANK, looked upon the character of the stools as the consequence of accumulations of mucus in the digestive canal, and have prescribed emetics and purgatives in order to evacuate them. BAGLIVI more judiciously directed vascular depletions, emollients, and mild purgatives. PINEL first evacuated the stomach by means of ipecacuanha; and either continued this substance afterwards, in weak aromatic infusions, or gave rhubarb with the tartrate of potash, or with the muriate of ammonia. He occasionally directed three or four grains of the extract of jalap in an emulsion, as recommended by ROEDERER and WAGLER. BROUSSAIS and his disciples, viewing this fever as a form of primary *gastro-enteritis* developed under the influence of cold, humidity, and bad diet, in persons whose mucous surfaces are predisposed to inordinate secretion, and who are liable to sympathetic affections of the limbs, head, &c., advise a treatment founded on these views. They believe that collections of mucus in the *primæ viæ* are not the cause of the constitutional disturbance, but are, equally with such disturbance, produced by the inflammatory irritation of the mucous surface. There can be no doubt of the frequent origin of the morbid secretion in this state, but that it always, or solely, originates in it, is questionable. Although inflammation, or rather vascular injection, of the mucous membranes is one of the constituents of the morbid condition, there are obviously others which modify it, or give it a more or less specific character. Besides, the follicles are more affected than the mucous membranes themselves; and however prominent the affection of these parts may be, the organic nervous system is manifestly that which is primarily impressed by the causes, and which continues longest and most universally to evince disorder.

415. *a*. The *first* intention is to remove the exciting causes; and, if the disease comes under treatment sufficiently early, to endeavour to arrest its progress, or to shorten its duration, by the exhibition of an emetic of ipecacuanha, by the vapour bath, by hot fomentations, and by warm emollient injections. — *b*. The *second* indication is to reduce vascular action, if the disease be fully developed, or the patient plethoric or robust, and if febrile excitement be considerable, by general or local bloodletting, in moderate quantity, by refrigerants, by the tepid bath, and by low regimen. — *c*. The *third* intention is to determine the circulation to the surface, and derive from the mucous surfaces by means of DOVER's powder, or by ipecacuanha, nitre and opium, or other diaphoretics; by the warm bath; and by blisters, sinapisms, or warm terebinthinate epithems applied over the abdomen. — *d*. The *fourth* object is to soothe intestinal irritation and to correct the secretions, by emollients and demulcents given by the mouth or by injection; and by small doses of blue pill or hydragyrum cum creta and camphor, with DOVER's powder. — *e*. The *fifth* is to evacuate morbid matters from the intestines, and to prevent their collection, by the occasional exhibition of mild purgatives and

laxative enemata.—*f. Sixthly*, to alleviate urgent symptoms, or determinations to particular organs — as to the head, the lungs, or liver — by local depletions, external derivatives, rubefacients, &c. — *g*. And, *seventhly*, to support the powers of life in the latter period by gentle tonics, light nourishment, and by cinchona or the sulphate of quinine, especially when the disease presents remissions, or is disposed to pass into the periodic type, or into rheumatism, and particularly in humid, marshy, and unwholesome situations. I have found the following aperient very serviceable in this form of fever, when the bowels required to be gently but freely evacuated. Others, however, in the Appendix (F. 266. 430. 827.), will equally useful.

No. 222. ℞ Potassæ Supertart. in pulv. ʒj.; Potassæ Nitratis ʒij.; Confect. Sennæ ʒij.; Syrup. Aurantii ʒj. M. Fiat Electuarium, cujus capiat Coch. i. vel ij. minima.

Bibliog. and Refer.—*Avicenna*, Canon. Liv. fen. i. tr. ii, c 47. 55.—*J. Bockel*, Synopsi novi Morbi, quem Febr. Catarrh. vocant, &c. Helma. 1580.—*Crause*, De Febr. Catarrhalibus, 4to. Jen. 1676.—*C. Piso*, De Morbis ex Serosa Colluvie ortis, 4to. Lugd. Bat. 1714.—*Baglivi*, Prax. Medica, l. i. cap. 5.—*I. G. De Hahn*, Febr. Contin. quæ Ann. 1729, Uratislaviæ grassatæ sunt, 4to. Urat. 1731.—*Roederer* et *Wagler*, Tractat. de Morbo Mucoso, &c. Goet. 1762. 1783. —*Strack*, De Febre Pituitosa. Mog. 1781.—*Knaus*, Annot. quædam circa Morb. Bil. Mucosum Ann. 1783-4. Stuttg. grassat. &c. Stuttg. 1786.—*Webers*, Discrim. inter Febr. Bil. et Pituitosam, *Doering*, Tr. vol. i.—*Elsner*, Animadvers. in Feb. Pituitosas. Regiom. 1789.—*M. Stoll*, Ratio Med. vol. iii. p. 141.; et Aphor. de Cognoscend. et Curand. Febr. &c., edit. 2d, p. 137.—*Consbruch*, Hist. Febris Mucosæ Ann. 1783-4 Stuttgardiæ grassatæ. Stuttg. 1790.—*Jacobi*, De Febre Pituitoso-nervosa, Stuttg. 1782 grass. 8vo. Stuttg. 1793.—*Stroem*, in Acta Reg. Soc. Med. Havn. vol. iv. p. 321.—*Selle*, Rudimenta Pyretologiæ, 3d edit. p. 262.—*Camz*, Beschreib. einer Schleimfieberepidemie. Tüb. 1795.—*Reil*, Memor. Clinic. fasc. i. p. 6.—*Py*, De la Fièvre Muqueuse, Journ. Gén. de Méd. t. xix. p. 229. 1805.—*Sarcone*, Hist. Raisonnée des Mal. Observ. à Naples, par *Bellay*. Lyon, 8vo. 1804.—*Pinel*, Nosog. Philosoph. t. i. p. 152.—*Hildenbrand*, Institut. Med. Pract. vol. iv. p. 741.—*Boisseau*, Traité des Fièvres, &c. p. 174.

XX. **Fever, Sweating.**—Syn. *Miliaris Sudatoria, Sudor Miliaris, Miliaria* (from *milium*, a millet seed), *Sudor, Sudor Anglicus, Sudor Picardius, Febris Sudatoria, F. Helodes Sudatoria, Sudatio Febris Helodes, F. Miliaris, F. Vesicularis, Purpura alba*, Auct. var.; *Miliaris*, Sauvages and Sagar; *Febris Purpurata*, F. Hoffmann; *La Suette, La Suette Miliaire, La Suette Epidémique, Fièvre Miliaire*, Pujol, Gastellier, Menière, &c.; *Der Friesel*, Germ.; *Miliary Fever, Sweating Miliaria, Sweating Sickness*.

416. Defin.—*After lassitude and general uneasiness, a sudden attack of febrile disorder, with most profuse and continued sweat, frequently followed by an eruption of miliary vesicles, the disease occurring epidemically and being infectious.*

417. I have preferred the name *sweating fever* to that of miliary fever, as sweating is the constant and characteristic phenomenon of the disease, and is present in the mild, as well as in the most malignant cases; whereas the miliary eruption is sometimes wanting in both. This malady should not be confounded with the febrile affections of lying-in women, attended by sudamina, that have improperly been denominated miliary fever, from the character of the eruption sometimes occurring as a symptom of them, during hot seasons and a too heating regimen. This is a specific fever, seldom observed in modern times, in this country, although frequently prevailing epidemically in many parts of Continental Europe.

418. i. *History.*—The epidemics which have been variously denominated, as stated in the *Synonymes*, have manifestly been modifications of the same disease, caused by the varying circumstances connected with its appearance.—The epidemic sweating sickness, which appeared between 1485 and 1528, and which ravaged England in these and several intermediate years, was evidently, as supposed by MM. Ozanam and Rayer, a most violent form of this malady, in which the sweat was the most prominent symptom, and the progress most rapid and acute. But many cases noticed by Boyer and others, in recent epidemics, were similarly characterised.—(*a*) The epidemics observed in France by Riverius, during 1618; in Germany by Welsch and Langius, in 1652; in Francfort in 1653; in Augsburg in 1660; in Bavaria in 1666; in Holland by Grunwal, in 1666; in Hamburgh in 1675; in London and in Edinburgh, towards the end of the seventeenth century, by Hamilton and Sibbald; in Saxony in 1694; in Hungary in 1697; in Plymouth by Huxham, in 1738; in Normandy by Le Pecq-de-la-Cloture, in 1740; near Mantes by Quesney, in 1750; in Navarre by Augustinis, in 1755; in Bayeux from 1769 to 1776; in Piedmont by Allioni, in 1758, and by Dallonio in 1782; and in Toulouse and the vicinity by Gallet du Plessis, in 1781; were essentially the same disease. In all these, the fever was ushered in by chills, horripilations, and other premonitory and invading symptoms, which were soon followed by pains in the head, loins, and limbs; by nausea, flushing, profuse sweat, dyspnœa, and, about the third day, by a miliary eruption. Numerous other epidemics that have presented this form of eruption as a prominent symptom, have been described by writers, who observed them during the two last centuries. But in these it was apparently caused, either by a too heating treatment and regimen, or by the neglect of evacuations during the early stage of the disease; and it was not always connected with excessive sweat. It was, indeed, in most cases merely a symptomatic eruption appearing at an advanced period, in a similar manner to petechiæ, &c., with which it was even sometimes associated. In the epidemics, however, which I have above enumerated, the eruption was not a consequence of neglected evacuations, nor of a heating regimen, for the treatment was generally depletory and cooling, and it occurred earlier in the disease, although always preceded by profuse sweat, which was coëtaneous, with the vascular excitement, and always peculiar and offensive. So thick a vapour generally surrounded the sick, arising from the excessive perspiration, that the flame of a candle was obscured by it.

419. (*b*) The epidemic occurrence of sweating fever in various parts of Picardy was first noticed in 1718. Since that time it has frequently appeared in that province, and in other parts of France; and has more nearly approached, than the epidemics noticed above, the characters of the sweating sickness of the 15th and 16th centuries, in respect of the rapidity of its course, the profuse sweat, and the frequent absence of the miliary eruption. The sweating fever of Picardy appears to have prevailed more or less in various parts of this province and of Flanders, from 1718 till 1747. In this year it appeared in Paris; and

was described by Bellot, Malouin, and Boyer. In various seasons, cases equal in severity to those of the terrible sweating sickness of the 15th century occasionally occurred. These writers observed some that ran their fatal course in fifteen hours, although more generally death did not take place until the third, fourth, fifth, or sixth day, or ever later. When patients passed the seventh day, they generally recovered.—The most robust were the most violently attacked; children and the aged generally escaped. Irruptions of this form of the disease occurred in various parts on the Oise, in 1747; at Beauvais in 1750; in several parts of the north of France in 1753; and in the environs of Amiens in 1758. (Meyzerei, Vandermonde, &c.) The chief peculiarities of these epidemics were a frequent occurrence of hæmorrhages, and of severe and complicated cases, often terminating fatally at the end of one or two days. Robust persons were the most severely attacked in these as in other epidemics. Females often experienced menorrhagia in the course of the disease; and hæmorrhagies occurring on the third or fourth day were generally fatal. The sweat was fœtid, or putrid, as likewise was the air expired by the patient. Bloodletting was employed at the commencement in the more robust and plethoric; at an advanced stage it was most injurious. Emetics, cooling aperients, acidulated drinks, refrigerants, &c. were also prescribed; and at a later period the preparations of cinchona, the decoction of contrayerva, camphor, &c. These were found the most successful remedies. — The epidemic of Saint Quentin, in 1768 and 1769, was generally ushered in by slight chills, rapidly followed by great heat, thirst, pains, and other symptoms. The treatment just described was most commonly employed. Since then, several other irruptions of this fever have occurred, presenting the phenomena about to be enumerated. That which took place in 1821, and was ably described by M. Rayer, was evidently more asthenic than those above referred to.

420. ii. *Symptoms.* — Individual cases of this fever are very much modified, even during the same epidemic, by the prominent affection of different organs, in different persons. To this circumstance is to be imputed its great diversity, as to severity and character, even in the same family and in similar circumstances. M. Rayer, however, divides it into two *forms*, the *mild* and the *malignant;* but it is obvious that intermediate grades are equally common; and that most of the malignant or severe cases, are rendered such by local complications.—(*a*) In the *milder* form, patients frequently complain of lassitude, loss of appetite, and pains over the eyes. Sometimes they feel the gradual accession of fever, and as if a vapour were extending over their limbs, until it amounts to burning heat, and more generally constriction about the epigastrium, for a very short time before the *hot vapour* is exhaled in the form of sweat from the surface. Occasionally persons have gone to bed apparently well, and have awaked bathed in sweat, which continued till their recovery or death (Rayer). The tongue is covered with a white, foul, or, more rarely, a yellow fur; and the mouth is clammy. There is more or less thirst, no appetite, and the bowels are costive throughout the disease. The urine is scanty. Respiration is oppressed, and the head aches. The pulse is slightly accelerated, but becomes more frequent at the period of the eruption; and is commonly full and soft. This state continues through the second, third, and fourth days; on which, but commonly on the third, a slight sensation of tingling is felt, followed by a miliary eruption on the skin. The *eruption* appears first on the neck, and spreads, either rapidly and generally, or slowly and partially, to the breast, sides, trunk, and insides of the thighs, legs, and arms. It may, however, come out suddenly as well as in succession, and be distinct or confluent. The vesicles which constitute it are the size of millet seeds, diaphanous or pearly, and are easily felt by the fingers. They are often intermixed with red papulæ; and more rarely, bullæ appear on some parts of the body. In about two or three days they dry up, and are followed by a desquamation of the cuticle. — The *sweating* is much more constant in its occurrence than the eruption —is always present, is remarkably profuse throughout the disease, especially before the eruption has become general, as it afterwards is somewhat diminished; and is attended by a peculiar odour, which Rayer, Schahl, and Hessert compare to that of rotten straw, and M. Menière to that of water impregnated with chlorine, or to that of the stools of patients in cholera. Le Pecq-de-la-Cloture says that it has a rotten-sour smell. The surface is hot, and more or less red. The sweat, rarefied by the heat, forms a cloud around the patient, that is condensed, and falls like fine rain or dew upon the bedclothes. The dyspnœa seems to depend upon congestion of the lungs and large vessels, and is referred chiefly to the præcordia or to the epigastrium. The headach may be suborbital or general: it is dull, heavy, and depressing, and seems not to be altogether the result of vascular determination to, or congestion of, the brain. In this form, the abdominal regions present nothing particular. The symptoms decline by degrees, and rarely continue longer than fourteen days: they commonly disappear about the eighth or tenth day.

421. (*b*) The *severe, complicated*, or *malignant* form is generally sudden in its attack as well as the mild; but lassitude and want of appetite usually precede it for some days. The principal symptoms of invasion are, sometimes chills or horripilations, and commonly vertigo, violent headach, nausea, efforts to vomit, flushed countenance, urgent dyspnœa; pain in the epigastrium, loins, and limbs; anxiety; throbbings of the arteries, and most profuse sweat. Either the cerebral, or the thoracic, or the abdominal, symptoms predominate in different cases, and give rise to distinct complications. Where the *head* is more especially implicated, delirium, coma, and convulsions are often present, and soon terminate life. In these, the patient first complains of vertigo, severe headach, nausea or vomiting, flushed face, injected and starting eyes, epistaxis, throbbing of the carotids and temporal arteries, &c., and soon becomes delirious and comatose. In rarer instances, the *spinal chord* and its membranes are particulatly affected, the patient complaining of painful tension in the course of the spine, with tetanic rigidity or spasms of the voluntary muscles. When the *lungs* are chiefly affected, there is often deep-seated pain in the chest, great dyspnœa, a short and quick respir-

ation, the crepitating rattle, or a blowing noise in some of the lobes of the lungs, diminished sonorousness of the chest, a full and frequent pulse, and bloody expectoration or hæmoptysis, indicating inflammation or inflammatory congestion of the respiratory organs. When the *digestive organs* are predominantly diseased, the patient complains of an acute constrictive pain in the epigastrium, with urgent anxiety, frequent sighing, a sense of suffocation, or of weight in the chest, and an unusual pulsation in the region of the stomach. These appear from the commencement, are exacerbated at intervals, and are most severe just before the eruption. In others, the symptoms indicate affection of the bowels, with constipation; and in some, severe pains are felt in the hypogastrium, with scanty, high coloured urine, and difficulty in voiding it.—This violent form of the disease may prove fatal in twenty-four or forty-eight hours, or in three or four days; but it commonly runs its course in from one to two weeks in favourable cases; sometimes, however, extending beyond three weeks. During convalescence, debility is its chief consequence, secondary affections being rare. Those that do occur, are gastro-intestinal disorders, and the eruption of boils.

422. The *alterations of structure* have been imperfectly observed.—When a fatal result has been preceded by anxiety, pain, or burning in the epigastrium, the mucous coat of the stomach and duodenum has been found much injected. In the cerebral complication, the brain has been found congested, the membranes injected, and the ventricles filled with serum. In the pulmonary complication, congestion of the lungs, and hepatization of portions of it, have been remarked. Although epidemic visitations of this disease in France have been frequent in modern times, and fatal cases very numerous, yet its pathological anatomy has been very imperfectly investigated. It is evident that death is caused chiefly by the severity of the complications accompanying it.

423. iii. *Diagnosis.*—The constant, the profuse, and the peculiar sweat attending the disease from the time of its developement, not only characterises it, but distinguishes it from all other fevers. The severity of the complications in the intense form, especially at the time of attack, and upon the appearance of the eruption, the character of the eruption, the epidemic prevalence of the malady, and its infectious nature, further serve to distinguish it. The descriptions of the *sweating sickness* by Caius, Willis and others prove that it was a more intense form of this disease than has been lately observed. The characteristic symptoms of the former all exist in the latter; and, although the eruption is not mentioned in the sweating sickness, this appears not to have been a general symptom in recent epidemics. M. Rayer states it to have been wanting in a great number of cases, in the epidemic of 1821; and M. Menière makes a similar remark as to that of 1832.

424. iv. *Prognosis.*—Sweating fever, as observed in modern times, is a mild disease in its simple form. Predominant affection of any internal organ will render the prognosis unfavourable, according to the severity of such affection. However alarming the symptoms, if they decline upon the appearance of the eruption, a favourable issue may be anticipated. M. Rayer states that, in 1821, the eruption was independent of irritation of the stomach; that it was confluent without violent previous pain in the epigastrium or nausea; that it did not always succeed the most profuse and incessant sweat; and that it did not invariably appear in cases where the gastro-intestinal disorder was the most remarkable. Death was often sudden—more unexpected than in the common eruptive fevers,—and often followed upon shrivelling of the vesicles. The greatest number of deaths occurred in 1821, between the ages of 23 and 33. The mortality in males was one in thirteen; and among females, one in twenty-eight. In the earlier epidemics observed in Picardy, the mortality was very much greater than this. It was greatest at the beginning and decline of the epidemic; and among bakers, smiths, and farriers: but was variable in different townships. The epidemic of 1832 was in many instances followed by pestilential cholera. The latter malady often followed the decline of, or convalescence from, the former, and even occasionally appeared in its course; the mortality being thereby much increased.

425. v. *Causes.*—The theatre of the epidemic of 1821, was bounded by extensive forests. M. Rayer states, that the disease is endemic in some situations; and that it may occur sporadically where it has prevailed epidemically. It has been observed only between 43° and 60° North latitude. Moist and shady places, excessive heat, and an atmosphere surcharged with electricity, seem to favour its irruption. No age gives immunity from an attack; but adults and females are most obnoxious to it. M. Menière states, that many of those who had the disease in 1821, were again attacked, and died of it, in the epidemic of 1832. When once engendered, it spreads by infection, in the same manner as typhus, scarlatina, and measles. Unhealthy situations, and the poor in the vicinity of the place where it first appeared, suffered in proportion to their proximity, during these two epidemics. M. Menière remarks that, of the numerous epidemics which have occurred in France, and in other countries, since 1718, to the present time, there is none which shows its origin, either in marsh exhalations, or in unwholesome food.

426. vi. Treatment.—Isolation, temporary migration, and avoidance of the affected, are the only preservative means that can be depended upon in this malady.—The *mild states* require but little aid; and it is doubtful if medical treatment will either shorten or alleviate the attack. In the *severer forms*, and where some internal organ is especially affected, appropriate remedies ought to be employed to guard it from danger. If the affection of the head, or of the chest, or of the digestive organs, be slight, *local depletions* will give relief. If the local complication be severe, general *bloodlettings*, with powerful external and internal derivatives, as blisters, sinapisms, purgatives, &c., will be occasionally used with success. But M. Rayer remarks, that the cerebral affection, when severe, is often rapidly fatal, notwithstanding the repeated abstraction of blood; and that the nervous phenomena are occasionally independent of actual inflammation.—After the eruption, bloodletting is always injurious; and if

it be resorted to at an earlier stage, and in large quantity, with the view of cutting short the disease, it may have a fatal effect, but it never will produce the desired result. When the eruption disappears suddenly, dry frictions, *urtication*, *sinapisms*, *blisters*, and rubefacient liniments, ought to be employed to solicit its return. *Sudorifics* may also be employed in this case; but they are seldom useful in other circumstances, as it does not seem advisable to use means to increase the sweat. Schahl and Hessert found *cold bathing* and *aspersion* of cold water beneficial at an early stage; and M. Rayer observed the pain at the epigastrium, and spasm of adjoining parts, preceding the eruption, to cease after the application of *cold epithems* to this region. Emollient cataplasms, *fomentations*, and *clysters*, will alleviate abdominal pain, and dysuria; and the general *warm bath*, the *hip bath*, and frictions of the surface, will have a similar effect, and promote convalescence, particularly if the intestinal or the urinary canal be disordered. In the more recent epidemics, *ipecacuanha* and the preparations of *antimony* were given in the first stage, with the view of rendering the subsequent course of the disease more mild; but this practice was found more injurious than beneficial.

427. The above comprises more than all that M. Rayer, the historian of the epidemic of 1821, has advanced respecting the treatment. Tessier, Boyer, and Menière, however, state, that full *bloodletting* at the commencement is generally beneficial, and evidently, relieves all the urgent symptoms. Indeed, the epistaxis often attending the cerebral affection, the hæmoptysis accompanying the pulmonary congestion, and the character of the gastro-intestinal symptoms, most obviously demand it. They further advise tepid diluents in moderate quantities; gentle anodynes to relieve the insomnia generally complained of; and mild derivatives to favour the eruption, which, when copious, often alleviates the internal affections. M. Rayer says no more of the use of *purgatives* in this disease, than if such means were entirely unknown. The writers who treated the epidemics in the 17th, and earlier part of the last century, employed them freely, and were certainly not less successful in their treatment than he. M. Menière advises the milder kinds to be exhibited, in most cases, and especially when the tongue is loaded. When the pulmonary congestion is urgent, he directs full bloodlettings and external revulsants; but he judiciously advises the effect of the former to be sedulously watched during the operation, as a too careless mode of abstracting blood, or a too large quantity, may produce instant and fatal collapse. There is evidently more of congestion than of inflammation in all the internal complications of this disease; and vital or nervous power is more or less depressed: therefore, although free depletions are often necessary, they should not be confided in alone; but *camphor*, *ammonia*, *serpentaria*, &c., ought to be exhibited according to the peculiarities of the case, and conformably with the principles explained in various sections of this article. When the eruption appears, means calculated to suppress it, or even to delay or diminish it, should be avoided. Vascular depletions have been then found injurious, and even speedily fatal; and cold applied to the surface is equally dangerous: errors of diet and regimen are likewise injurious.

428. *Regimen.* — Patients ought to be deprived of nourishment of every kind, the first four or five days of the disease, or even longer. Diluents of a mild kind, and tepid, should be given in moderate quantity. A little veal or chicken broth may be allowed about the sixth, seventh, or eighth day; and the quantity and consistency of the food gradually increased. Relapses may follow errors in diet, or consecutive gastro-intestinal disorder may be induced by this cause. The regimenal and other means usually required in epidemical maladies, are necessary in this.

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XXI. Fever, Synochoid. Syn. — *Synochus*, Auct. var.; *Enecia Synochus*, Good; *Synochus mitior*, S. Smith; *Common Continued Fever*.

429. Defin. — *Languor, lassitude, and chills, followed by vertigo, moderate vascular reaction, and other febrile symptoms, of a continued type, and regular course.*

430. This is the most common form of continued fever in this country. It appears either sporadically or epidemically. In the latter case, it is frequently complicated, or characterised by predominant affection of some particular viscus or part, and thence generally assumes a severer character than in its sporadic form. It often appears in this latter manner from other causes than infection; but, in circumstances favourable to the generation of an infectious effluvium, this may become a superadded or a chief cause, or, indeed, the only cause; but, in this case, the disease which results is some one of the more common forms enumerated under the *typhoid*

species of continued fever.—As, therefore, the *causes* of *synochoid*, and of these forms of *typhoid* fever, are often the same—their intensity and concurrence producing the more severe states of disease, as well as giving rise to an infectious miasm — the view which is about to be taken of them with reference to the former species, will very nearly serve also for the latter.

431. i. Causes.— *A*. Of the *remote causes* of the varieties of continued fevers most frequently observed in this and other temperate climates, those which precede the operation of the more effective causes, which are usually internal as respects the œconomy, and which, from the circumstance of their disposing the system to the operation of these latter causes, have been usually called the *predisposing*, require first to be noticed. It is often difficult to determine in what the disposition to be affected by these forms of fever consists, and in what manner it is caused. To say, with many, that it arises from an increased susceptibility, does not advance our information one step, and is merely the substitution of one term for another. Close observation of the circumstances connected with the origin of these diseases will show us, that the disposition to become affected with them is not the result of exactly the same circumstances as favour the appearance of ardent fever. A depressed or weak state of vital power, especially as manifested in the nervous systems, but particularly in that of organic life, seems to be one of the most common causes of predisposition. This is proved by the fact, that perfect health, mental activity and energy, confidence in various means of prevention, the moderate use of tonics, &c., enable the body to resist the impression of the exciting causes, particularly infectious and mephitic effluvia; and that fear of the disease, despondency, the depressing feelings and emotions, fatigue, increased sensibility, disorder of the digestive and assimilating functions, &c., are amongst the most common occasions of these causes taking effect.— But, although diminished energy of the powers of life has a marked influence in favouring the operation of the exciting causes, yet something more is required; and this must be referred to a certain constitution of frame, which is influenced sometimes in a relative manner only by relative causes, and at other times only by positive causes, and which often either resists the operation of the usual causes altogether, or yields merely to the combined action of a greater or less number.

432. A much greater predisposition to be affected by continued fevers exists between the ages of fifteen and thirty-five, than at any other period; the forms of fever being generally of a more inflammatory and acute kind between these ages, and in the sanguine, irritable, and plethoric constitutions; whilst persons past the latter of these ages, and those of a lymphatic, leucophlegmatic, or melancholic temperament, are more liable to experience the lower grades of action. Scarcity, famine, and, consequently, insufficient and unwholesome nourishment, among the lower classes of the community, are the chief causes of the generation and spread of fevers, especially those of a simple, low, and infectious character. Whatever depresses or exhausts the vital and moral energies, exposes the body to the impression of the exciting causes. The circumstances which produce this effect are fully explained in the article Disease (§ 21. 23. 27—36.), and in a previous section (§ 64.).

433. The disposition, also, which is generated by certain epidemic constitutions of the atmosphere and season should not be left out of consideration. A peculiar diathesis seems to be gradually and generally induced by the epidemic influence, whatever that influence may be in respect of its nature; and this diathesis or change of the vital manifestations of the organisation rapidly passes into febrile commotion upon the action of one or more of the exciting causes. The change thus effected in the diathesis, and increased by the impression of the exciting causes, may hence be viewed as the proximate cause, or earliest pathological state, of the disease; and to its continuance or non-continuance after the febrile action is fully developed, is often to be imputed the disposition or indisposition to relapse. This is more particularly the case in respect of the fevers caused by exhalations from the soil and from decayed vegetable matters. Infectious miasms — or the effluvia from the bodies of those in fever — suddenly and remarkably increase the morbid diathesis; but when the resulting disease has been undergone, the morbid diathesis is terminated, and a disposition to a return or relapse is altogether or nearly lost. Although epidemic states of the air thus do not favour relapses of infectious fevers, yet they greatly dispose the system to a first attack upon exposure to the exciting causes, when the diathesis has not been changed by a previous attack.

434. *B*. The *exciting causes* of continued fever are upon the whole much better known than the states of the system which dispose to their operation. They are extremely numerous; for whatever interests the vital energy so as to disturb generally its manifestations, and to occasion a morbid reaction, may be an exciting cause of fever.—It is unnecessary to enumerate even the most influential of them, as they are adduced with sufficient details, in the articles Disease (§ 55—63.), Endemic Influences, Infection, and in an early section of this article (§ 65.). The chief causes of this class of fevers are — 1st. Those which proceed (*a*) from the soil; (*b*) from its productions in a state of decay; and (*c*) from animal matter undergoing decomposition; either of these acting separately, or all of them conjointly;—2d. Animal miasms — (*a*) from healthy persons or animals crowded together, or confined in imperfectly ventilated situations, and without due regard to cleanliness; (*b*) from persons labouring under diseases of various kinds in confined apartments; and (*c*) from one or more persons affected by the disease which the effluvium propagates; — and, 3d. Changes taking place in one or more of the various functions, and which having reached a certain pitch, break out in open fever. Each of these requires a few remarks.

435. *a*. Emanations from the soil or its productions in a state of decay, are most frequently productive of periodic fevers; but they occasionally also give rise to continued fever, especially during certain states of season and temperature, and in plethoric and robust constitutions. What the conditions are, that occasion the continued, in preference to the periodic, type, cannot

be precisely stated. Extreme ranges of temperature, particularly high grades of it, and humid states of the air, may have considerable influence, as is, indeed, often observed in warm climates, amongst Europeans who have recently removed thither; but, in this and other temperate countries, the continued forms of fever much less frequently proceed from this source alone, than is supposed by some writers. In many places, exhalations from dead animal matter concur with those proper to the soil and its productions in causing fever; and, in this case, the disease assumes a more continued type and a lower grade of action; the circulating and secreted fluids being more remarkably vitiated. There can be no doubt, also, that the particular form and complication of the fever often depend much upon the water in common use, upon the nature of the soil, und upon the exuberance of its products. Water loaded with decaying animal or vegetable matter; rich, clay, deep, low, and absorbent soils, &c.; and the effluvia from putrefying animal matter; are frequently productive, particularly when conjoined, of continued fever, which often assumes a gastric or enteric character.

436. *b. Animal miasms* from a number of persons shut up in small space, in ill ventilated and crowded apartments, and in low and humid localities, as in ships of war, transports, jails, camps, besieged towns, workhouses, &c., will, in favourable circumstances, so contaminate the air with animal effluvia as to give rise to fever, presenting characters of severity in proportion to the extent to which the air is vitiated. Instances of this kind are referred to in the articles EPIDEMICS (§ 12. 17. &c.) and INFECTION, and are adduced by PRINGLE, LIND, BLANE, and by most recent writers on Fever. It is unnecessary to offer any remarks upon this, and the other sources of animal miasms, which act as a poison on sound persons, and occasion fveers, or upon *infection* as a principal cause of the specific forms of the disease, as they are fully illustrated in that article.

437. *c.* That changes may take place spontaneously in one or more of the functions, and proceed to the extent of giving rise to the worst forms of fever, appears to be fully proved. The chief causes of these changes seem to be protracted or excessive mental anxiety and depression, loss of property, disappointment, wounded pride, humiliating occurrences, &c. These causes, however, often concur with the predisposition arising out of disorder of the digestive and assimilating functions, especially when such disorder is connected with colluvies on the *primæ viæ*, and a torpid or loaded state of the biliary organs; and are reinforced by exposure to cold, insufficient nourishment, changes in the usual modes or habits of life, want of sleep, and exhalations from the soil, &c.

438. *C. Determining influences, &c.* — There are numerous causes which, although often insufficient of themselves to produce continued fever, are remarkably influential in giving rise to predominant affection of particular organs, in modifying its form, or increasing its severity. Several of the exciting causes, moreover, have the power not only of occasioning the disease, but also of determining its type, form, and character. This is the case more especially with the effluvium proceeding from an infected person. It is important to attend to these circumstances, more especially such as determine the nature of the complications, &c. of fever, as a due reference to them guides the practitioner to an appropriate plan of cure. — *Epidemic constitutions* are most influential in thus forming the kind and state of fever (see EPIDEMICS). Next to these are season and temperature; climate and situation; famine; the contingencies of war; employments and avocations; habits and modes of living; mental exertions and moral emotions; and previous disorder of some one or more of the internal viscera.

439. *α.* During cold and dry *seasons*, the more inflammatory, or sthenic, forms of fever, and pulmonary complications, are observed. In high ranges of *temperature*, and in those conjoined with *humidity*, the digestive mucous surface and liver are inordinately affected, and the period of increased excitement soon passes into exhaustion, with marked change in the circulating and excreted fluids, and often in the soft solids. — *β. Climate*, according to its temperature and humidity, exerts similar effects. The *situation*, when elevated very far from the level of the sea, has a similar influence to cold and dry seasons; but when it is low, confined, or near the sea, rivers, or lakes, the disadvantage of humidity, and the contingent evils of marsh exhalations, tend to aggravate the type, or to complicate the disease. The quality of the *water* has a remarkable influence, both in generating continued fever, and in determining its form; putrid water, or water containing decayed vegetable or animal matter, generally causing fever of an adynamic, gastric, enteric, or mucous character. — *γ. Employments* and *avocations* may either prevent or favour attacks of fever. Tanners and workmen exposed to the fumes of pitch, tar, chlorine, &c., are rarely affected, even when fever is epidemic. Persons much exposed to the open air, and vicissitudes of weather, are most liable to fever of a sthenic or phlogistic kind, and to the pulmonary and pleuritic complications. — *δ. Habits* and *modes of living* are very influential and powerful determining causes of fever, even in this climate. The influence which full and rich living, and its opposite, poor and unwholesome living, exert upon the state of the disease, has been sufficiently manifested by the epidemics which have prevailed at various times in Ireland since the commencement of the present century, according as they appeared in the poor and ill-fed, and as they extended to those in easy circumstances. In the former, fever usually assumes the common continued, or the milder adynamic and typhoid forms, often attended by the pulmonary complication, or with petechiæ, &c., and frequently passing into dysentery, &c.; in the latter class, it is either accompanied, at an early stage, with high action, or with congestion, and predominant affection of the head, liver, or stomach. In persons living chiefly upon fish, it generally assumes a low and putrid character. Those who are intemperate, or who have resorted to spirituous liquors on the invasion of the disease, present especial disorder of the brain and digestive mucous surface. — *ε. Intellectual exertion*, mental *anxiety*, and other inordinate emotions, may both occasion a severe fever, and aggravate its intensity, even when arising from infection; and, in both cases, a cerebral or typhoid complication, of a dan

kind, is produced. — ζ. *Previous disorder* heightens the severity of the disease, and necessarily determines its predominant features or complications, although sometimes in an indirect manner. Thus, it is common to observe bronchitis previous to, or attending the invasion of, fever, followed by a remarkable affection of the brain and of the mucous membrane of the intestines. In this case, the changes effected by respiration on the blood are imperfect; and, consequently, this fluid becomes morbid, — disordering first the functions and ultimately the structure, of the digestive mucous surface and brain.

440. ii. Description. — *Common continued fever* occurs in a simple and complicated form, presenting various grades of severity; the severe and complicated states passing into, or becoming identified with, varieties of the adynamic species. The severe states of common fever have been very generally imputed to its complications with inflammation of internal parts; but, although its complications are necessarily severe, yet it may be equally so without any evidence of local or predominant affection. This, however, is seldom the case. — I shall, therefore, first describe the simple form; and afterwards the more usual complications and states of severity.

441. *A. Simple Continued Fever — Simple Fever; Mild Synochus; Synochus mitior* – is usually preceded by the symptoms described above, as constituting — *a.* The *precursory stage* (§ 34.), especially by *lassitude*, and a general feeling of uneasy debility, and mental languor. The countenance is pale; the features sharpened, dejected, or anxious; and the pulse weak and small. — *b.* After an indefinite period, varying from two or three, to several days, irregular chills, rigors or shivering, commonly alternating with transient flushings or feelings of heat, are experienced, with the symptoms characteristic of the *period of invasion* (§ 35.). This stage is seldom attended by any actual coldness of the surface, particularly after it has continued a short time; the chilliness being accompanied by increased heat, constriction, and dryness of the skin. — *c.* With the disappearance of the chills, the period of *reaction* or of *excitement* (§ 36.), and all the phenomena associated with it, supervene. The vertigo, pains of the head, back, and limbs, and restlessness, usually present in the preceding stage, are increased in this. The patient complains of mental confusion and inability; of general uneasiness and restlessness; the countenance becomes full and flushed; the tongue white, foul, loaded, or furred; the heat of surface generally rises above 100°, and the pulse and respiration are fuller, stronger, and more frequent than natural; the pulse being commonly from 90 to 100 or 105 beats in a minute. The fever is now developed, and proceeds, as described above (§ 36.), usually for several days, — its duration varying from two, three, or four, days to as many weeks, until it either subsides in consequence of the treatment adopted, or passes off by means of some critical evacuation (*the period of crisis*), which most frequently occurs on one of the critical days, from the 3d to the 21st day from the time of invasion, or that in which chills or rigors were first felt. - The stages of *decline* and *convalescence* commonly advance in the manner stated above (§ 41, 42.).

442. This mild form of fever generally *terminates* favourably, even when left to nature; but it may become complicated in its course, or pass into a state of dangerous, or even fatal, exhaustion towards the end of the second week, particularly in weak, aged, and exhausted persons. The return of the healthy functions is indicated — *a.* by the subsidence of the prominent morbid actions; — *b.* by the appearance of critical evacuations; — *c.* by a quiet and prolonged sleep, out of which the patient awakens refreshed, and partially restored; — and, *d.* by the other phenomena already enumerated (§ 41.), as indicative of a gradual decline of the disease. The transition to a severer form of fever is commonly owing to the occurrence of a predominant affection of the respiratory surfaces, or to the change induced in the circulating and secreted fluids, or to the affection of the digestive mucous surface, or to the circulation within the head.

443. *B. Severe or Complicated Synochoid Fever — Synochus gravior; Severe Synochus* — occurs from the same causes that produce the milder disease, either acting with greater intensity, or aided by additional circumstances.—The several stages may present a more severe affection of all the functions, than has been now described, without any very predominant lesion of a particular organ; but much more frequently some important viscus betrays increased disorder, generally of an inflammatory or disorganising kind. Yet this predominant lesion is not altogether identical with inflammation — certainly not with the inflammation primarily affecting healthy persons. It is less acute or intense as respects the symptoms attending it, more asthenic as regards the state of constitutional power, and more diffusive and sub-acute in its character, than common phlegmasia. It partakes of more of the features of the erysipelatous than of those of common or pure inflammation. Even when the local affection is more than usually phlogistic in appearance, still it is most important to recollect, especially as respects the treatment, that it is preceded and attended by a more or less severe constitutional disturbance, by lesion of the various manifestations of life, and by a change of the circulating and secreted fluids, — circumstances arising out of the poisonous influence of the febrile cause, and imparting the peculiar characters to this affection, — changing it from the true phlogistic or sthenic inflammatory condition, and determining, accordingly, the consequent lesions (§ 50.). Instead, therefore, of viewing the complication as the cause of the severity of the fever, we should rather consider the intensity of the morbid impression made by the febrile poison, and the resulting consequences, as the principal source of severity and of local affection, aided by the predisposed state of constitution, and of the viscus especially affected.—I shall describe the predominant lesions or complications of synochoid fever, in the order of their usual succession, and of their frequency.

445. *a. Synochoid fever with predominant affection of the bronchi and lungs.* — This is the most common, and generally the earliest, complication, although it frequently exists only in a slight degree. The bronchial surface is often more or less congested and irritated, and the structure of the lungs sometimes implicated. —This complication is not necessarily severe in

proportion to the severity of the fever; but when it is early present, and its symptoms prominent, it necessarily aggravates the fever, and superinduces further complications, by impeding the changes produced in the blood by respiration. That the respiratory organs, particularly the bronchial lining, should be very frequently affected in fever, may be expected from the nature of the exciting causes, and the channels through which they invade the system, as already explained (§ 100. *et seq.*) — the respiratory surfaces being the parts on which the morbid impression is generally first made upon the frame.— In most instances, the predominant disorder of these organs is limited to the bronchial surface; but, in others, the substance of the lungs is also congested; and, in rarer cases, the pleura is at the same time implicated. During particular seasons and epidemics, and in some climates more frequently than in others, this complication is very generally observed. When the bronchial membrane is especially affected, and the symptoms are very obvious early in the disease, it has usually received the name of *Catarrhal Fever*. But the affection of the bronchi, especially when the mucous secretion is not abundant, and still more frequently that of the parenchyma of the lungs, is often nearly concealed by the severity of the cerebral symptoms superinduced by it, or is latent owing to the altered state of the circulating fluids, or masked by some other predominant lesion. This fact, first clearly established by Laennec, points out the necessity of having recourse to mediate auscultation, not only in cases presenting the open symptoms of the pulmonary complication, but also in those of considerable severity, and where the sensorium is much disturbed.

446. The *bronchial affection* is generally not very remarkable during the first two or three days; the patient complaining only of a slight oppression or constriction in the chest, with accelerated respiration and occasional sighing. To these succeed, fits of dry cough, wheezing, and, subsequently, the expectoration of a dark viscid mucus. There is often no cough; and the bronchial affection is evinced chiefly by the mucous rhonchus heard more or less extensively upon auscultation, by the disordered breathing, and by the matter expectorated. When the mucous rattle is heard extensively, and particularly if it extend to both lungs, great danger should be apprehended; for the changes induced by respiration on the blood being impeded, this fluid becomes vitiated and induces serious disturbance of the brain, and of the excreting organs and surfaces, ultimately passing into structural lesion. If the affection implicate much of the substance and vesicular structure of the lungs, the breathing becomes hurried, oppressed, or laborious, especially after coughing; and the expectoration rounded and streaked with blood. In such cases, the fever is always severe, and attended with much danger, generally in proportion to the extent to which the respiratory surface and lungs are affected. But the danger is not dependent solely upon the pulmonary affection, but also upon the consequences which have been just shown to arise out of it. When, therefore, with the symptoms now mentioned, the edges of the tongue and lips are dark or purplish, and the countenance of a dusky hue, or flushed or suffused with a dark red; when the patient becomes delirious or comatose; the pulse very frequent, soft, and feeble; the abdomen tympanitic, or inordinately relaxed; the temperature of the extremities low, or their motions tremulous; and the tongue loaded with a brown or black coating; consecutive pathological states of great danger, owing to depressed vital power, and to contamination of the fluids, then exist.

447. It not infrequently happens, that a severe bronchial complication attends the early stage of this fever; and that, as soon as the blood is so contaminated, and the cerebral functions are so disturbed, as to obscure sensibility, and lower irritability, the bronchial affection becomes latent, and its more obvious symptoms disappear; the pathological conditions which it induced being now most prominent, and proving the immediate cause of an unfavourable result. If, in such cases, we succeed in removing the morbid condition of the blood, by exciting the nervous energy and the functions of excreting organs, the bronchial affection often returns, with the improvement in the circulating fluids and in the nervous functions; but it also often disappears entirely with the other affection of important organs, particularly when critical evacuations terminate the disease. This return of the bronchial affection with the decline of the other dangerous symptoms, I have remarked in several cases; but it may generally be permanently removed by appropriate means (§ 462.). In the progress of this complication, the expectoration, which was at first scanty and frothy or viscid, or altogether wanting, is more copious, of a pale yellow, or yellowish green hue, and gradually diminishes with the decline of the fever. In some instances, it becomes so abundant, as the disease passes its acme, as to favour the resolution of the inflammatory congestion of the bronchi or lungs, and thus to prove a salutary crisis, as remarked by some of the older writers.— When, with dyspnœa and oppression, there are much uneasiness and inability to expand the chest, with a short and quick respiration, active congestion of the parenchyma of the lungs should be suspected; and if, in addition to these, pain be occasioned on coughing, and on full respiration, an inflammatory state, probably extending to the pleura, may be dreaded.—In the last stage, the skin is dusky and cool; the pulse is feeble and hurried, more rarely slow and intermittent; the headach passes into incoherent wandering, or low muttering delirium, or coma, but never into violent delirium. When sensibility is early impaired, this complication may proceed to extensive organic change, without having been suspected during life, owing to the imperfect evolution of the usual signs, and to the circumstances already stated (§ 445.). But if the breathing be attentively observed, it will be always found more or less disordered in these cases; and if auscultation be also resorted to, the local affection will not pass undetected.

448. *b. Synochoid fever with predominant cerebral affection.* — This complication may appear early in fever, or at any period of its course. It may be the only prominent lesion, or it may supervene on either of the other predominant affections.— It may be only occasionally o
or it may characterise particular epidem

it may, moreover, be slight or sub-acute, or remarkably intense, and in all the intermediate degrees.—In the more *slight* or *sub-acute* forms, it constitutes the *Nervous Fever* of some writers; and, in the more *acute* and *intense* grades, the *Phrenitic* or *Brain Fever* of others. — The former of these very nearly approach, in their pathological states, the nervous variety of adynamic fever, denominated *Ataxic* by Pinel, *Neuro-sthenic* by Hildenbrand, and *Typhus mitior* by Cullen.

449. *a.* Common continued fever, with predominant cerebral affection — the *Neuro-sthenic* of Hildenbrand — commences, and proceeds for two or three days, as the simple or mild form of the disease. Either then, or at an earlier period, the patient usually complains of pain in some part of the head, most frequently in the temples and forehead, or in the occiput, extending down the neck. The pain is often constant and severe, but it is sometimes slight or entirely wanting; and it is commonly attended by throbbing of the carotids and temporal arteries, and flushings of the countenance. In those cases where no pain is felt, even upon shaking the head, the cerebral affection may not be less urgent and dangerous: but there is always, in those, a very early and remarkable giddiness, either with or without flushing of the face. Occasionally the pain and giddiness alternate, and the latter is always distressing when the former is absent. The expression of the eyes is either heavy and dull, or morbidly brilliant and animated. The conjunctiva is generally loaded, injected, and suffused, in the former case; and brighter and more glistening in the latter. But the eyes are always more or less sensible to light, the eyebrows contracted, and lids half closed upon exposure to it. Hearing and the general sensibility are also more acute. Noises and light invariably increase all the symptoms. The heat of surface is generally above the natural standard, especially over the head; but it is often not augmented on the lower parts of the body. The patient is watchful and restless, and the expression of his countenance indicative of suffering. In the less acute cases, the pulse, the thirst, the appearances of the tongue and of the evacuations, are nearly as in the simple form; and the symptoms generally continue, without alteration, for several days. An important change then occurs. In favourable cases, the slumbers, which were short and disturbed, or attended by a slight dreamy delirium, become quiet, profound, and refreshing. In unfavourable cases, the pain in the head changes to a dull, lethargic state, with a great diminution of the sensibility, and with increased injection and suffusion of the eyes. Delirium, if it have not already appeared, now comes on, attended by moaning or by incoherent muttering, during short and interrupted slumbers; the tongue is loaded, dark, and dry; and the thirst is diminished. In from one to three days, the insensibility passes into coma, unless a favourable alteration takes place; the pulse becomes very quick, and often rises to 120 or upwards; the strength sinks; and the tongue is more dry. To these succeed tremors, rolling of the head on the pillow, tossing of the hands, picking at the bedclothes, and the other dangerous symptoms consequent upon the more acute states of this complication. Even when this unfavourable change has occurred, a stop may be occasionally put to its progress, although it generally pursues its onward course. A more tranquil and protracted sleep; subsidence of the delirium, or of the tremors, or of the frequency of the pulse; and a cleaner or more moist tongue, commencing at its edges, with an improvement in the appearance of the countenance, and in the state of the skin and of the excretions; are the usual indications of an arrest of the dangerous progress of the disease.

450. *β.* In the more acute states, the cerebral symptoms are severe, and their progress rapid, in proportion to the intensity of the local complication; the headach or giddiness, the intolerance of light and noise, and the general sensibility, being coordinately excessive. The pain in the back, loins, and limbs, is very great; the skin is often intensely hot, and pungent, particularly over the scalp, and is occasionally covered by perspiration, which is rarely copious or general; the eyes are injected, and suffused; the breathing is frequent and suspirious; the patient is anxious, uneasy, and remarkably restless; he rolls the head, and is wholly without sleep. The pulse is at first strong, full, or bounding; but generally devoid of the hardness characteristic of primary or pure phrenitis. Sometimes it is oppressed; and, in the most intense states of complication, it is often intermittent, slow, or not much above the natural frequency. Within four or five days, the pain passes into delirium and insensibility. The delirium is sometimes violent, and is then soon followed by tremors and insensibility; and these by subsultus tendinum. The insensibility increases, and passes into a drowsy lethargy; the delirium continuing, but becoming low and muttering. The patient may still become observant, and answer when roused; but coma supervenes, occasionally with rolling of the eyeballs or squinting, dilatation of the pupils, and falling of the eyelids. The tongue is now parched and brown; the gums and teeth are covered by a dark mucous sordes; the evacuations take place inconsciously and involuntarily; the respiration becomes irregular; the pulse either slow, or remarkably rapid and feeble, or intermittent; and life soon terminated.

451. Between' these extreme states, there is every grade of intensity, the above symptoms being variously modified. In some cases, the cerebral affection is very insidious, and more or less slow; in others, open, manifest, and rapid. In the former it may be indicated only by giddiness and sickness or vomiting; the pulse in the carotids, and temperature of the head, not being affected. In a case of this description, which lately occurred in my practice (Mr. H. of Fitzroy Market), all the symptoms subsided instantly upon bloodletting. — It may thus exist nevertheless, although in a more protracted form, and present but few of the above symptoms, which, however, are most frequently observed, but not all of them in the same case. The various grades of this complication may be further associated with considerable bronchial affection, or with the disorder of the digestive canal about to be noticed. In such cases, the predominant lesion, either in the head, the thorax, or abdomen, frequently obscures the others, until the treatment, by subduing it, renders them more evident.

or until some one of them acquires additional activity.

452. *c. Synochoid fever with predominant affection of the digestive mucous surface.* — The mucous surface of the stomach and intestines is affected more or less in all fevers, in common with the rest of the organisation. In the simple or mild continued fever, it is generally less disordered than in any other. But in the more severe form, it is often prominently deranged, either at the commencement or at a later period. — *α.* The affection of the *mucous surface of the stomach* is sometimes remarkable from the invasion of the disease. In this case, *retchings* and *vomiting* — symptoms seldom observed in the thoracic and cerebral complications, particularly the former — are always present; and the fever has hence been denominated by many writers, *Mild Gastric Fever*, from its very close resemblance to the species described above (§ 387.). The reare also pain and soreness felt in the epigastrium, or in the left hypochondrium, and sometimes also in the right, with tenderness on pressure. The bowels are generally costive; the tongue is red at its sides and point, and loaded with a dirty yellowish fur; the pulse is soft, regular, full, sometimes strong, seldom much above 100; and the skin is hot. This state of disease is often followed by cerebral affection, and all the characteristics of that complication; or it passes into the intestinal or enteric form.

453. *β.* The *enteric affection* is sometimes present almost at the commencement of the disease; more frequently it does not appear until a later period; and occasionally it supervenes upon either the cerebral or the gastric complications — aggravating the former, and allaying the latter of these affections. — In most cases, it indicates a severe form of fever, which, at an advanced stage, is further associated with very marked cerebral disturbance. It commonly commences with *looseness*, and with *pain* and *soreness* in the abdomen, especially on pressure. Pain and tenderness are much less complained of when this complication occurs late in the disease, or when the cerebral symptoms are also very prominent. In cases of the early appearance of the enteric disorder, abdominal pain commonly ceases as the fever advances, particularly if the head become also very much affected, even when the purging and other symptoms are increased. The tenderness, however, generally continues much longer. The tongue is at first unusually red at the sides and point, loaded with a dirty white or greyish fur, and moist. As the fever advances, the redness becomes darker and duller, the surface drier, and the fur browner; and at last dark mucous sordes collect on the teeth and lips. The abdomen is commonly soft and natural, but is sometimes hard or doughy. The pulse is at first full, and soft, ranging from 80 to 100; but usually becoming more frequent at an advanced period. Thirst is also present, unless when the head is much affected, and at the last stage of unfavourable cases. When this complication does not evince any improvement in the course of two or three days, it assumes nearly the same features as characterise the worst cases attended by cephalic affection (§ 450.).

454. When the enteric affection comes on in the course of the cerebral complication, it may pass unheeded, unless the physician is particularly watchful, and expert in detecting it. In these cases, sensibility is so obscured, that pain is seldom felt, even upon firm pressure; and the bowels are occasionally but little disturbed. The tongue, however, is red at its point and edges, is covered by a dirty fur, and is dry: the pulse is generally about 110, soft, and small. In both these states of enteric disorder, the looseness or diarrhœa is the most frequent symptom. The stools are from three or four to eight or ten in the twenty-four hours; and are at first feculent, fœtid, dark, and thin. They subsequently become, in unfavourable cases, watery and of an ochrey hue, — an appearance imputed by Dr. BRIGHT to ulceration in the intestines. But this result is more common in the enteric complication of adynamic than of synochoid fever.

455. *γ.* The *complications* of the common continued fever of this and other temperate climates, are more frequently *associated* or *mixed*, as Dr. SOUTHWOOD SMITH has very judiciously insisted upon, than met with singly. In these mixed affections, however, one or other usually predominates more or less; although cases sometimes occur in which it is difficult to say which is most prominent; or the predominating disorder of an early stage subsides, and is succeeded or obscured by another. Occasionally, also, other complications besides those above specified appear, even in the same epidemic. — *Sore throat*, or *inflammations* of the *fauces*, *pharynx*, or *œsophagus*, or severe affection of the *liver*, with more or less disorder of the biliary secretion, sometimes accompanies one or other of the prominent affections above described.

456. iii. TREATMENT. — In this fever, as well as in all others in temperate climates, the *indications* and *circumstances* stated above (§ 123, 124.), as deserving of especial attention, should be strictly observed. The prevailing epidemic, and the changes that take place in its nature, or characteristic states of vital action, with its progress and with the season, should be carefully studied and made the basis of treatment. Some difficulty may occur at first in coming to just conclusions; but it will vanish with the extent of observation, especially when diligence has been used. The chief points to which the attention of the practitioner will be directed are — the nature and concurrence of the causes, the extent to which they may have affected vital manifestations, the degree of excitement or vascular reaction in connection with nervous power, the state of the circulating and secreted fluids, and the nature and amount of local complications or determinations. The physician who has studied, in an intimate manner, the various phases of disordered vital manifestation, will have little difficulty in recognising the chief characteristics of fever, under the ever-shifting circumstances in which they present themselves, and in appropriating accordingly his method of cure.

457. *A.* The ancients observed carefully the spontaneous changes which take place in fever, and conduce to recovery (see art. CRISIS); and they were guided, in forming their indications of cure, by these changes, which they merely attempted to promote or to imitate. This mode of practice may be followed in synochoid fever more successfully, perhaps, than

in any other. Yet it will be better to combine with it the more modern indication, of resorting to such means as may subdue the more urgent symptoms, and avert contingent danger. If the patient be seen as early as the *premonitory* and *invading* stages, the impending disease may be averted by the means advised above (§ 121, 122.) — more especially by *emetics*, warm *diaphoretics*, and the *vapour bath*. But when *excitement* has commenced, the treatment should be antiphlogistic. In this stage, we should endeavour, by a careful examination of the symptoms, to ascertain the existence of local complications; and, having determined their absence, the question will then be as to having recourse to *bloodletting*. I have already considered this topic so fully (§ 128—139.) that nothing further need be here advanced. If the nature of the prevailing epidemic, or the degree of reaction, require depletions, the earlier in this stage they are resorted to the better. But even then they require caution and discrimination. If the excitement be slight, and the patient neither robust nor plethoric, and more especially if the causes and circumstances connected with the origin of the disease be of a depressing nature, they will be better withheld.

458. The exhibition of *emetics* in the stage of excitement was advised by many of the ancients, and practised by some of the most recent writers, although objected to by others. The reason of this difference of opinion is very obvious. There are states, even of this stage, in which they will be of service, and others in which they will be injurious. When reaction is slight — when the patient is not plethoric, has not experienced full vomiting, and does not complain of pain or of tenderness in the epigastrium or hypochondria — then emetics may be exhibited. But if the excitement be great, with determination to the head; and if the patient have already vomited freely, and more especially if the symptoms just mentioned be present, they should not be prescribed. (See § 149.)

459. *Purgatives*, so much decried by Broussais, and with some justice as respects several states of fever prevalent in France, are certainly of very great service in the common continued fever of this climate, when employed with a cautious discrimination. Early in this disease, calomel, either with or without James's powder, may be given at night, and a purgative draught in the morning. At a more advanced stage, calomel, or hydrargyrum cum creta, may be conjoined with rhubarb. If the stomach be too irritable to retain the more common purgatives, a full dose of calomel will generally be retained; but its action should be promoted by enemata (see F. 140. 144.). During the febrile excitement, and when the bowels are sluggish, the stronger saline purgatives may be given in solution, in small doses, and at short intervals, with refrigerants (F. 440, 441.). The remarks already offered upon this subject (§ 150, 151.) will guide the practitioner as to the choice of purgatives, and the extent to which they should be prescribed. In this fever, especially, it can never be injurious to give them to the extent of freely evacuating morbid accumulations in the bowels, and of promoting the alvine secretions and excretions. When the fæces are very offensive, greater mischief will accrue from allowing them to remain, even for a short time, in the bowels, than from too active measures in evacuating them.

460. The remarks that have been offered above respecting *refrigerants* (§ 139, 140.), *diaphoretics* (§ 152.), and *diuretics* (§ 153.), are entirely applicable to this form of fever.—The *cold affusion*, which formerly attracted so much more, and now so much less, attention than it deserves, is more appropriate in this than in any other disease. This practice, although resorted to by the ancients and in Eastern countries, was but little known in this until it was employed by Wright and Jackson. The work of Dr. Currie on the subject first brought it into fashion; but now it certainly has not fashion in its favour. When the excitement is fully developed, and the heat of skin above the natural standard, when there is no sense of chilliness, and when the surface is hot and unperspirable, the cold affusion may be employed. Dr. Currie directed water of the temperature of from 40° to 60° or 70°, and preferred the hours from six to nine in the evening for its use. In cases of debility, the *cool* or *tepid* affusion is more appropriate. I have resorted to cold affusion over the whole body, in several cases of fever, in a warm climate; but I was not induced by its effects to entertain a high opinion of it. The affusion of cold, cool, or tepid water on the head, when this part is prominently affected, and cold sponging the surface, are more beneficial, and admit of more general application. Dr. Currie believed that the general affusion had the effect of lowering the pulse and the morbid heat, of inducing perspiration and sleep, and of cutting short the fever. I have never seen it succeed unequivocally in producing the latter effects; but have remarked that the excitement returned shortly after its use. In the complication with disease of any of the thoracic or abdominal viscera, it should not be used (§ 141.).

418. *B. Of the Complications.* — *a.* Predominant *affection of the head* has received attention above (§ 165.). What I have there stated is applicable to this complication of common continued fever. — *Bloodletting* is especially requisite, but its amount, and the mode of performing it, should entirely depend upon the symptoms and the stage of the disease. — The *cold affusion* on the head, and *purgatives*, are the next in importance. When the cerebral affection has been preceded or attended by diarrhœa, purgatives should be prescribed with caution. Rhubarb with hydrargyrum cum creta, given so as to evacuate morbid matters, and promoted by suitable enemata (F. 140.), will be then sufficient. When *delirium* is the principal symptom, care should be taken to discriminate accurately the states of vascular action and vital power. If it be unattended by increased heat of scalp, the pulse being very quick and soft, and the countenance sunk or pale, and especially if it have followed intestinal disorder, all lowering agents should be laid aside, and restoratives with opiates, and mild nourishment in small quantities, prescribed. When fever occurs in persons addicted to spirituous or other intoxicating liquors, the cerebral affection is apt to become very severe, and to be attended with delirium and often with

tremor. In such cases, depletions should be used with caution. If tremor, irritability, &c., appear, opium, with or without camphor, should be exhibited. In other respects, the means advised in the article Delirium, according to the pathological states upon which it depends, will be here appropriate. I have repeatedly seen the cerebral symptoms greatly aggravated by the application of a *blister* to the scalp, at a too early stage of the disease. Blisters should be applied preferably on the nape, but never on the head unless there be profound coma, or low delirium with great exhaustion of vital power, as more fully shown in the articles Coma (§ 16.), and Delirium (§ 19.).

462. *b.* The observations already made respecting *the pulmonary complications* (§ 160—163.) are mostly applicable to those occurring in this form of fever. — *Bronchitis* is the most common affection, and requires the treatment above advised (§ 161, 162.). When the substance of the lungs, or the pleura, is implicated, vascular depletions ought to be early practised. But even in these cases, we should recollect, that bloodletting must be employed with greater caution than in inflammations occurring primarily and in healthy constitutions. It is in this fever, and in its pulmonary complications especially, that antimonials may be given with greatest freedom. After depletions and antimonials have been carried as far as seems prudent, blisters, or other external derivatives, should be used. If the air-passages become loaded with mucus, antimony or ipecacuanha or sulphate of zinc may be given so as to excite full vomiting.

463. *c. Predominant affections of the digestive mucous surface* have already received attention, and the treatment there recommended (§ 155—159.) is quite appropriate in these complications of this form of fever. — In the *gastric state* of disorder, particularly when much pain and tenderness, with irritability, exist, local depletions should be early employed; and a full dose of calomel, given shortly afterwards, will generally allay what may remain of these symptoms. Enemata, also, will assist materially in producing this effect, and evacuate morbid matters from the bowels. Small, but often repeated, doses of muriate of ammonia, or of the nitrate of potash with the sub-carbonate of soda; or camphor julap, with the solution of acetate of ammonia, and nitre or spirit of nitric æther; will afterwards be extremely beneficial. Even in this form of fever, but still more in the adynamic, we should be cautious not to be misled by the persistence of pain and tenderness at the epigastrium; or induced to prescribe too frequent or too large depletions with the view of overcoming these symptoms. They may never be removed by these means, however freely employed; for, notwithstanding the arguments of Broussais for their origin in inflammatory action, I believe that they depend more upon the altered state of the organic nervous sensibility, than upon increased vascular action in the stomach.

464. In the *enteric complication*, the treatment will depend upon the stage of fever at which it appears, and the progress it may have itself made. — Local depletions, external derivatives, and the other means enumerated above (§ 156—159.), are generally necessary. If bloody or ochrey discharges are observed, especially late in the disease, the terebinthinate medicines, or the superacetate of lead with opium, as advised by Dr. Bardsley, will be found the most efficient remedies. If the powers of the system become much reduced, gentle tonics, with the chlorates, as the infusion of valerian with the chlorate of potash, and paregoric elixir, will be of essential service. The following medicines will prove of great use in earlier stages of this complication, after local depletions, especially when aided by external rubefacients and derivatives. In slight cases, either of them may be given, according to circumstances; in the more urgent, both may be taken alternately, at intervals of three hours.

No. 223. ℞ Sodæ Sub-carbon. gr. x.; Potassæ Nitratis gr. viij.; Tinct. Camphoræ Comp. ʒj.; Mist. Camphoræ (vel Infus. Valerianæ) ʒx.; Syrup. Aurantii ʒss. M. Fiat Haustus, sextis horis sumendus.

No. 224 ℞ Camphoræ rasæ et subactæ gr. ss.—j.; Pulv. Ipecacuanhæ Comp. gr. iv.—vj.; Hydrarg. cum Creta gr. iij.—v.; Syrup. Simp. q. s. ut fiant Pilulæ ij. vel iij. sextâ quâque horâ sumendæ.

XXII. Fever, Typhoid.* Syn. — *Adynamic Fever, Asthenic Fever, Febris Asthenica; Febris Contagiosa; Febris Typhoides; Typhus* (from τυφος, stupor, or τυφω, to smoulder); *Fièvre Typhoide*, Chomel; *Fièvre adynamique, F. nerveux, F. ataxique*, Fr.; *Tifo*, Ital.; *Der Typhus, Nervenfieber*, Germ.; *Low Fever, Contagious Fever, Infectious Fever.*

465. Defin. — *After lassitude and general malaise, imperfect or suppressed vascular reaction, with depressed vital power, manifested especially in the nervous, vascular, and muscular systems, and giving rise to changes more or less evident in the circulating fluids and soft solids.*

466. This fever cannot be said to differ specifically from that last described, although certain varieties of it present very marked distinctions. Indeed, the severer forms or complications of synochoid fever very closely approach, or run into, certain states of typhoid fever; the chief differences consisting in the more sthenic vascular reaction in the early part of the period of excitement in the former. Even the milder cases of simple continued fever may gradually assume a perfectly typhoid state, in the advanced stage. The distinctions which characterise the following varieties are results of the *circumstances* already shown (§ 43.) to determine the forms and complications of fevers generally; especially of the constitution and habit of body; of the previous health and condition of vital organs; of the nature, intensity, and concurrence of the causes of the prevailing epidemic; of the influences operating after infection or during the early stages, and of the treatment and regimen then adopted.

467. *A.* The Causes of typhoid fevers differ but little from those of the synochoid forms. — *a.* The *predisposing causes* (§ 431.). of both are the same. Although typhoid fevers most frequently occur in persons from 15 to 40 years of age, yet the mortality, in proportion to the number affected, is much less in this than in more advanced periods of life. The predisposition to be attacked diminishes remarkably with advancing age, especially after 50; but the proportion of those who

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* I use the term *Typhoid* in the same sense as Cullen and the majority of writers on Fever in this country since his time. It is, in this sense, nearly synonymous with most of the names adduced under it.

die increases in a still greater ratio. The predisposition also diminishes as we descend from puberty to infancy, and the mortality diminishes in a still greater ratio. Thus children and aged persons are least obnoxious to typhoid and infectious fevers: a somewhat different law here obtaining from that which characterises the operation of exhalations from the soil upon the human constitution; these latter affecting the young and old as well as the middle-aged, and renewing their attacks in various forms, whilst typhus fever seldom occurs oftener than once in the same person.

468. *b*. The *exciting causes* (§ 434.) of typhoid and synochoid fevers are often the same, excepting that infectious miasms, want and famine, the various contingencies connected with the operations of war, and epidemic influences, are most concerned in producing the *severer varieties* about to be described.—The *sporadic cases* of this fever, and which generally present either the milder form, or most of the nervous character, often originate in the depressing passions, in changes from the usual habits and modes of life, or in exposure to novel influences, physical and moral; in weak delicate persons of a lax habit of body; in persons imperfectly fed, or reduced by previous disease, or by exhausting discharges, &c. From these causes especially proceed the adynamic, slow nervous, or mild typhoid fevers, often observed in persons who have recently removed into large cities, or who live in crowded, low, and ill ventilated apartments. — The *epidemic* visitations of typhoid fever are usually of the more low or severe forms described hereafter.

i. MILD TYPHOID FEVER. SYN.—*Low Nervous Fever; Simple Typhoid Fever; Simple Adynamic Fever; Regular Typhus; Slow Nervous Fever*, Huxham; *Typhus mitior*, Cullen; *Febris nervosa*, Auct.; *Languor Panonicus*.

469. *A*. This form of fever is characterised chiefly by great languor and debility; by giddiness, dulness, and confusion of intellect; by a soft, feeble, and quick pulse; and by loss of muscular power, sleeplessness, and low delirium. It usually commences with similar *premonitory symptoms* (*period of infection*, HARTMANN) to those above described. The patient complains of giddiness, lassitude, uneasiness at the epigastrium, of nausea and loss of appetite, of alternate chills and flushes, and of pain in the back and limbs, — the *period of invasion*. The chills are often prolonged, or recur for two or three days, but seldom amount to rigor. The skin afterwards becomes warm, but seldom very hot — the *period of excitement*, of *irritation* (NAUMANN), of *reaction* (HARTMANN), of *inflammatory irritation* (GOEDEN); the pulse frequent, full, soft, or weak; the countenance dull, pallid, and shrunk, or, occasionally, transiently flushed; the head heavy, confused, and giddy; the eye heavy and devoid of lustre; and the tongue loaded or covered with a dirty mucus. There are more or less thirst; a desire of cold, acid drink; sometimes pain at the epigastrium, nausea, and vomiting; or an irregular and relaxed state of the bowels; and offensive evacuations. Pain of the head is but little, or not at all, complained of, but that of the back and limbs is felt severely. *Tinnitus aurium* is generally present. Febrile uneasiness is great, the restlessness constant, and the want of sleep continued.—About the third, fourth, or fifth day, the head is more affected, and the mind more confused. The respiration is short and quick; and torpor, or *coma vigil*, is often observed. Occasional flushes occur, in some cases, while the extremities are cool. The urine is pale, of a whey colour, or like small beer—occasionally scanty. The bowels are either torpid, or relaxed, or irregular; and deliquium, or faintness, partial sweats, tremors, &c. are complained of, on attempt to sit up. Delirium of a low kind, or consisting of a muttering incoherence, occurs about this time; generally, at first, during the night, but subsequently recurring during the day. The eyes become muddy, afterwards suffused or injected; and the tongue of a darker hue, dry or incrusted.

470. From the 7th to the 9th, 10th, or 11th day, the delirium degenerates into stupor — the period of *predominant narcotism* of NAUMANN — the *nervous stage* of HILDENBRAND — the *collapse* of CULLEN and HARTMANN; the pulse becomes small, weak, and very quick, or unequal; the heat of the skin natural, or diminished, or irregularly distributed; the hearing dull; and tremor, the supine posture, coma, and unconscious evacuations, are soon afterwards observed. Petechiæ sometimes appear on the trunk, thighs, &c. The tongue becomes brown or black, incrusted and fissured, is protruded with difficulty, and the gums and lips are covered by a dark sordes.—From about the fourteenth day to a much later period, according to the character of the epidemic, the peculiarities of the patient, the severity of the early stages, and the state of internal organs, a favourable change very often occurs in all the symptoms — the *stages of crisis and decline*, or of *recovery*, (HARTMANN) — and is announced by a refreshing sleep, or by a warm and general sweat, or by a gentle diarrhœa; followed by subsidence of delirium, tremor, &c.; by the tongue being moist and clean at its edges, the skin more natural, and the pulse slower; by returning consciousness; and by the improved appearance of the countenance. If these changes do not take place; or if the sweats are cold and clammy on the extremities; or if they, or the diarrhœa, be unattended by amelioration of the symptoms; a *fatal change* should be dreaded, particularly if profound coma and great deafness, subsultus tendinum, or convulsive or spasmodic movements, difficulty or inability to swallow or to articulate, hiccup, involuntary evacuations, retention of urine, tympanitic abdomen, sliding down in bed; very rapid, fluttering, or intermittent pulse; very black tongue; and a quick, jerking, laboured respiration, or other unfavourable symptoms, appear.

471. *B*. The symptoms which *distinguish* this form of fever from the synochoid are—the greater prostration of strength from the commencement; the mental torpor and confusion of ideas; the long-continued chilliness, generally without rigor or shivering, at its invasion; the moderate increase of temperature afterwards, or its natural grade; the pallid and shrunk countenance, expressive of suffering and debility; the muddy, lack-lustre eye; the torpor, giddiness, and absence of pain in the head, passing into stupor with delirium at an early stage; the quick and small, or the full, open, and soft pulse, even during the period of excitement; the early dryness, and dark appearance, of the tongue; the remarkable

fœtor of the breath, and of the discharges; the supine posture; the dull, dusky, lurid, or dirty hue of the surface; the frequent occurrence of sloughs in the parts pressed upon, or of erysipelas, and occasionally of enlargement and inflammation of glands; and the early appearance of delirium, with tremor, and other symptoms indicating extreme depression of vital power. When any of these phenomena occur in synochoid fevers, it is always at a far advanced stage; the synochoid thus merely lapsing into the typhoid form, owing to various contingent influences, or to predominant affections of particular organs.

472. *C.* Such are the usual progress and characteristic phenomena of simple typhus; but it presents slight modifications, with the activity of reaction in the early stage, with the affection of particular organs or of the skin, and with the character of the prevailing epidemic. When the predominant affection is either so evident or so influential, as to modify materially the state of disease, certain varieties result, which have been described by authors as specific or distinct forms of fever, and have been often connected, in too absolute a manner, with the peculiar circumstances in which they were observed, or in which they originated. I shall here notice these varieties, with reference to the circumstances whence their peculiarities seem to proceed, and to the various names imposed upon them from a desire of appearing original, but with the effect of proving inaccurate or of causing misapprehension and confusion.

473. ii. COMPLICATED TYPHOID OR NERVOUS FEVER. — *A. With predominant Affection of the respiratory Organs.* — The bronchial surface is the part chiefly affected, and is rather congested than inflamed. The pleura is rarely attacked; but the substance of the lungs is sometimes implicated; and it then commonly becomes rapidly infiltrated or condensed, a fatal result quickly supervening. This complication is often obscure, or even latent; but it generally admits of detection by auscultation, or by attentive observation alone. The patient sometimes complains of stricture, oppression, or dyspnœa, but very seldom of pain in the chest. The respiration is short and hurried, is attended by the mucous rattle, and with more or less cough. The skin is seldom hot; at a later period it is cool, or even cold, in the extremities, and dusky or lurid; the cheek is tinged with a dark red, and often assumes a livid or purplish hue. The pulse is rapid and weak. The confusion or stupor of an early stage passes quickly into low, incoherent, muttering, and coma. The tongue becomes very dry, black, crusted, and fissured; it cannot be protruded, and articulation is lost. This state may continue for several days, with unconscious evacuations, and all the nervous symptoms prominently marked; at last the patient sinks asphyxied, the changes necessary to life ceasing to take place in the blood sent to the lungs.

474. *B. Nervous or Typhoid Fever with prominent Affection of the digestive mucous Surface*—the *Adynamic Fever* of several French writers; the *Dothinentérie* of M. BRETONNEAU.—Many of the observations made respecting this affection in synochoid fever (§452.), apply to its occurrence in typhoid fevers. It is very commonly observed in large cities, and in circumstances that occasion the use of water containing animal matter in a state of decay; and it commences in a similar manner to the other varieties of typhoid fever. The symptoms that usually attend its progress are — a tumid, tense, hard, or tympanitic state of the abdomen, at an early stage of the fever, frequently without pain or even tenderness on pressure, but with involuntary stools, and inconsciousness of their passage at a later period. The tongue is dry, black, incrusted, and the crust sometimes fissured; but it occasionally is dark red, dry, and devoid of papillæ or fur. The stools are often ochrey, and more frequent than natural. Discharges of blood, in greater or less quantity, sometimes accompany them; but the hæmorrhage, and the changes in the mucous surface occasioning it, may occur without much, or even any, relaxation of the bowels.

475. *C. Typhoid Fever, with prominent Affection of the cerebro-spinal nervous System* — the *Ataxic* of PINEL — is seldom attended by acute pain in the head. But heaviness, stupor, confusion, and giddiness are felt severely, and very early in the attack. The eyes are injected, suffused, and devoid of lustre. Delirium appears early, and frequently becomes more violent than in mild typhus; the patient attempting to get up, or out of bed. The scalp is warm, or hot, and the extremities are often cool. Insensibility and coma quickly supervene, and are sometimes attended by spasmodic contractions of the muscles of a limb, or by partial convulsions. Inability to swallow, retention of urine, and loss of speech are occasionally observed. Startings of the tendons, relaxation of the sphincters, and failure of the circulation occur in the last stage, and usher in a fatal termination. This complication is especially characterised by the early appearance and the severe form of the symptoms depending directly upon the state of the cerebro-spinal nervous system.

476. *D. Typhoid or Nervous Fever with severe Affection of several vital Organs* — *Typhus gravior* of CULLEN and others — is generally characterised by intense disorder of the brain and digestive canal, with more or less evident affection of the bronchial surface; delirium being early, and at first somewhat violent, and soon followed by insensibility, &c. The pulse is quick and weak; the skin is hot, dry, pungent, or harsh, in an early part of the stage of reaction, but it generally becomes cool, particularly in the extremities, and often discoloured; respiration is panting or quick; the tongue dry and black; the abdomen tumid, tender, or tympanitic; and the stools are dark, offensive, and passed involuntarily and without consciousness. In this form there is some degree of reaction, expressed most severely in the digestive canal and cerebro-spinal nervous system; but it is characterised by depression of vital power, that is soon increased by the exhaustion consequent upon the reaction induced in this state.

477. The vital organs may, however, be severely affected, although excitement be very slightly, or even not at all, manifested. Such cases constitute the *Congestive Typhus* of some modern writers, — a form of comparatively rare occurrence, unless accompanied with petechiæ and other symptoms indicating serious changes, not merely of vital action, but also of the fluids and soft solids. — In this variety, the depression of

vital power is extreme from the commencement, and such as prevents the developement, and, in some cases, even the least manifestation, of excitement. The causes of the disease have given vitality a shock beyond its powers of resistance, or of recovery. Muscular power is almost entirely annihilated, and the anxiety at the epigastrium and præcordia is extreme. Respiration is oppressed, and the pulse is quick, sometimes irregular, intermittent, or even slow, and always small, weak, and thready. The countenance and eyes at first have an intoxicated appearance: the former being pallid, occasionally slightly bloated, or livid and dingy; the latter being vacant or suffused, and, afterwards, injected, ecchymosed, half shut, or open. The skin, at an early stage, is warm or harsh; subsequently it is cool, withered, lurid, and, sometimes, studded with petechiæ or vibices; the extremities being cool, or even cold, and dingy, or of a leaden hue. The mind is very much confused at the commencement, and soon passes into a state of incoherence, delirious muttering, and coma. The patient is unable to protrude the tongue, owing to deficient power of the muscles of the organ; and seldom complains of thirst. The abdomen is tumid or inflated; the bowels being relaxed, the stools black and offensive, and, with the urine, passed unconsciously. The progress of the disease is usually rapid, and generally to a fatal termination; but the *premonitory stage* may be protracted, although severe — the *invasion* being sometimes sudden, and resembling an apoplectic seizure. If the powers of life rally, recovery may take place; but it is tedious, and often attended by various consecutive disorders.

478. *E. Of other Modifications or peculiar States of Typhoid or Low Nervous Fever.* — Various phenomena beside those already described may accompany this fever, according to the combination and intensity of the causes, the previous health of the patient, and the circumstances affecting him subsequently to the operation of the exciting agent. — *a.* When caused by *mental distress, despondency*, &c., this fever presents certain peculiarities deserving notice. The patient is dejected, indolent, and incapable of exertion. He loses his appetite and strength; he cannot rest at night, or his sleep is disturbed and unrefreshing; and he complains of headach, and of many of the symptoms of a common cold. He is absent, his mind being constantly occupied with the subject of his misery. His countenance assumes an anxious appearance; his healthy looks vanish; and his absence of mind often passes into a state of reverie. After several days, manifest affection of the brain is observed, with characters varying with the age, strength, condition, and habits of the patient. In the robust, plethoric, and in persons addicted to intoxicating liquors, it is sudden and violent in its accession; the headach and despondency quickly passing into delirium of an active and constant kind—the patient calling out, or starting up, and attempting to get out of bed. The pulse is quick, firm, and oppressed, or small; sometimes soft or irregular. Muscular power is not so much, nor so early, reduced as in the other states of the disease, but there is continual jactitation. In the debilitated, the aged, or the ill-fed, the cerebral affection is less violent in its attack, and commences more gradually, often attended by red or suffused eyes, or by catarrhal symptoms, or by diarrhœa; by delirium, tremor, great prostration of strength, hurried breathing, weak quick pulse, subsultus tendinum, and, sometimes, with a mottled appearance of the surface. In other respects, the progress of the disease is nearly the same as the more severe cerebral complications already noticed (§ 475.), but it much more frequently terminates unfavourably.

479. *b.* In some cases the fever is complicated with *sore throat*; and this symptom is occasionally so severe and early as to resemble an attack of *cynanche maligna*. Indeed, cases not infrequently occur, which fully indicate that the one disease may pass into the other, under favourable circumstances in respect of predisposition and concurrence of the exciting causes; or, in other words, that in young persons, in those predisposed to sore throat, and in cold and humid states of the air, certain of the exciting causes of typhoid fevers will sometimes occasion a malignant or putrid inflammation of the throat, ushered in and attended by this form of fever; or they will, in such or similar circumstances, produce a low fever, in which inflammation of the throat is a contingent complication, and assumes an asthenic or unfavourable character, owing to the depressed state of vital power, and morbid condition of the circulation, in which it occurs. This complication is observed either as the most prominent local affection, or in conjunction with some other remarkable disorder, especially with the gastric complication. In some instances, it is very severe; the pharynx and upper part of the œsophagus being also more or less affected, and deglutition altogether prevented.

480. *c. Paralysis* may occur, especially in the cerebral state of this fever; and, in this case, the use of one side of the body is generally lost. If the patient recover from the fever, the functions of the paralysed side are often gradually restored. This complication may take place in those cases which commence with protracted or severe premonitory symptoms, against which the patient struggles, until he falls down from exhaustion; or is *suddenly* seized, as in a case of apoplexy — the fever running its course, as after the usual invasion, with chills, rigors, vomitings, &c. When the disease is developed in this sudden manner, it commonly presents the cerebral character throughout, with delirium, passing into coma, &c. In a case, however, of this kind, the cerebral symptoms were subsequently slight, and the disease mild.[*] In some of the cerebral cases of this fever, the affection of the mind continues for some days, or even weeks,

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[*] A young lady went some distance to visit an intimate friend, delirious in fever; and having gone into the chamber, she was sensible of a disagreeable odour upon the curtains of the bed being drawn. She soon afterwards complained of slight nausea, of headach, loss of appetite, and general lassitude. These symptoms continued gradually to increase for six days, during which time she kept about. On the morning of the seventh day she suddenly fell down without sense or motion. I saw her in this state soon afterwards, and, viewing the attack as the result of sudden congestion of the brain, and before I had learnt the above particulars, I prescribed a moderate bloodletting, and purgatives. The functions of the brain soon returned, and the fever ran its course in a mild form, and without delirium or prominent affection of any organ.

after the bodily functions are restored. Instances may even occur of permanent insanity being the consequence. But, in all such cases, hopes of recovery should be entertained until some weeks, or even months, have elapsed from the disappearance of the fever.

481. *d. Relapses* are not infrequent after the mild forms of typhoid fever; especially when the duration of the disease has been shortened by the treatment, or its course materially altered. They are also much more common in one epidemic than in another. In many instances, particularly when the procession of the morbid phenomena has been interrupted by large depletions, or drastic purgatives, the symptoms become ameliorated for a time, but recur with their previous severity; the recurrence being different from a relapse.—This fever, especially its gastric and enteric states, may pass, or be converted, into a low or typhoid form of *dysentery* (see that article, § 26, 27.), owing to the influence of the same circumstances that usually cause relapses; especially premature exposure in early convalescence; the use of too much, or of improper, food; the continued operation of the exciting causes; a close, impure, and infectious air; and suppression of the excretions. — *Local affections*, particularly *inflammations*, may also appear during convalescence, arising either from the above causes, or from atmospheric vicissitudes; or from whatever may inordinately affect the nervous and vascular systems. In these cases, the inflammation is apt to pursue a severe and rapid course, owing to the unfavourable or debilitated state of constitution in which it occurs. Bronchitis, often associated with affection of the substance of the lungs, and inflammation of the mucous surface of the bowels, sometimes with softening and enlargement, or ulceration, of the mucous follicles, are the most common diseases thus contingent on convalescence. Inflammatory affections of the stomach or liver may also take place. When the mucous surface of the intestines is the seat of consecutive disorder, the bowels generally are more or less relaxed, and the stools are of an ochrey hue, and offensive. In such cases, the follicles are especially affected; are often ulcerated; and, although they will generally heal under judicious treatment, perforation of the intestines and fatal peritonitis may be the result at a period more or less remote from the disappearance of the fever.

482. *F. Of Petechiæ and exanthematous Eruptions in Typhoid Fevers.* — Nervous or typhoid fevers may occur sporadically or epidemically, without any *petechial* or other eruption; or may be attended by *petechiæ* or *vibices* in their progress, and particularly at an advanced period, or by an *exanthematous eruption* at an earlier stage; or even by both kinds of cutaneous affection, either successively or almost coëtaneously. For many years, or in successive epidemics, or even in a single epidemic, typhoid fever may appear in any one or more of the states just described; or it may assume either of these forms, associated with one or other, or with both, of the affections of the skin just mentioned in a portion of the cases only; or the affection of the skin may be one of the most unvarying and chief characteristics of an epidemic: and, of the cases composing such an epidemic, some may be of the mild, others of the complicated or severe form; some may evince more or less reaction or excitement, others may present depression of the powers of life and congestion, as prominent phenomena throughout. The above description, although applicable more especially to the occurrence of typhoid fever, independently of any marked affection of the skin, yet does not the less apply to the occasional association of the disease with this affection. Those epidemics, in which the changes in the skin are very constant phenomena, sometimes possess other characters, both in the early and in the advanced stages, that require an especial notice. Whilst these changes — both *petechial* and *exanthematous* — have been considered by **HILDENBRAND**, **NAUMANN**, **FODÉRÉ**, **PEEBLES**, and other experienced writers, as indications of specific kinds of fever, which, in the early stages, may present more or less either of inflammatory excitement or of depression of vital power; they have been viewed, by many authors, merely as occasional occurrences, or as modifications met with only in certain epidemics, and not as characteristics of distinct varieties.

483. In trying to solve this question, the same difficulties present themselves that arise in all attempts to arrange the different varieties and states of fever in such an order as the more constant phenomena may warrant, and as may conduce to appropriate and successful methods of treatment. If I refer to my own observations, in different parts of the Continent, some time after the late war, and in various parts of this country, both before and subsequently, I shall find — 1st. That *petechiæ* and vibices were either seldom or rarely seen for several years, and in some epidemics, excepting in the most severe or malignant cases, or when favoured by a too stimulant treatment, and a too heating regimen, during the early stages; and that, at other times, they appeared more frequently in the advanced periods of the lowest forms of fever, and even, although much more rarely, towards the termination of synochoid fever, when antiphlogistic remedies had been neglected in the stage of excitement. — 2d. That this change, in some epidemics, was a very common or even general symptom, occurring in mild as well as in severe cases, although presenting very different appearances in each; and that they were sometimes observed early in the low states of fever, particularly when caused by unwholesome and deficient food, by a foul atmosphere, or by infectious miasms. — 3d. That they were very frequently connected, especially in the plethoric, in the previously unhealthy, and in persons using much animal food, with evident change of the circulating fluids, with predominant disorder of the digestive organs, with a soft, broad, and open pulse, and with hæmorrhages from the intestines, and a tendency to disorganisation of the mucous surface of the bowels. — 4th. That an *exanthematous rash* or eruption was observed in some epidemics, from the third to the eighth day of the fever, was quite distinct from petechiæ, generally appeared earlier, and was, in some cases, either associated with, or succeeded by, petechiæ or vibices, or even both. — 5th. That this exantheme was of a reddish colour, varying in deepness, and rarely passing to a dark hue; that it occurred in cases characterised by vascular reaction in the early stage, as well as in

those of a very low grade — in the mild, in the complicated, and in the severe; that this eruption was most probably overlooked in many cases where it existed; and that it was very generally confounded with petechiæ, owing to its late appearance, or to its colour changing, in a somewhat similar manner to petechiæ, with the states of vital power and of the circulating fluids.— 6th. That although the difference between both these affections of the skin has been insisted on by HILDENBRAND and NAUMANN, it has been too widely drawn by them, and without due reference to the occasional association of both affections. From these facts, therefore, I am induced to come to the conclusions above stated (§ 482.); and, conformably with the views of the experienced writers just mentioned, to notice more particularly the states of fever in which these changes in the skin are observed, without considering these states as always constituting distinct species.

iii. TYPHOID FEVER, WITH PUTRO-ADYNAMIC CHARACTERS. SYN. — *Putro-adynamic Fever*, *Σύνοχος μετα σηπεδόνος*, Galen; *Synochus Putris, S. cum Putredine, Febris continua Putrida*, Rivière; *F. continens Putrida*, Selle; *F. Putrida sanguinea*, Vogel; *F. colliquativa putrefaciens*, Quesnoi; *F. Hungarica, F. nervosa-putrida, F. asthenica, F. contagiosa; F. colliquativa essentialis*, Borsieri; *F. Putrida simplex*, Richter; *F. charactere putrido aut septico*, Hildenbrand; *F. Petechialis, F. Nosocomialis, F. Castrensis, F. Purpurata maligna, F. Maligna, F. Carceraria, Pestis Bellica;* Auct. var.; *F. Continens maligna*, Huxham; *Das Faulfieber, Fauligе Fieber*, Germ.; *Fièvre grave, F. Maligne, F. Putride*, Fr.; *F. Adynamique*, Pinel; *Febbre Putrida*, Ital.; *Morbo Petechiale*, Cerri; *Febbre Petechiale*, Rossi; *Febbre epidemica Petechiale*, Buffa; *Petechial Typhus, Camp Fever, Jail Fever, Putrid Fever, Putrid Malignant Fever, Spotted Fever.*

484. Conformably with what I have stated above, I consider this as a variety merely of typhoid fever; its especial characteristic — the appearance of petechiæ and vibices — being contingent upon certain circumstances and causes tending to contaminate the circulating fluids, and to destroy the tonicity and irritability of contractile tissues, and appearing only as the effect of a series of anterior changes. Although petechiæ may occasionally appear in the advanced stages of other fevers, particularly those of the typhoid form, yet in those epidemics which result from famine, war, unwholesome food, and from air loaded with putrid animal and vegetable matter, or with the emanations proceeding from a number of persons shut up in a close atmosphere — causes which are often conjoined — this symptom is very generally, if not constantly, observed, and is only one of the indications of the very serious changes which have taken place, not only in the blood, but also in the soft and irritable structures of the frame. Infection, either directly or by fomites, is, however, the chief cause, although cold, humidity, fear of the disease, and the other agents just noticed, may either generate the fever *de novo*, or predispose the system to infection, or aid its operation after exposure to it. Although certain epidemics evince a putrid or septic character at an early period, and thereby justify the appellation generally given to them; yet this character is seldom primary, or otherwise than the consequence of suppression or exhaustion of vital power, the fever commencing in some one of the forms already described. Indeed, there is no variety of fever that may not evince a septic or putrid state — 1st, from the vital depression produced by the exciting cause; 2dly, from exhaustion consequent upon vascular reaction; 3dly, from the passage of contaminating matters into the blood; and, 4thly, from these states conjoined. Hence, when the causes are of a contaminating kind, and the influences continuing to operate after infection have a similar tendency, putrid or malignant symptoms will arise, whether the fever be synochoid, nervous, typhoid, or gastric, in its early periods. These fevers are the most prone to the septic character; but others, as remittent, inflammatory, and bilious fevers, may also assume it. This particular character may, or may not, be developed, or may appear at a later or earlier period, owing to the nature and diversity of the causes; to the condition of the internal functions and of the circulating fluids at the time of attack; to the rigidity or tone, or to the laxity, of the softer solids; to the violence or absence of vascular reaction; and to the early treatment and regimen.

485. *A.* Petechial, or putro-adynamic fever, generally commences with the premonitory and invading symptoms usually observed in other fevers of a low grade. When an epidemic presents changes of a septic or putrid nature, as predominant features, the early stages of the fever vary most remarkably according to the intensity of the causes, and the state of the patient. The *period* which elapses from infection till the manifestation of the disease ranges from a few hours to five or six weeks. It is commonly some days, but sufficient evidence has been furnished, in the Irish and other epidemics, that the longest of these periods may occur. During the time the disease thus takes to form, the usual *premonitory* symptoms are observed, and increase until chills, horripilations, or rigors are felt. In some instances the disease commences insidiously, with or without catarrhal symptoms, becoming gradually severe and dangerous. In these, it is often difficult to assign the exact period of *attack*. Fatal cases most frequently begin in this manner, especially in the plethoric, cachectic, and persons accustomed to full living. In others, after a protracted and severe *premonitory stage* and indistinct symptoms of *invasion*, the fever proceeds with indications of imperfectly developed reaction, and soon assumes a putrid or malignant form. In some cases, rigors and shiverings sufficiently evince the period of attack, and quickly give rise to inordinate reaction, followed by exhaustion and evidence of change in the fluids and soft structures. Amongst the most constant of the early symptoms are — dull pains in the head, occiput, back, and limbs; universal weariness, soreness, and loss of muscular power; confusion of mind; pains in the joints and limbs resembling rheumatism; frequent sighing; nausea or vomiting; and noises in the ears.

486. The pulse, when *reaction* is developed, is full, open, quick, sharp, but soft and easily compressed. Respiration is laborious, suspirious, with oppression or anxiety at the præcordia and epigas-

trium. Burning heat is often felt internally, and on the surface of the trunk. When reaction is either imperfect, or does not take place, the pulse is slow, or not more frequent than usual, is weak and compressible, sometimes unequal or intermittent; and the temperature is little or not at all increased, or it is unnatural. The tongue is either loaded and furred, or flabby and covered with a dirty mucus. Thirst is generally urgent. The vascular excitement usually continues, in various grades, from six to eight days; and as it passes its acme, or about this period, purplish spots, of the size of flea-bites, and of various shades of deepness, appear upon the neck, breast, and insides of the arms and thighs. The pulse becomes more soft and weak; sometimes unequal and small. The tongue is more loaded, and of a darker colour. Thirst is diminished, or is not complained of; and the excretions present a very morbid appearance, and an offensive odour. To these are added dulness of all the senses, or delirium, alternating with stupor, difficulty of articulation, and often also of deglutition, leipothymia, faintness, and tremors. From the eleventh to the seventeenth day, but frequently earlier, the abdomen becomes tympanitic, if the disease proceeds *unfavourably*; the petechiæ are of a darker colour; vibices or blotches appear on the extremities; profuse fœtid perspirations break out without relief; the posture is constantly supine; parts pressed upon quickly sphacelate; the temperature sinks often below the natural standard; and the tongue is now black, fissured, or flabby, clean, dark red, or livid. Coma; subsultus tendinum; convulsions; hæmorrhage from the bowels; or exudations of a sanious fluid in the evacuations, or from the gums, lips, and nostrils; also take place towards the close.

487. A *favourable* change most frequently occurs from the ninth to the seventeenth day, and is indicated by profound sleep; by a warm, soft, and moderate perspiration; by turbid urine; by natural stools; and by a brighter colour, or disappearance, of the petechiæ.—The *duration* of this fever is seldom longer than twenty-one days; but it may terminate on any intermediate day between the sixth and twenty-fourth. A fatal issue occurs most frequently from the eighth to the fourteenth.—Towards the close of an epidemic, the usual course is often departed from; mild cases of short duration, and *relapses*, amongst these especially, being very common. When mercury has been given so as to affect the mouth, a crisis is prevented, and convalescence is protracted.

488. *B. Modifications.* — *a.* Such is the more usual course of the disease, particularly as observed in modern times. But it presents various grades of severity, and several modifications and complications. It is in some cases, even in the same epidemic, comparatively mild; yet presenting manifest signs of colliquation, or of a septic tendency, particularly as respects the state of vital power, the circulating fluids, and the appearance of the petechiæ. In others, the attack is violent from the commencement, and the symptoms intense; diminution of the vital cohesion of the tissues, and dissolution of the fluids, appearing early and proceeding rapidly. In many, the invasion is gradual, or much less tumultuous, than in these; the progress is more insidious, and the results are not less dangerous. In both, the body undergoes decomposition soon after death, and the rigidity usually observed *post mortem* does not take place.

489. *b.* When this fever is epidemic, petechiæ may appear as early as the third, fourth, or fifth day from the attack, in mild as well as in severe cases; and a white miliary eruption may break out at a late stage, particularly when the perspirations are copious. Yellowness of the skin, or purplish colour of the extremities, or enlargement and inflammation of the glands in the neck or groins, may occur in an advanced period. Pimples may also appear on the surface, and may be considered a favourable indication. Although delirium and insensibility generally follow the headach of the early stages, yet the mind may be serene and unaffected throughout—even to the moment of dissolution. In cases which present no distinct sign of invasion, nor of reaction, but proceed insensibly to a general colliquation of the fluids and solids, the excretions, both cutaneous and intestinal, are generally abundant and very offensive; the flow even of urine being sometimes excessive. The tongue is occasionally natural; or it is clean and raw-like; or as if streaked with blood, or with a bloody sanies. An aphthous state of it, and of the lips, is also sometimes remarked.

490. *c.* In persons who live fully and luxuriously, particularly if they have passed their thirtieth year, this fever often proceeds in an insidious but fatal manner. Such patients do not complain of pain, or of much uneasiness; although they are remarkably debilitated and depressed. Their manner is somewhat hurried, but their intellect is clear. The skin is greasy, and covered with dun petechiæ, sometimes intermingled with white miliary vesicles; its temperature is low; the countenance slightly suffused; the eyes glassy; the tongue sometimes loaded or crusted, or clean and moist; thirst is often absent, and the pulse but little accelerated. Convulsions are frequent; and a fatal termination often ensues, mostly before the fourteenth day.

491. *C. Complications*, similar to those already described, may take place in the early stages of this disease.—*a.* The *catarrhal*, *bronchial*, and *pulmonary complications* are most common in winter. When the bronchi and lungs are seriously implicated, the respiration is short, hurried, or laboured; cough is frequent; and the sputum is bloody, rusty, or consists of a dark, sanious matter, particularly in the latter stages. —*b.* The association with *cerebral affection* is very frequent, particularly in the strong and plethoric, and in persons whose minds have been much harassed previously to the attack. These latter seldom recover from it. In this state the headach is severe from the commencement; the eyes are injected or suffused; reaction is more or less energetic, and is often attended by epistaxis, which, however, is never critical. Delirium, insensibility, subsultus tendinum, &c., are common phenomena in the latter stages of unfavourable cases. —*c.* The *digestive canal* and *liver* are chiefly affected in summer and autumn; the fever assuming gastric and bilious characters at its commencement, with bilious vomitings, &c., but soon passing into the putrid state. The enteric and dysenteric states are also frequent, especially at later periods of the disease. The *enteric* is the most dangerous of the abdominal complications,

particularly when the petechiæ, or vibices, are of a dark, or deep purple colour; the abdomen tympanitic; and the stools are green, livid, or black, mixed with dark fluid or grumous blood. In these, fatal hæmorrhages sometimes occur. The dysenteric state may take place in mild as well as in severe cases, at an advanced stage; with severe gripings, and dark sanious, bloody, and mucous stools, which are very fœtid and infectious. The disease may thus pass into the adynamic form of dysentery. This change was common in the epidemics lately prevalent in Ireland. — *d.* The complication with inflammation of the *fauces* and *pharynx*, or with putrid sore throat, is sometimes observed, and is to be distinguished from primary *cynanche maligna*, by its occurrence in the course of the fever, or as a contingent affection (§ 479.).

492. The *sequelæ* of this fever are sometimes serious. They consist chiefly of dysentery, chronic diarrhœa, dropsies and œdematous swellings of the extremities, pulmonary consumption, hepatic obstructions, mania and other forms of insanity, abscesses in various parts of the body, sloughing sores, inflammation of veins, particularlyof those of the extremities, gangrene of the feet, rheumatic affections, &c. Most of these result in great measure from the changes that have taken place in the blood during the fever; these changes affecting the blood-vessels, and organs most susceptible of congestion. — *Relapses* are frequent in cases of short duration, and in those which have been apparently cut short by active treatment; and are generally more dangerous than the first attack. They are more common in males than in females; and towards the close of an epidemic, than at its commencement.

493. *D. Diagnosis, or the Changes which more especially constitute Malignancy or Putro-adynamia in Fevers.* — *a.* The *secretions*, next after the state of vital power, indicate incipient dissolution of the vital cohesion of the blood and soft tissues.—The *urine* has first a more viscid and albuminous appearance than usual. It is frothy, browner, and less transparent. If this pathological condition increases, the urine becomes brown, or dark brown, clouded, turbid, muddy, and often deposits a brown sediment. It quickly becomes putrid or offensive.—The *fæces* are fœtid, or have a putrid smell — are dark, fluid, ochrey, or contain blood.—The *sweat* is thick, clammy, sometimes cold, copious, and always offensive; and occasionally it imparts an ichorous stain to the linen. —The secretion poured into the mouth is a thick, viscid, slimy, dirty mucus, of a dark brown colour, that collects over the teeth, edges of the tongue, and lips.

494. *b.* The changes observed in the *vascular system* are — an open, broad, soft, compressible, undulating, or unequal, or a very quick, small, thready, and irregular pulse; a more than usually dark appearance of the superficial veins, or dark streaks in their course; and, at an advanced stage, exudations of dark, dissolved, or thin blood, or of a bloody sanies, from the outlets of canals, as the mouth, nostrils, anus, vagina, &c.—Blood taken from a vein, even previously to the occurrence of these signs, is very dark, thin, sometimes of a black purple hue; and either does not separate into coagulum and serum, or coagulates into a soft, pultaceous, or gelatinous mass, with imperfect separation of the serum. The fibrinous and albuminous constituents are deficient; and, owing to this circumstance, together with the want of vital power in the vascular system, the coagulum wants cohesion, the least agitation causing a partial admixture of red particles in the surrounding serum.—As the dissolution of the vital cohesion of the circulating fluids and softer solids proceeds, the colouring particles of the blood often fall to the bottom of the vessel, or of the gelatinous coagulum, leaving the upper stratum, and the surrounding serum, of various shades — sometimes of a greenish, purplish, or reddish hue. Langrish, Huxham, Fordyce, Hildenbrand, and others, have noticed a peculiar putrid odour of the blood when taken from a vein. (See Blood, § 110. *et seq.*). This fluid soon undergoes putrefaction after its removal from the body. It presents, however, various anomalies, in particular cases, or in some epidemics; but it seldom evinces very remarkable alterations, excepting as the grosser and more palpable results of anterior changes, which, although evidently of a most important kind, admit not of precise recognition; nor do those alterations occur until the symptoms indicate depression of constitutional power, imperfect assimilation of absorbed fluids, and lesion of the depurating functions. In connection with these changes, particularly those of the blood, the tonicity, or vital cohesion, of the extreme capillaries and softer solids are very much impaired, occasioning thereby further alterations. The functions of the cerebro-spinal nervous system are often more or less disordered, as in low nervous fevers; and the states of the mucous and cellular tissues, and of the skin, are remarkably altered. The cellular tissue becomes flaccid, softened, or less coherent, and consequently slightly tumid; and hence the bloated appearance in extreme cases; or cachectic fulness of the surface, in the most fatal states of the disease. The mucous tissue is discoloured; it exhibits a dirty brown, or grey, or livid hue, with black ecchymosed spots.

495. *c.* The *cutaneous surface* is at first merely dusky or lurid. But as vital power is further depressed, a bluish, marbled discolouration is sometimes observed in the shape of veins. *Petechiæ* of various depths of shade, from a lively or dark red, to a purplish or brown colour, appear principally upon parts usually covered by the clothes. They are either alone, or attended by the exanthematous eruption characterising the variety next to be noticed (§ 497.), or by dark or purplish spots of various sizes. In some cases, the skin, especially that of the extremities, becomes of a dark purple colour. When there is much heat of surface in the early stage of excitement, a caustic or morbid sensation is imparted, which increases whilst the hand remains in contact with it. When copious sweats follow, a white miliary eruption, intermingled with petechiæ, or vibices also, sometimes is observed. As the temperature is reduced, an unpleasant raw, cadaverous, or cold feeling is imparted to the hand of the examiner; and the petechiæ often become much darker, or more numerous, or aggregated, or almost confluent in some parts. In such cases, *passive hæmorrhages*, particularly from the bowels, are not uncommon; but they may also occur without much change in the skin. The

integuments readily sphacelate from slight injury, irritation, or pressure; and may even be the seat of sphacelating sores or carbuncles in extreme cases. — Enlargement or obstruction of the lymphatic glands, with a tendency to asthenic inflammation and disorganisation of the surrounding cellular tissue, is sometimes seen in the most malignant cases; but these changes take place most remarkably in *plague*, which has been considered by many able writers as a modification merely of this fever—the one disease running into the other. (See the article on that disease.)

496. As to the *causes* of, or pathological states giving rise to, the septic or putrid changes in the fluids and solids, observed more remarkably in some fevers than in others, even the most experienced writers are not agreed. There can be no doubt that these changes should be referred chiefly to the depressed state of organic nervous or vital power, and to the consequently imperfect functions of assimilation, excretion, and depuration, as insisted upon above (§ 102.), and in the article Blood. But the direct introduction of putrid animal or vegetable matter into the circulation, in considerable quantity, so as to depress the vital influence below the power either of salutary reaction or of excreting it through the emunctories, will so contaminate the whole mass of fluids, as to give rise to alterations and appearances very similar to those just described, and to many of the more intense symptoms previously noticed as depending chiefly upon the state of the cerebro-spinal system (§ 491.). The experiments made by Gaspard, Magendie, and others (see *Lond. Med. Repository*, vol. xvii.), have proved this fact; but changes quite as malignant, as in the fever now being considered, and in plague and yellow fever, take place without any very manifest or demonstrable source whence they could have proceeded. In such cases, numerous facts and circumstances concur in showing that a morbid seminium—an infectious miasm—proceeds from the bodies of those already affected, and, through the medium of the inspired air, contaminates the blood as it circulates in the lungs, and affects the organic nervous influence. It may also be admitted, that miasms proceeding from animal and vegetable matter in a state of decay—from a number of persons breathing the same atmosphere—from those shut up in close, warm, and ill-ventilated places—will produce a similar effect, and generate a malignant fever *de novo*, which will be capable of propagating itself by means of the emanations evolved in its course.

iv. Typhus. Syn. — *True Typhus; Nervous Fever with exanthematous Eruption; Contagious Typhus; Febris nervosa epidemica; F. nervosa exanthematica; F. maligna cum sopore*, Rivière; *F. Contagiosa; F. nervosa petechialis; F. pestilentialis Europæ; Typhus Contagiosus exanthematicus*, Hildenbrand; *T. Castrensis*, Boerhaave; *T. Gravior*, Cullen; *T. nostras, T. Europæus; T. Communis, T. Bellicus; T. Contagiosus*, Naumann; *T. Exanthematicus; Pestis Bellica; Der Ansteckende Typhus, Das Ansteckendefieber, Das Exanthematische Nervenfieber*, Germ.; *Die Kriegspest*, Hufeland; *Das Fleckfieber*, Reuss; *Typhus Contagieux, Fièvre d'Hôpital*, Fr.; *Fièvre adynamique ataxique*, Pinel; *Tifo Contagioso*, Ital.

497. This fever is *characterised* by phenomena which distinguish it from the foregoing varieties; — *by catarrhal and gastric symptoms early in the disease; by stupor, delirium, or typhomania; by a peculiar cutaneous eruption; by more or less evident affection of the liver; and by the determinate course and regular succession of all the febrile changes.*

498. *True or contagious typhus* has been confounded with *synochoid* and *nervous fevers*, on the one hand, and with *putrid* or *malignant fever*, on the other. It has been already stated, that putridity or malignancy not only may characterise a particular form of fever or certain epidemics, even at an early period of their course; but also, owing to various contingencies, may take place in advanced stages of any other fever. As the circumstances favouring the generation and spread of typhus are often such as also tend to develope those changes which have been usually named putrid or malignant, and as these changes are frequently observed in the latter stages of typhus — the symptoms distinguishing this fever becoming associated with, or followed by, those indicating the putro-adynamic state — so has it been often confounded with other fevers, in which this state has predominated more or less. If we refer to the numerous histories of epidemic typhus recorded by writers from the close of the fifteenth century up to the present time, or even to the brief abstracts furnished by M. Ozanam (*Hist. Méd. des Maladies Epidémiques, &c.* t. iv. p. 155. *et seq.*), we shall find, that although many of these, owing to the concurrence of circumstances developing a putrid or malignant disease, were instances of fever, either identical with, or very closely resembling, that which I have described as such in the preceding section; yet many others — or even the majority — were true typhus in which the putro-adynamic state was either early or prominently developed; the exanthematous eruption characteristic of typhus being succeeded or accompanied by the petechiæ indicating the approach of the septic condition, and being either mistaken for them, or for an eruption of miliaria. Owing to this circumstance especially, typhus, low nervous, and putrid fevers have been very generally confounded together. The essential characters of typhus were first distinctly traced by Sauvages; but Cullen mixed them up with the symptoms of those forms of low nervous or typhoid fever which occur sporadically. Even among modern writers, comparatively few have made the distinction, excepting Hildenbrand, Fodéré, Naumann, Peebles, and some others. True or contagious typhus has not been epidemic in England for many years; or, if it have appeared in a few places, it has not extended beyond them. In Ireland, however, it was extensively prevalent, particularly in the years 1817, 1818, and 1819; and in some parts of Scotland since that time. The fevers most commonly observed in England, and particularly in London, have been either synochoid, simple, or complicated; or low nervous fever variously associated, and but rarely displaying a predominance of putrid or septic characters.

499. True typhus, although prone to assume a septic condition, especially when epidemic, and appearing under the unfavourable circumstances about to be noticed, yet may run its whole course

without petechiæ or any marked putrid symptom. It may, as shown by Hildenbrand, be simple, or variously complicated; and, as remarked by Dr. Peebles, it may be benign throughout, or assume a malignant character, according to individual diathesis, the nature of the prevailing epidemic, or the mode of treatment. It generally presents itself as an epidemic, is contagious, and runs a uniform course, unless predominant affection of some internal organ modifies its course or prolongs its duration.

500. It has been shown above, that the *petechial affection* consists of minute stains or ecchymoses, caused by the transudation of blood from the minute capillaries of the vascular *rete* of the skin, owing to the atony of these vessels, and the alteration of the blood; that it may occur in the advanced stage of any fever, even of the more inflammatory or purely eruptive, when converted into an adynamic or typhoid state, by improper treatment or the peculiar condition of the patient; and that it is not, in any sense of the word, an *eruption*, as it has been very improperly denominated by some writers. This change in the skin, which has been viewed as one of the chief indications of incipient putridity, or of a septic tendency, is very different from the eruption characterising typhus. The *petechiæ*, or cutaneous ecchymoses, vary in dimensions from minute *stigmata* to large patches or *vibices*, and in the deepness or shade of colour. They very rarely appear at the commencement, even of the more putrid or malignant fevers, unless from peculiar depravity of constitution, or from causes affecting more especially the circulating fluids — as imperfect nourishment, unwholesome food, or other injurious ingesta.

501. But the *exanthematous eruption* attending true typhus, is as characteristic of it as the eruptions of measles or of scarlatina; and, although observed by numerous writers, it has been confounded with petechiæ, with which it is often associated in the advanced stages of the fever, or with miliary eruptions. — Hildenbrand gave a description of it, as it appeared in the contagious fevers prevalent in Germany during the commencement of the present century; and Dr. Peebles has recently described it accurately and minutely, and as he saw it in Italy soon after the war. His description agrees with my own observations about the same period. This eruption appears in the early progress of a fever produced by human effluvia, when circumstances occur to promote them, or to prevent their dissipation. The animal miasm, whether generated by numbers crowded in a small space and confined air, or proceeding from a person affected by the disease, should be viewed as a poison, affecting the human body in a specific manner, and causing fever with an eruption of a certain form, which propagates itself by the diffusion of a morbid effluvium in the surrounding air, or by its retention in various animal productions or porous substances when shut up from the air.

502. This eruption usually appears from the third to the seventh day of the fever, but it may be delayed till the twelfth or fourteenth day. It is of a florid, reddish ,or reddish pink colour; disappearing on pressure, but soon returning when pressure is removed. This circumstance is sufficient to distinguish it from petechiæ. The more exuberant resembles the measles, and has been mistaken for them; but it is more papillar, and rougher to the touch, being sensibly elevated to the eye; and, although sometimes grouped or crowded, it does not coalesce so much as measles, but each papilla is more or less separate. It is sometimes vesicular, and followed by desquamation of the cuticle. It is occasionally indistinct, and may be then overlooked, and it sometimes approaches more nearly the miliary eruption. Hence it has been mistaken for this eruption in such cases. It is generally confined to the trunk of the body, the arms, and thighs; but it may cover nearly all the body. It rarely extends over the face or hands. In children, it appears only upon the trunk, or parts of it, and often scantily. It is sometimes evanescent, disappearing in one part of the day and returning in another (Peebles). It may be copious in some cases, and scanty in others, even in the same family. Owing to these circumstances, it may escape observation. It is not liable to recede early in its course; but if it disappear from injudicious treatment, or a faulty state of the system, malignant symptoms are apt to supervene.

503. In some cases, the interstices of the skin between the papillæ are red or erythematous. In these, there are also increased suffusion of the eyes, redness of the tongue at the point and edges, redness of the fauces, as in mild scarlatina, and subsequent desquamation of the cuticle. The *duration* of this eruption is from three to five days. When the exantheme is slight, it disappears without leaving discernible marks; but when it is exuberant, stains are left in the situation of the papillæ. If petechiæ occur in this fever, they seldom are observed before the eighth or tenth day, and then this eruption has usually disappeared. When the petechiæ are earlier, or the eruption continues longer, so that both exist together, they are quite distinct and different in their appearances; for the latter is never so dark or livid as the former generally is, and the petechiæ are not attended by the elevation of the cuticle and roughness characterising the eruption. The stains left by an exuberant eruption generally become livid when petechiæ are present; but the eruption itself does not assume a dark tint, as long as it retains its papillar form. In the most malignant cases, and when petechiæ appear early in the disease, the colour of the eruption may, however, become deeper, or may change with the alteration in the fluids and softer solids.

504. *A.* Description.—True typhus proceeds in a more regular and determinate manner than synochoid or nervous fevers; and presents the several stages into which I divided fever, when treating of it generally. The *premonitory stage* exhibits the same symptoms as are observed to announce other fevers, and varies much in duration. Hildenbrand states from three to seven days; but a much longer time may elapse from the time of infection to the occurrence of the *stage of invasion*. This period is the commencement of the febrile paroxysms. It begins with a creeping sensation over the head and back, followed by shiverings, paleness of the surface, the cutis anserina, intervening flushes of heat, heaviness or giddiness of the head, and the usual symptoms of this stage. After a few hours — seldom more than twelve — the *stage of reaction*—the *inflammatory* of Hilden-

BRAND, the *irritative inflammatory* of GOEDEN—appears. The pulse becomes full, strong, or oppressed; the countenance flushed; the skin hot and turgid; the head confused, heavy, or giddy; and the urine scanty and high-coloured. With these are associated catarrhal or gastric symptoms. —On the second day of this stage, after a sleepless and restless night, the heat increases, while the vomiting and sometimes the nausea disappear. The weight in the head changes to stupor, often with *tinnitus aurium;* giddiness is augmented, and the upright posture cannot be borne. The catarrhal affection is more developed: the eyes are red; the mucous membrane of the nose and fauces is tumid and red; deglutition is painful; tightness is felt in the chest, often with cough; and both hypochondria are tense and painful. The patient is averse from exertion, tardy in his answers, silent as to his complaint, and slow in protruding his tongue. These symptoms continue during the third and fourth days. On the latter of these, an exacerbation takes place, usually followed by a moderate epistaxis, excepting in the milder cases, and generally with relief of the affection of the head. From the third to the sixth day, but sometimes later, the surface of the body becomes turgid and the eruption appears. During the fifth, sixth, and seventh days, the symptoms are unchanged, excepting that the catarrhal affection commonly ceases with the appearance of the eruption. On the seventh day, an evident exacerbation takes place, followed by a slight remission of a few hours, and introduces a new stage.

505. The *nervous stage*—the *status nervosus* of HILDENBRAND—begins with the eighth day from the occurrence of rigors. The heat of the surface is now considerably increased, but the turgidity disappears. The epidermis is dry, shrivelled, and brittle; but petechiæ or miliaria are frequently present, and either appear in the latter part of the preceding stage, or early in this. The tongue, which was at first clean, and subsequently white, rather than loaded or furred, now becomes parched and shrunk. Thirst is increased; but the torpor is often so great that the patient does not ask for drink. The tightness of the chest goes off, and the breathing is freer, but more frequent. The cough ceases, and is often replaced by singultus. Swallowing is impeded, chiefly owing to the dryness of the fauces and pharynx. The bowels now assume activity—predominant action being determined to them in place of the skin. Repeated, loose, fœtid stools occur, attended by slight pains in the bowels, and by flatulent distension of the abdomen, evidently owing to increased vascular action. The pulse is variable; it generally continues full, free, not very frequent, nor small or soft; and it often indicates imperfect reaction or contraction after the heart's impulse, or seems to be in a state of constant expansion. The most prominent, however, of the symptoms in this stage are those referrible to the sensorium. In the preceding stage, the external senses are impaired, and the ideas confused. There are sleeplessness, restlessness, and some involuntary motions. These are all aggravated or modified in this period. Muscular power is suppressed by the general torpor of the nervous system, rather than by debility, as in a state of intoxication; but the involuntary motions, such as tremors, subsultus tendinum, slight convulsions, or spasmodic affections, are increased. Difficulty of deglutition, and of evacuating the urine, is more common; deafness is increased; vision is impaired; and smell and taste are lost. The patient dreams without being asleep (*typhomania*), talks deliriously, is occupied with his internal impressions, and disregards or is unimpressed by external objects, or confounds internal and external perceptions. A single idea or impression usually torments the patient during the fever, and on recovery there is seldom any recollection of it. This state closely resembles somnambulism. With insensibility to external objects, there is complete loss of the appetites and desires; the patient wishes and feels nothing; and replies, when roused, that he is very well. This stupor, in various degrees, with the supine posture, at once announces the form of the disease. The foregoing symptoms continue during the ninth and tenth days. On the evening of the latter day, a stronger evening exacerbation than usual occurs, and lasts for a few hours; and a gentle perspiration, or some evacuation by stool or urine, takes place. A slight remission follows on the eleventh day; but on the twelfth and thirteenth, febrile heat, and the affection of the nervous system, are again increased.

506. The *period of crisis* now generally succeeds, and without any assistance from art. At the end of the thirteenth day, a more severe exacerbation than any former one takes place; the heat is more glowing; the arteries pulsate more strongly; the brain is more affected; and the stupor passes into sopor. In twelve hours afterwards, and on the fourteenth day, the parched skin shows a tendency to perspiration. In some, a slight epistaxis occurs, with relief to the head; the nostrils become moist; the tongue at the point and edges moist, clean, and red; and perspiration more copious and general. A free expectoration often takes place, especially if the chest has been affected. When the perspiration is salutary, it is uniform, not clammy, has a peculiar smell, and occurs during sleep. The stools are now copious, loose, and offensive; and the urine plentiful, muddy, high-coloured, and deposits a copious sediment. With these changes, or in a few hours afterwards, the patient seems as if he had awakened from a dream, or from a state of intoxication; and, with a return of complete consciousness, all the severe symptoms abate. A sense of fatigue and weakness, soreness of the whole body, pale hollow countenance, giddiness, deafness, and *tinnitus aurium*, drowsiness, or frequent inclination to sleep, tendency to perspire, quick pulse, and acceleration of it upon slight irritation or exertion, unnatural taste in the mouth, whitish tongue, &c., remain for six or seven days after the crisis—these symptoms gradually disappearing, the tinnitus aurium last of all.

507. *B. Modifications* and *complications.*—As in exanthematous fevers, so in this, variations from the regular type, both in the symptoms and in their course, are apt to occur, owing—1st, to the age, habit of body, previous health, and temperament of the patient; 2dly, to the prevailing epidemic constitution, whether inflammatory, bilious, or tending to the periodic type; and, 3dly, to the living, diet, and treatment, and to the unfavourable circumstances to which the patient is ex-

posed.—*a*. The *anomalous phenomena* observed in the *stage of invasion*, are few. The shivering may be so slight as hardly to be observed, the fever seeming to begin at once with increased heat; or the rigors may last or return at intervals during some days.—In the *period of reaction*, the modifications are often more numerous and striking. The inflammatory character of this stage is often greatly increased; sometimes as respects the violence of the general symptoms, but at others with severe local affection. When the *head* is the seat of prominent action, the delirium may be phrenitic, maniacal, or the stupor may amount to apoplectic sopor. Inflammation may take place, either in the *lungs*, or in the *liver*, or in the *digestive mucous surface*, and be so fully developed as to resemble idiopathic disease of these viscera, if the previous fever, stupor, tinnitus aurium, and peculiar eruption, did not establish the difference between them.—*Bilio-gastric* affection, also, may be so prominent as to simulate that form of fever. But the stupor and typhomania will assist the diagnosis, should the eruption be so slight as to escape observation. The *nervous* character may show itself prematurely; especially when the vital powers are weak, depressed, or speedily exhausted. In these, *septic* or *malignant* symptoms may occur. In some cases, the inflammatory stage may continue to the ninth or even to the eleventh day.

508. *b*. In the *nervous stage*, various modifications are also observed. Local affections may continue through the greater part of this stage, or may even first appear in it; particularly those seated in the intestines, and implicating especially the mucous follicles. Diarrhœa, or typhoid dysentery, may thus supervene, and be either slight, severe, or fatal. The former of these affections is caused by vascular determination to the intestinal mucous surface, consequent upon the subsidence of the eruption, and by the unhealthy bile secreted by the irritated liver from the impure blood circulating in it. The dysenteric symptoms are owing to the morbid action going on in the lower part of the ileum, in the cæcum, and large bowels. Lumbrici are sometimes passed. But the principal and most frequent variations consist in the appearance of numerous *petechiæ* and vibices, or in their increase or deeper hue, if they had previously been observed, with several other putro-adynamic changes. In these, the nervous symptoms may not be more remarkable than in milder cases; or these symptoms may be very prominent, either with or without the occurrence or aggravation of the malignant or septic state. Miliary eruptions may also appear in this stage. In the more unfavourable cases, the tongue may be shrunk like a piece of burnt leather, the heat of surface excessive, the diarrhœa exhausting, the distension of the abdomen great, and pains in the bowels severe. Muscæ volitantes, picking of the bed-clothes, constant muttering, spasmodic affections, stiffness or cramps of the extremities, paralysis of the eyelids or tongue, horror at liquids, may also occur. A black coating of the tongue and teeth; fœtor of the breath, stools, and of the body; dark petechiæ or vibices; ecchymoses or bluish patches; passive hæmorrhages, and even carbuncles, may appear during this stage, particularly when circumstances concur to produce putrid or septic changes in the course of the fever. These severe cases, if they are not fatal before the fourteenth day, often run on to the seventeenth, twenty-first, or twenty-eighth day, and generally end in death.

509. *c*. Sometimes the *precrisis* on the seventh day either does not take place, or is not followed by any alleviation, or is attended by aggravation of the symptoms. If a decisive *crisis* take not place on the fourteenth day, it rarely happens till the twenty-first; a crisis between these days being seldom effective. When death occurs, the fatal change is either premature or procrastinated. The symptoms accompanying a crisis are often variable. Changes in the urine cannot be depended upon. Discharges from the bowels are often copious, without benefit; and if they continue so without alleviation of the symptoms, or are unnatural, ulceration of the intestinal mucous surface may be dreaded. A critical sweat is sometimes wanting, the patient recovering nevertheless.

510. *d*. The *decline* of the disease may be protracted, but never shortened; and attended by various symptoms, as a continuation of the stupor, nightly recurrence of delirium, or lingering affections of some one of the thoracic or abdominal viscera. A new disease, of an inflammatory kind, may occur during the stages of decline and convalescence, or tubercular consumption may supervene; and *relapses* are not infrequent in the latter period, owing to a fresh infection.—*Recovery* may be *retarded* by the severity of the complications, by want of sleep, by errors in regimen, and by the depressing passions.

511. *e*. The foregoing modifications refer entirely to aggravating circumstances; but some cases are so slight, that the patient scarcely keeps his bed—a trifling degree of stupor, with scanty eruption, and occasional pains in the bowels, constituting the chief complaint. In the more benign cases, a decisive crisis occasionally takes place as early as the eleventh, or even the ninth, day; but *relapses* are liable to follow, if the patient be exposed to a re-infection.

512. v. PROGNOSIS OF TYPHOID FEVERS. The prognosis will be influenced by the appearance of any of those phenomena to which attention has been directed above (§ 434.). But in addition to these, the practitioner will take into the account the previous condition, the *age*, and the sex of the patient; the nature of the prevailing epidemic; and the influences continuing to operate during treatment. As to the manner in which *age* should affect the prognosis, from the beginning, some very interesting facts have been adduced by Dr. ALISON, who has given the following table in illustration of the comparative prevalence and mortality of typhus at different ages, as observed in his practice:—

	Cases.	*Deaths.*	*Proportions.*
Under 15 years	83	2	1 in 41½
15 to 30	149	11	1 in 13½
30 to 50	93	17	1 in 5½
Above 50	17	7	1 in 2⅖
Total	342	37	1 in 9⅕

Of these 342, there were 170 cases of simple or mild typhus, in which only three deaths occurred; 79 cases presenting prominent affection of the head, and in these 21 were fatal; 58 cases with affection of the pulmonary organs, in which 13 were fatal; and 35 with abdominal affection, in which only 1 death occurred. — From these, as well as from other data and facts, which have come before every experienced physician, it may be inferred that the mortality from this fever increases in an accelerating ratio with the advance in age and predominant affection of internal vital organs. It is very probable that the great increase in deaths at an advanced age proceeds from the circumstance of the powers of life being then less able to resist the changes and tendency to death that take place in the course of the disease, and the contamination of the fluids and soft solids; and from certain internal organs having then become highly predisposed to serious functional and organic lesions.

513. Typhus is seldom dangerous to children, in any class of society, although they are often attacked when the disease is epidemic. In the upper ranks, and in those accustomed to live fully and luxuriously, it is very fatal, and generally assumes highly inflammatory states in the early stages, or septic changes at a later period. In the epidemic in Ireland, during 1817, 1818, and 1819, from one fourth to one half of those in good circumstances, who were infected, died. Of twelve physicians who were actively engaged in the treatment of this fever in Cork, eleven were seized with it, and four died. It is less fatal to females than to males; but pregnant women frequently miscarry when they are attacked. Very few *negroes* recover from it. Persons whose minds have been much harassed previously to infection, are in the greatest danger. The putro-adynamic form, and, next to it, the low nervous, are most dangerous, of typhoid fevers.

514. vi. CAUSES. — The chief cause of true typhus has been already stated to be an animal miasm, generated either by a number of persons confined in a close air, or by the disease itself. This miasm contaminates the air, and infects the healthy frame through the respiratory organs — either directly as it proceeds from the morbid source, or indirectly by means of substances capable of retaining it for a time, and of giving it out upon exposure to the air. The causes *predisposing* to, or counteracting, infection, are deserving of a brief notice. Infants and old persons are the least susceptible. Adults, of delicate habits and melancholy disposition, and those who dread infection, are most liable to be attacked. Insufficient or unwholesome nourishment, personal or domestic filth, and bodily fatigue or mental distress, are very influential concurring causes. Persons of a lively disposition, those who use tobacco, and who have no fear of the disease, most frequently escape. Chronic diseases, particularly those of the lungs, ulcers, and external sores or eruptions, are very often preventives. HILDENBRAND states, that, in his very extensive experience, he never saw a consumptive patient contract the disease. A regular and fully developed attack seems to prevent a second, for many years afterwards, if not for ever.

515. Although animal or infectious miasms will occasion the low nervous and putro-adynamic fevers, yet they arise also from other causes, as shown above (§ 468. 485.). The latter not only may be consequent upon other forms of fever; but it also may proceed directly from terrestrial exhalations, or from animo-vegetable matter, decaying in a warm close air, or from a combination of causes both internal or intrinsic, and external as respects the patient.

516. vii. TERMINATIONS and ORGANIC LESIONS. — True typhus terminates in recovery, in the great majority of cases — in about nine out of ten — even when left to nature. Medical treatment, if not very judiciously directed, may be as injurious as beneficial, by interrupting the regular succession of morbid phenomena, and preventing those changes from taking place that are conducive to recovery. An officious interference may thus be mischievous, particularly when the disease is regular or moderate, and no vital organ is very severely affected. Medical treatment will not shorten the disease; we can only expect to conduct it to a successful issue, by protecting internal organs from injury, when they experience the onus of morbid action, and by resisting the tendency to death, in the last stages. — *A.* When typhus ends in *death*, disorganisation of some important viscus, the exhaustion of vital power or of irritability, and deterioration of the fluids, are the immediate causes — each in various grades; for this event cannot be ascribed to one solely, although either may be chiefly concerned in producing it. — When debility or exhausted irritability, the state of the blood, or lesions of the intestines, cause this termination, the stupor and delirium generally cease, and the patient recovers his consciousness just before death. — Upon *dissection*, in these cases, no morbid appearances, beyond slight congestion, or a somewhat increased quantity of fluid in the ventricles or at the base of the brain, are observed within the cranium; the digestive mucous surface, and the blood in the large vessels and cavities of the heart, being most altered. When death is produced by inflammation of the brain, or of its membranes, during the stage of reaction, or by simple or inflammatory congestion, in this or the subsequent stage, symptoms of an irritated or inflammatory state of the brain, passing more or less rapidly into apoplectic sopor, precede the fatal issue. In these, the blood-vessels of the brain and membranes are engorged, sometimes with extravasation of serum, or of sanguineous serum, or more rarely of blood. The patient sometimes dies soon after a critical exacerbation, from the sudden occurrence of the apoplectic state. In this case, the brain is only slightly congested, with little or no effusion of fluid. In those who die with cerebral affection in an advanced period of the disease, collections of serous fluid in the ventricles, and between the membranes of the brain, are frequently found. Abscesses in the substance of the brain are met with in rare instances. HILDENBRAND considers *nervous apoplexy* to be the most frequent cause of death in typhus. This only occurs in the latter days of the disease, preceded by the symptoms of the nervous stage, a fatal result taking place suddenly. As it usually happens on critical days, it may arise from the exacerbation, which then occurs, wholly exhausting the nervous powers; particularly as no morbid appearances, at all adequate to account for death, are observed on dissection. It differs but little from death by debility, excepting that the latter mode takes place gradually and slowly.

517. M. CHOMEL gives the following as the results of a very careful inspection of the encephalon in 38 cases: — Injection of the membranes,

in 4; œdema of the membranes, in 7; very slight general softening of the brain, in 6; effusion of serum in the ventricles, varying from a drachm to half an ounce, in 12; numerous red points upon dividing the cerebral substance, in 5; increased density of this substance, in 2; and the normal condition, in 15.

518. *a*. A fatal issue is evidently caused, or accelerated, in some cases, by the severity of the associated disease of the respiratory organs, preventing the necessary changes from being effected in the blood circulating in the lungs. It proceeds in others chiefly from the influence of the morbid blood upon the weakened irritability of contractile tissues, and particularly of the heart; and, in rare instances, from perforation of the intestines inducing general peritonitis, which soon exhausts the remaining powers of life. The lesions of the digestive mucous surface evidently assist in producing this effect; but in a much less degree than the depression of organic nervous power and of irritability, and the deteriorated state of the blood, with which they are intimately connected, and of which they are important effects. All these internal lesions evidently commence in the course, or even not until the advanced stages, of the disease; and, when developed, are analogous to the sphacelated sores and other alterations which take place in external parts in the more malignant cases. These internal as well as external lesions depend upon the anterior changes in the organic nervous power and irritability, and in the blood; they present similar characters; and, where even the slighter external lesions are observed, the existence or occurrence of those that are internal is to be feared. The most constant of these latter are discolouration and diminished cohesion of the intestinal tunics, distension of the intestinal tube by flatus, and enlargement and ulceration of the follicles, with inflammation or engorgement of the mesenteric glands. There are various other lesions associated with those; but they are different in different cases.

519. *b*. Since Petit and Bretonneau directed attention to the almost constant change in the *intestinal mucous follicles* in typhoid fever, the subject has been further illustrated by the researches of Louis, Andral, Bright, Chomel, and others. But, although this lesion is so constant in the low fevers occurring in Paris and some other parts of France, it is certainly not so frequent in the same states of fever in this country; and, instead of viewing it as intimately connected with the nature of these fevers, I consider it as only one of several changes superinduced in the progress of the disease, but one of the most constant and important. The first alteration which these follicles present is enlargement or engorgement, owing to the formation under the mucous coat of a yellowish-white matter, slightly friable, which imparts to the agminated follicles the appearance of a thickened patch, and to the isolated follicles that of a pustule. To this state, which is generally preserved till the twelfth or fifteenth day, succeeds, in most cases, ulceration, beginning either in the mucous surface and extending to the whitish matter, or in this latter, which becomes softened and detaches the mucous coat from the parts underneath. These grades of lesion in the follicles almost constantly commence in those nearest the ileo-cæcal valve. From the eighth to the fifteenth or twentieth day, the agminated patches, which have not experienced the above changes, present a reticulated appearance; their mucous covering being of a deeper colour than natural, softened, partially detached, and perforated by numerous orifices of enlarged follicles. In proportion as these patches disappear by ulceration, or by sphacelation, the margins of the ulcers become either more level, evincing a disposition to cicatrization, or more elevated, owing to thickening of the submucous and muscular tunics. The ulceration generally extends in width and depth, and successively invades the submucous, muscular, and serous coats; ending at last in perforation; but death most frequently takes place before this last change occurs. Evidence of cicatrization is, in rare instances, observed, when the disease has been of long duration. Ulceration does not attack all the patches containing the enlarged glands; for resolution sometimes takes place, or absorption of the matter they contained.

520. *c*. The *mouth tongue*, and *pharynx* are frequently covered with a thick mucus, underneath which the mucous coat is often not manifestly altered. But in some cases, this coat is softened, discoloured, and studded with a few small round or oval ulcers, most of them not referrible to the follicles. The *œsophagus* occasionally is excoriated or slightly ulcerated. The *stomach* is variously *coloured* in its internal surface. It is sometimes pale, most frequently red in various grades, or purplish or brownish red, occasionally yellowish; and often the parts of the organ in contact with the liver and spleen have imbibed the colour of these viscera. — *Softening*, or diminished cohesion, of the mucous and submucous tissues, throughout the greatest part of the large curvature, or even the whole of the stomach, is observed in a large proportion of cases. The softening seldom extends to all the coats. Sometimes the mucous tunic is not only softened, but entirely destroyed, the cellular tissue or the muscular coat being denuded. It is generally easily detached from the subjacent parts. M. Chomel found, of forty-two cases, more or less extensive softening in fourteen. He remarks, that he observed softening of the internal coats of the stomach in the same proportion of fatal cases from small-pox.—*Thickening*, and great *tenuity* of the mucous coat, have also been seen but not so frequently as softening. Although M. Louis met with ulceration of the mucous membrane of the stomach in four cases, and M. Andral in ten, yet M. Chomel did not find one instance in the forty-two inspections, of which he has given the details.

521. *d*. The *duodenum* and *jejunum* have occasionally imbibed the colour of the bile or of adjoining viscera. They are generally of a deeper red than the rest of the intestines. The *ileum* is usually more or less red, with numerous arborisations on the external surface; but more frequently the redness is seated chiefly in the mucous coat, and particularly in the margins of the valvulæ conniventes. In many cases, the redness is disposed in zones, between which the three coats of the intestine present a remarkable pallor. The redness and injection are not greater around the ulcerations and tumid patches of agminated follicles, than in other parts. Alterations of colour are not so common in the *large*, as in the *small*

intestines, the former presenting chiefly reddish or reddish brown patches, or ecchymosed spots. *Softening* of the mucous surface of the intestines, in the situation of the agminated follicles, or in the intervals between them, is seldom very great; the subjacent cellular tissue more frequently and decidedly presents this change. *Induration* is never observed in the digestive canal after typhoid fevers. In several cases, the mucous coat is remarkably *tumid* or thickened, presenting a gelatinous aspect, and various shades of colour from a bright red to a reddish black. This change varies in extent from two or three inches to as many feet, but is quite continuous, extending around the intestine. It is most frequently found in the ileum, but it may occur in any part of the small or large bowels. It arises from the infiltration of fluid blood into the mucous and submucous tissues; for, upon pressing the part, the blood exudes through the pores, leaving the mucous coat almost in its natural state. M. CHOMEL observed this lesion in seven out of forty-two cases, and in all these there was hæmorrhage, either from the bowels, or into them. He also remarked it in other diseases, wherein intestinal hæmorrhage had occurred before death.

522. *e.* The *mesenteric glands* are very generally more or less changed, especially in connection with intestinal ulcerations. They are frequently only enlarged, sometimes softened, and occasionally both enlarged and indurated. In some instances, puriform matter may be traced in the sanious blood which they contain. They are usually only enlarged or indurated, or sometimes injected, in fatal cases which have not been of long duration. M. CHOMEL gives the following as the results in the 42 cases examined by him: — Enlargement, with commencing softening and suppuration in 14 cases, dead from the seventh to the twenty-fifth day of the disease; marked softening in 12, dead from the tenth to the thirty-sixth day; redness, enlargement, and induration in 10, who died after the nineteenth day; slight enlargement, with a bluish, purplish, and blackish discolouration, in 3 cases, dead after the seventeenth day.

523. It would seem that the mesenteric glands experience an analogous change to that of the follicles; that they become enlarged and softened about the same period as the follicles; and that, if the disease takes a favourable turn, they are gradually diminished, and assume their natural state. Suppuration is seldom observed in them, and ulceration never. The glands nearest the cæcum are those chiefly affected; and this is the part in which the follicles are most frequently and early diseased. M. CHOMEL does not think that ulceration of the follicles is the cause of the suppuration of the glands, as the latter may exist without the former. — I believe that softening of the mesenteric glands, with traces of puriform matter in them, may take place without any necessary dependence upon ulceration of the follicles.

524. *f.* The lesions observed in the other abdominal viscera are seldom such as materially to influence the termination of typhoid fevers. The *liver* is frequently more or less softened. M. LOUIS found this alteration in nearly one half of the fatal cases he examined. It is generally associated with softening of other organs, especially of the *spleen*. This viscus is enlarged in most of the fatal cases; in one half it is increased to about double its usual volume, or upwards. It is always also softened—sometimes very remarkably so. The alterations of these organs seem to have little or no influence upon the symptoms during life. The same may be said of the lesions of the mesenteric glands. Even the ulcerations found in the intestines have no determinate relation to the phenomena referrible to the digestive canal. Diarrhœa is not a uniform result of this lesion; and pain is seldom complained of unless at an early stage, or until the peritoneal tunic is perforated. The ochrey appearance of the stools, noticed by Dr. BRIGHT, cannot be depended upon as an indication of this alteration; and meteorismus, or a tympanitic state of the abdomen, although often attending it, indicates chiefly extreme depression of vital power, evinced especially in the weakened irritability or tonicity of the intestinal tunics, throughout the whole tube, rendering them incapable of resisting the accumulation of flatus. Many of the symptoms referred, by Continental writers, to organic lesions of the bowels, originating either in inflammation, or irritation, are inseparable from the typhoid states of fever, and are the expression of the disease on the whole œconomy, rather than on this part of it in particular. That the affection of the digestive mucous surface and follicles is greater in some epidemics and countries than in others, and in large cities than in towns or country places, I am convinced from observation and the researches of modern pathologists. That it is more common in France, especially in Paris, than in England, is evident from the results of recent inquiries. Actual ulceration was found in *La Charité* by M. ANDRAL, in 92 cases out of 229 examinations; and only in 16 out of 54, by Dr. TWEEDIE in the fever hospital. The proportions, although different, show the frequency and importance of the lesion, and the necessity of guarding against its occurrence in the course of the disease. But the above changes of the intestines and mesenteric glands are not confined to typhoid fevers. They often take place in other fevers, whether bilious or gastric, mucous, synochoid, &c., particularly when these fevers lapse into a putrid or typhoid state in their advanced stages. Their frequent occurrence also in hectic is well known; and I believe that they would have been found still more frequently in all fevers, both continued and remittent, if the intestinal canal had been more generally inspected in that way in which only it can be said to be inspected, namely, by laying it open throughout its whole extent. That it has been very imperfectly examined in most epidemics, is evident, from the descriptions furnished of the morbid appearances, and from the circumstance of it having been very generally overlooked as late as the epidemics described by HILDENBRAND and others early in this century; and, although occasionally inspected by some of the writers upon the epidemic of Ireland, in 1817, 1818, and 1819, it was not until after the researches of BROUSSAIS, PETIT, BRETONNEAU, ANDRAL, and LOUIS, that attention has been generally directed to it. Making every allowance for the undue importance assigned to the lesions observed in this situation, the propriety of estimating them correctly, as to their origin and consequences, must be conceded.

525. *g*. The importance of the lesions observed in the *respiratory organs* has been alluded to. The *epiglottis* has been sometimes seen œdematous. M. CHOMEL found it ulcerated, with denudation of the cartilages, in three cases out of twenty which were carefully inspected. The *larynx*, especially its superior aperture, is occasionally also the seat of ulceration. When ulceration is observed in either of these situations, it often also exists in the *pharynx*, in which it seems often to have begun; and it is generally found to consist of several small but deep ulcers, commencing in the form of pustules filled with whitish purulent matter, but without any surrounding injection, or inflammatory circle. — The *lungs* are often much diseased; but the alterations of them most frequently seen, occur only during the last days of life; and are referrible to the predominance of physical, over the vital, forces, as the disease approaches a fatal issue. But as congestion of the circulating fluids occurs in the more depending parts, the vital cohesion, particularly of the parenchymatous parts of the lungs, becomes diminished, giving rise to more or less marked *softening* of the engorged part. In less frequent instances, it is not only a simple congestion from stasis of the fluids that is found, but also indications of pneumonia in the first or second degree. The pneumonia is sometimes confined to two or three lobules; in which case it may have passed into a suppurative state before death: in other instances it occupies a whole lobe, but without any signs of suppuration. Œdema, or even emphysema, of parts of the lungs, is also occasionally remarked. The *bronchi* are generally red, or of a livid red, or violet colour. The tint generally deepens in the small bronchi, and in the direction of the air-cells. They also contain some mucus. — M. CHOMEL gives the following as the state of the lungs in 42 cases: — Congestion, with or without softening, in 18; hepatisation in the first degree, in 3; hepatisation in the second degree on one side, in 2; lobular pneumonia, in 3; emphysema, in 2; œdema, in 2; effusion into the pleura, in 2; and the normal state, in 10.

526. *h*. The state of the *blood* varies much in fatal cases of nervous, putrid, or typhus fever. Where the putrid, malignant, or septic characters have been most remarkable before death, the changes of the blood have been usually the greatest.—This fluid is commonly dark, black, diffluent; and but rarely in the state of fibrinous clots. In a few cases, the blood in the heart and large vessels assumes the form of black coagula, which are different from those observed in other acute diseases. This state is evidently owing to the absence, or great diminution, of fibrine. The presence of a gaseous fluid in the blood, especially in that of the veins, is also evident in some cases. I have observed this circumstance in death from other diseases, particularly if asphyxy was the mode in which the fatal event took place. (See art. BLOOD, § 110. *et seq.*)

527. *i*. The *heart* is often softened and somewhat discoloured. The *softening* of this organ varies from an almost unappreciable, to a most marked, degree. In some cases it is so great, that the fingers may be pushed through the parietes of the ventricles with ease. This diminution of cohesion is generally observed in cases where the changes in the blood, and softening of the liver and spleen, have been the most remarkable. *Flaccidity*, or a state of softness different from that just mentioned, is still more frequent. The flaccidity may exist without very manifest loss of the cohesion of the structure; but it is generally attended by some degree of the latter, and the softening may be great, and yet the flaccidity not very apparent, although this is rare.—The *colour* of the internal membrane varies in different cases, and even in the opposite sides of the heart in the same case. In some, the membrane is red; in others dark, brown, or livid: it is often colourless, particularly when the heart is softened. It never presents inflammatory appearances, nor the changes immediately proceeding from the inflammatory state. —The researches of MM. TROUSSEAU, RIGOT (*Archives Génér. de Méd.* t. xii.—xiv.), and CHOMEL (*Clinique Méd.* p. 279.), show that the redness often found in the aorta, cavities of the heart, and large veins, in this class of fevers, is entirely owing to the tinging by, or to imbibition of, the colouring particles of the blood. Inflammation of the heart, or of its membranes, has not been observed in any case of these fevers.

528. *k*. The *external changes* observed after death most frequently commence a considerable time before this event. These consist chiefly of petechiæ, vibices, and blotches, varying as to size, situation, and depth of colour; and are to be ascribed to the extravasation of serum, coloured with red particles, or of blood itself, into the vascular layer of the skin. Gangrenous eschars, and sphacelus, are met with chiefly in parts pressed upon by the weight of the body, as the sacrum, shoulder blades, heels, and scalp of the occiput, or in those to which blisters, sinapisms, or other acrid substances have been applied. But these changes may occur in other situations, although rarely, and without these causes, as in the insides of the thighs; unusual pressure, or any other cause, either dissipating or exhausting the remaining vitality of the part, producing these effects. Phagedenic sores or ulcers, and enlargements of the absorbent glands, are also observed in rare instances. These sphacelating or spreading ulcers often commence in the form of pustules or vesicles, which break, leaving a foul sore which rapidly spreads. Besides these, the usual consequences of erysipelas are sometimes observed, or the remains of exanthematous and miliary eruptions. Even emphysema has appeared shortly before, and has remained after, death.

529. B. *Pathological conclusions.* — The *exposition* I have made of the organic lesions, more especially proceeding from typhoid fevers, suggests some important considerations, relative not only to the nature, but also to the treatment, of these diseases. Few of these changes become apparent before the seventh day from the invasion, when vascular action has passed into exhaustion, when organic nervous power and rritability are remarkably lowered, the circulating and secreted fluids are become morbid, and the powers of vital resistance in great measure overthrown. If inflammatory action should attack any part, either in this state, or even at an earlier stage, it will be very different, as to its phenomena, its progress, and its results, from inflammation occurring primarily, or in a system whose vital and physical constituents are not materially deranged. It is the remarkable affection of these

constituents by the causes of fever, and by the changes following more directly upon these causes, that imparts a similar character and termination to all the lesions now described. The depressed vital power of the extreme vessels, the lessened irritability of contractile parts, and the diminished vital cohesion of parenchymatous and other structures, heightened by the morbid state of the blood, are very frequently followed by gradual softening, infiltration, congestion, or effusion; and these often pass into disorganisation amounting even to sphacelation, or to sphacelating ulceration, even without the intervention of inflammatory action, or of any of its consequences. Owing to the intimate dependence of the states of the digestive canal, more especially of its internal surface, upon organic nervous influence, the former is involved, in a correlative manner, whenever the latter suffers. The tonic contractility of the muscular and serous coats of this canal is much diminished, the vital cohesion of its mucous membrane is weakened, the tonicity of the extreme vessels of this coat is lessened, and its functions of secretion impaired or otherwise changed. In this state, it is unable to resist the impressions made by morbid secretions passing over it. The alterations which had previously taken place in the organic nervous influence, in the functions of respiration, and in the blood, have conjointly given rise to diseased — usually acrid, or irritating — secretions from the liver, pancreas, and even also from the intestinal surface. When we find these secretions produce spreading or sphacelating sores, as they often do, in the protected cutaneous surface, we cannot be surprised at their occasioning analogous lesions in the more delicate mucous surface of the intestines, rendered still more delicate and susceptible of lesion by the previous changes just described. During the several days of the patient's life, from the commencement of these changes, or from the presence of morbid secretions in the intestinal canal, absorption will proceed on the digestive mucous surface; and, notwithstanding the amount of absorption may be very small, yet we cannot conceive it possible, that morbid secretions, either floating through the intestines, or collected in the follicles, will pass through absorbent glands, or even into the vessels which run to them, without producing a material change in them. If these views be just, the inference that depressed organic nervous influence and irritability, a morbid state of the blood, and disorder of the secretions, are concerned especially in causing the changes of structure observed in the digestive canal, will be admitted; and, if admitted, it becomes the basis of a rational method of treatment. But these early pathological states induce also those organic lesions in typhoid fevers, affecting other internal organs, and even other external parts, and stamp them all with the same important characters — characters indicating both a common origin and a similar tendency, and pointing to the same principles of cure.

530. viii. TREATMENT OF TYPHOID FEVERS.— The treatment of this class of fevers is the most difficult in practical medicine. If the physician possess not just views as to the different and varying states of vital action, and as to their influence in producing organic lesion — if he be not enlightened as to physiological pathology, as well as to pathological anatomy — if his knowledge of the instruments of his art be not adequately varied and comprehensive — if his resources be not great and based on science — he administers to a patient in any of the forms of typhoid fever, with an equal chance of doing mischief, or of affording benefit; and he may as well adopt his plan of treatment from the "hazard of the die," as to attempt to reason on the matter. It is better that the patient were left to the spontaneous efforts of nature, than that he should fall into the hands of such a practitioner. If we look back to the influence of theory and system in the treatment of these diseases; to the importance bestowed on names; and to the manner in which names have been confounded with, or substituted for, indefinite and varying entities; we shall not be at a loss to explain wherefore it has often been a matter of difficulty to decide, whether or not medical interference has proved beneficial or injurious. This is, however, not an opprobrium to our science; but a proof of its difficulties, and of the ill-founded pretensions of many of its professors and teachers. In our own days, we have seen pretensions to which ignorance gave confidence, and for which professional cant procured currency, obtain a credence which now seems surprising, and produce results which the adequately informed always anticipated. We have witnessed the promulgation of doctrines, and of modes of practice, warranted neither by an acquaintance with vital actions, nor by a knowledge of, or regard to, facts, lead to the most serious consequences; and have remarked, moreover, the power they obtained over those who were either unwilling or unable to inquire into their truth. But we have also seen, in the brief space of two or three years, the illusion vanish before the increasing and spreading lights of pathological and practical knowledge.

531. The difficulties attendant upon the treatment of this class of fevers depend chiefly upon the varying states of vital action in their course; the modifications and complications they present in different circumstances and epidemics; and the inadequate means of discrimination in our power, between the changes induced by treatment and those taking place spontaneously.—It is not also from the effects produced upon a few detached cases, that we can judge sufficiently of the efficacy of certain remedies; but from the results in a number — from the rate of mortality in various circumstances, and in different epidemics. Whatever may have been the method advised by writers — too many of whom have written from motives wide from those by which alone they ought to have been actuated — we shall find, upon close inquiry, that the general mortality has been such as to demonstrate its little efficacy, or to show the small superiority possessed by it over others.

532. The ancients observed the changes which take place in the course of fevers with great attention, attributed recovery to the critical evacuations which frequently occurred in their advanced stages, and did not attempt to interfere with the efforts of nature as long as the disease pursued a simple and mild course; but interposed in order to accelerate and replace evacuations, when they did not occur after a certain period, or were interrupted by any circumstance. The chief fallacy in this doctrine is, that the evacuation, when it

occurred, was mistaken for the cause of the amendment, instead of being viewed as the effect, and as one of the signs by which this change is often indicated.

533. The physicians who, in modern times, attributed an important part to putridity of the humours, recognised merely a portion of the mischief, and that often the most remote and contingent, and mistook, in great measure, both its origin and nature. They had recourse to camphor, bark, musk, and various preparations, both vegetable and mineral, possessing antiseptic properties; and, if they had employed them in appropriate periods and states of the disease, the benefit derived from them would have been much less equivocal. But, mistaking the origin of the phenomena usually called putrid, they frequently prescribed these medicines improperly; and whilst endeavouring by an early exhibition of them to prevent putridity, they actually often accelerated or favoured its occurrence.

534. A nearly similar mode of treatment was advised by **Brown**, and his once numerous followers on the Continent; but it was based upon a different doctrine — upon the predominance of the asthenic diathesis and its consequences. Although wine, opium, tonics, and stimulants, were recommended by them, in various forms and combinations, with advantage, in certain states of typhoid fevers, particularly in the latter stages; yet the evils resulting from an early recourse to them were also sufficiently evident, and at last became manifest even to the disciples of this school. That this practice, and the modifications introduced by its partisans, did not prove so injurious in the treatment of fever, especially on the Continent, as may be supposed, is accounted for by the circumstance, that depressed vital power, with septic changes in the fluids in the last stages, characterised the much larger proportion of fevers prevalent for several years after its promulgation. But the appearance of exanthematic typhus in the north of Italy, at the close of the last century, opened the eyes of **Razori** to the impropriety of having recourse to stimulants in its treatment, and laid the foundation for the doctrine and practice of *contra-stimulus*. The general character of the petechial fevers prevalent about the commencement of the present century in Italy and Germany, was such as I have delineated in the section on typhus (§ 497.), with more or less of inflammatory or irritative action in the stage of excitement; the exanthematous eruption in this stage being frequently mistaken for petechiæ, and the appearance of these, and of other adynamic symptoms, being favoured by the vascular reaction which preceded them.

535. The administration of *tartarised antimony*, in large doses, was the principal treatment employed by **Razori**. When the patient was young and robust, and the disease had not reached the acme of excitement, he directed a moderate bloodletting at the outset, and, immediately afterwards, four, six, eight, ten, or twelve grains of tartar emetic, or even more, in solution. He prescribed this medicine in smaller doses subsequently, or substituted for it the *kermes mineral*, conjoined with nitre, and in doses of one grain, or of a grain and a half, every half hour, or hour, or every two hours, according to the degree of vascular excitement. He often gave the tartar emetic and kermes alternately. **Razori** also employed purgatives, particularly when the antimony did not act sufficiently upon the bowels; preferring neutral salts, manna, and tamarinds, in large doses, and administering them, in other cases, in enemata. He enforced a cooling regimen and severe diet, and allowed only refrigerant beverages. The success of this treatment is stated to have been great; and its propriety, as well as success, may be admitted, when employed in an epidemic characterised by high vascular excitement at its commencement, and when adopted sufficiently early after reaction has taken place, and in previously healthy persons. But in other states of typhoid fever, and in the latter stages especially, the large doses of antimony here advised appear not, *à priori*, to be suitable means. It should, however, be admitted, that the exhibition of tartarised antimony in the advanced stages of this fever has never been satisfactorily tried, either in this country or in France and Germany. That it may be found not so inappropriate as generally considered, is an inference which the trials made of it, very recently, by Dr. **Graves**, of Dublin, fully warrant.

536. The pathological tenets lately prevalent in France have, as M. **Chomel** states, prevented the treatment of **Razori** from being adopted, or even tried, in that country. The doctrine of **Broussais** was opposed to this and every other means that seemed to its supporters likely to aggravate the inflammatory action of the digestive mucous surface, which they suppose to be the cause of all fevers. If we examine the practical tenets of this school, we shall find more than one postulatum assumed as fully established, although admitting not only of doubt, but even of disproval. That fever does not depend upon this lesion, although predominant morbid action in the digestive canal may appear in many cases, and in some fevers more frequently than in others, has been already shown. And, granting that this morbid action is attended by vascular injection of the mucous membrane, it still remains to be proved, that it is the same kind of affection as inflammation. That it is not the same as primary and sthenic inflammation, its phenomena and results, as well as the *juvantia* and *lædentia*, sufficiently prove. Even granting the doctrine of **Broussais** in its fullest range, it still remains to be demonstrated, that the treatment advised is that which is the most beneficial, or the most appropriate, in the numerous and varying morbid conditions which fevers assume; and it, moreover, should be shown, that the means which the espousers of this doctrine reprobate, are one whit more prejudicial than those which they laud. In a class of diseases so varying, and even opposite, as to their pathological states, as fevers are, not only in their different forms, but also in the same case at different stages, the success of various remedies cannot be predicated from doctrinal tenets. However ingenious the theory, and close the reasoning, by which we are led to practical inferences, careful experiment and repeated observation are necessary to test the character of any method of cure; and even were we to adopt the views of **Broussais**, to these tests we ought to resort before we should decide between the efficacy of gum-water and leeches on the one hand, and that of antimony and purgatives on

the other; or, indeed, respecting the propriety of any remedy whatever.

537. The pathological views of **HOFFMANN**, and the modifications of them by **SAUVAGES** and **CULLEN**, although entirely based upon solidism, were favourable to rational modes of practice. These views, in the varying explanations of them furnished by **HEBERDEN**, **FORDYCE**, and others, have very generally guided practitioners in this country in the treatment of typhoid fevers, until Dr. **HAMILTON** introduced a modification of the usual practice, or induced them to have a more frequent recourse to purgatives than had previously been ventured upon. That these remedies, especially when judiciously selected and combined, do not produce the mischievous effects in typhus which **BROUSSAIS** supposes them to produce, even when given in cases the most favourable to his views, I am convinced by experience, and many of his disciples are at last opening their eyes to the fact. MM. **BRETONNEAU**, **ANDRAL**, and others, more or less partial favourers of his doctrine, have recently so far discarded the practical tenets of their school, as to venture on the exhibition of these medicines; and, as M. **CHOMEL** justly remarks, have found that the dread of them so long entertained is unjust, and that they may be employed early in many cases of typhus with great benefit. Where, however, there is reason to suspect the existence, or even the commencement, of ulceration, the impropriety of having recourse to them, unless with the circumspection and in the manner hereafter to be mentioned, cannot be doubted. But ulceration seldom occurs before the twelfth day of the disease; and if they have been judiciously employed previously, I believe that it will very rarely take place either then or at a later period.

538. The humoral pathology, although superseded very generally by solidism, since the days of **HOFFMANN**, still continued to be partially adopted by some practitioners in different parts of the Continent. It has been lately revived in a too exclusive manner in this country. Amongst those who have espoused views of this kind may be mentioned, Dr. **STOKER**, Dr. **CLANNY**, and, still more recently, Dr. **STEVENS** — each of whom has endeavoured to establish the early predominance of morbid states of the blood. These views have been already partially discussed; and I have now nothing further to add respecting them, than that the changes of the blood for which Dr. **STOKER** argues, are those which have been above stated (§ 526.), and which refer merely to its external appearances. Dr. **CLANNY** insists chiefly on the diminution in typhus of the carbonic acid, which he supposes the blood to contain in health. He recommends the use of fluids containing, or evolving, this gas, as effervescing draughts, Seltzer water, &c. M. **CHOMEL** states, that he gave this practice a trial in the Hôtel Dieu during two years; and that, although the cases in which he employed it were not numerous, they satisfied him that it did not influence the usual results, and that he preferred, therefore, to try other means, the inefficacy of which had not been so fully shown. Of the treatment of Dr. **STEVENS**, in respect of this class of fevers, I entertain similar opinions to those expressed above (§ 382.). In two cases of low nervous fever to which I was lately called, at a period, however, too late to expect benefit from any treatment, I prescribed the remedies this writer has advised, but without any effect.

539. If *the rational method of treatment*, or that which is modified according to the form, state, or stage of the disease, is not much more successful than that which is dictated in the spirit of system, or of empiricism, it has at least this to recommend it,—that it brings the results of science to bear upon existing pathological states, both vital and structural. Although not admitting so readily of the usual tests of success as more empirical methods, the experienced physician will readily form a tolerably accurate idea of the circumstances, either promoting or preventing favourable results. He will make due allowances for the forms and periods of the disease, the characters of the epidemic, the influence of season, and for the numerous circumstances appertaining to individual cases; and he will at once perceive, that the means that are beneficial in one epidemic, or in one form of fever, or in certain cases, will be most injurious in others. In the present state of our knowledge, the rational method of cure is that which is most appropriate to the different varieties and stages of fever. According to it, *indications* or intentions are derived from a due estimate of existing symptoms and signs, and of the pathological conditions evinced by them. Whilst it comprises every method of cure, and all kinds of means, it adapts them to the states of the disease and of the patient. The judicious physician employs, according to circumstances, remedies the most opposite; and, in different cases, or in different periods of the same case, he has recourse to sedatives, to refrigerants, to evacuants, to tonics, to astringents, to stimulants, or to antiseptics. He neglects no means, but adopts none exclusively; and, while interpreting the value of symptoms, and inferring the morbid states producing them, he endeavours to select and to combine the medicines, whose known operations are such as are most likely to remove these states, or to prevent the accession of others usually supervening in the course of the disease, and increasing its danger.—I will now proceed to consider — 1st, The treatment appropriate to the different stages of typhoid fever;—2dly, The modifications required by its different forms and complications;—and, 3dly, The means recommended in a special manner, and the circumstances or states of the disease in which they may afford benefit.

540. *A. The Treatment appropriate to the stages.* — *a*. In the *premonitory stage*, and whilst that of *invasion* is not fully formed, the future fever may be checked or prevented by the shower bath, followed by frictions of the surface; by an emetic, or by a warm stomachic purgative; or by a warm or vapour bath; or by all these following in succession; and in some cases, also, by warm diluents or diaphoretics; but this result cannot be depended upon.—*b*. When the *stage of invasion* is pronounced, bleeding, hot stimulants, &c. are hurtful, or even dangerous. Tepid and warm diluents, and the warmth of bed, are the most suitable means. If vomiting accompany this stage, it may be increased by tepid and emollient diluents. If nausea only be complained of, and if there be little pain, tenderness, or tension, in the hypochondria and epigastrium, an emetic may be given, and its action promoted by these means.

—This treatment will generally shorten the chills, &c. characterising this period, and favour a relaxation of the surface, or the occurrence of moderate reaction.

541. *c.* In the *stage of excitement*, the treatment must altogether depend upon the degree in which reaction is developed, and the manner in which the brain, the lungs, or the digestive canal, appears to suffer. If the fever does not present, early in this state, the characters of low nervous fever, to their full extent, or those of an adynamic, or of a putrid or septic kind, then a small or moderate *bloodletting* may be prescribed; but the effects at the time of the operation should be carefully observed. If the patient be young, or robust, previously healthy and well fed, then a more copious depletion may be practised, if he be seen early. Even in the lower states of this fever, if any of the viscera just named be prominently affected, a *local depletion*, either by leeches or by cupping, may be employed. But if the period of excitement be far advanced; if the fever be simple or mild; if it have passed the tenth day; and if it be the true or exanthematic typhus, unattended by inflammatory associations; bloodletting will seldom be of service, and it may interrupt the regular and favourable course of the disease, particularly the latter form of it. In a large number of cases, in which M. **Louis** states bloodletting to have been tried, and in which it appears to have been indicated, the advantage procured by it seems to have been slight; but sufficient to increase, to a small amount, the proportion of recoveries, and to diminish the duration of the disease.—*Emetics* have been advised also in this stage; and, in cases where the chills return on successive days, or frequently alternate with flushes, I believe that they will be found of service. **Hildenbrand** directs them in the first, second, or third day, or even later; having premised a bloodletting in the cases indicating it; and prefers a large dose of ipecacuanha, with a grain of tartar emetic.—Next to emetics, *purgatives* are of advantage. At an early period, or before the eighth or ninth day, a full dose of calomel, either alone or with rhubarb, may be given; or jalap, with cream of tartar; and their action promoted by moderate doses of the neutral salts, or by manna, tarmarinds, &c., according to circumstances. These clear away morbid secretions, and mucous sordes, from the digestive surface; which, if allowed to remain, would favour the occurrence of the morbid changes in the intestines. If, however, the bowels have been much relaxed, and still continue so, it will be preferable to give an occasional dose of hydrargyrum cum creta, rhubarb, and ipecacuanha, which will promote a healthy state of the mucous surface, and facilitate the evacuation of morbid secretions. If the bowels be only gently open, the circumstance is favourable; but an inordinate action of them must be moderated by the above medicine, or by others hereafter to be mentioned, lest intestinal ulceration and perforation be the ultimate result. At the same time, care should be taken not to produce a sudden change or constipation, otherwise the cerebral or nervous symptoms will generally be much aggravated, and a tendency to effusion on the brain be produced.—*Diaphoretics*, suitable to the state of the symptoms, either variously combined, or associated with diuretics, may be given from time to time. Of these, the more refrigerant, with small doses of camphor, will be most serviceable; and either some one of those in the Appendix (F. 431. 436. 440. 818. 865.), or the following, may be prescribed: —

No. 225. ℞ Camphoræ rasæ gr. ss.—j.; Potassæ Nitratis gr. iij.; Pulv. Acaciæ gr. ij.; Mucilag. Acaciæ q. s. M. Fiant Pilulæ ij. quartis horis sumendæ.

No. 226. ℞ Mist. Camphoræ ʒj.; Liq. Ammoniæ Acetatis ʒij.; Ammoniæ Muriatis, gr. iv.; Syrup. Limonis ʒj. M. Fiat Haustus, quartâquâque horâ capiendus; vel interdum, secundis horis, pilulæ et haustus, alternis vicibus, sumantur.

542. *d.* In the *nervous stage*, the debility is more real; irritability is more exhausted, and the sensorium more severely and uniformly affected. The functions of the skin, and frequently those of the bowels, are also more disturbed than before. The *indications* are to support or stimulate the system, according to the forms the disease assumes. —*Blisters* may be employed in this stage—seldom before. They favourably impress the nervous system, check the tendency to diarrhœa and affection of the intestinal mucous surface, and render the skin more perspirable. They are most serviceable at the commencement of this stage; and are best applied on the nape of the neck, behind both ears, or on the calves of the leg.—*Camphor* is now one of the best remedies that can be exhibited. Whilst it promotes nervous power, it relaxes the skin, and does not increase inflammatory action, but rather tends to allay it, particularly the nervous and cachectic forms of it, which alone can exist in this disease. It should be given in larger doses in this stage, more especially of the malignant or putrid form. From twelve to twenty grains may be exhibited in the twenty-four hours. **Hildenbrand** advises, in the latter part of this stage, medium doses of camphor; or one grain every two hours, with an infusion of *arnica* and *angelica root*. He considers that these lessen the stupor, giddiness, and delirium; act favourably on the skin, and prevent the tendency to diarrhœa.—*Emetics* are sometimes beneficial in this stage, when they have been neglected in the previous one, or contra-indicated.—*Purgatives* are of service only when the bowels require assistance. They should be given with the intention of evacuating morbid matters, of preventing the injurious impression made by such matters upon the intestinal mucous surface, and of promoting a healthy action of the abdominal emunctories. Hydrargyrum cum creta, and rhubarb, and the infusion of the latter with the milder saline substances, in a state of effervescence, are the most appropriate. These preserve the tone of the digestive mucous surface, whilst they enable it to throw off fæcal collections. Their action may be occasionally promoted by emollient and gently laxative enemata. I doubt much the propriety of exhibiting *calomel*, or any of the drastic purgatives, in this stage; and I believe that the more active neutral salts exhaust the strength, and produce watery stools, in this period, particularly if they be exhibited in any quantity. It is in the common, or synochoid, form of fever, or at the commencement of this, that they may be employed. In the latter stages of low fevers, calomel and cathartics are apt to increase the intestinal symptoms, or to determine an irritative action of the bowels, liable to terminate in the lesions already noticed.

543. *e.* When the disease has reached its *acme*,

or is approaching the fourteenth day, the treatment should very much depend upon the predominant symptoms, upon what has been already done, and on the effects observed.—If no unfavourable symptoms are present, mild saline *diaphoretics*, as camphor mixture, with liquor ammoniæ acetatis, &c., or the former with the alkaline carbonates, and citric acid, or lemon juice, in effervescence, and mild demulcent diluents, are all that are required. The chief intention at this stage is to favour a genial perspiration. The temperature of both medicines and drinks should not be lower than tepid. If the disease is complicated, particularly at this period, or is proceeding irregularly, the treatment must be varied, as will be hereafter shown. If a crisis take place, or the more urgent symptoms gradually subside, the means should vary with the degree of vital depression evinced. Both tonics and stimulants should at first be mild, in moderate doses, and suited to the state of the pulse, and of the skin and bowels. At first a cold infusion of *cinchona*, or the decoction, may be given with the solution of the acetate of ammonia, or with either of the alkaline carbonates and citric acid, in effervescence. The infusion of *valerian* may also be substituted for the cinchona, and given as directed above.—The *regimen*, *diet*, and *convalescence*, should be managed with strict reference to the forms and complications of individual cases, and as will be hereafter shown.

544. *B. The Treatment of the Varieties and Complications of Typhoid Fever.*—*a.* In the *simple typhoid*, or *low nervous fever*, when it commences as described above (§ 469.), the period of excitement being characterised by little or slight reaction, *bloodletting* is seldom beneficial; or local bleeding, in a situation indicated by the prominent affection, will only be required. If the pulse be very rapid, or soft, and open; if the prostration be great, and the tongue assume a dark colour; and particularly if this state exist at the commencement of the disease; vascular depletions will be injurious. The indications enumerated above (§132, 133.) will further serve to point out when they may, or may not, be resorted to.—An *emetic* is always of service, particularly if there be nausea; and if vomiting be spontaneous, it should be moderately assisted, as already advised.—The bowels should be evacuated early in the disease by mild *purgatives*. Those already mentioned are the most appropriate, or fresh castor oil may be used. They may be repeated occasionally, with the views I have stated, but with due caution, lest they induce too great exhaustion, or favour the supervention of intestinal disorder.—Whilst the heat of skin continues, *tepid* or *coldsponging* the surface is grateful to the patient, diminishes the restlessness, and favours the operation of *diaphoretics*, during the state.—If diaphoresis occur, it should be promoted by mild, tepid *diluents*, either simple or medicated, in the manner about to be noticed. If copious perspirations occur, especially about the acme of the disease, or at a critical time, they should not be arrested, unless they increase the exhaustion, or are attended by signs of septic deliquescence.—In the *nervous stage*, the treatment directed above should be employed (§ 542.).

545. *a. Prominent affection or consecutive inflammation of the respiratory organs*, in the nervous form of typhoid fever, requires the utmost discrimination on the part of the practitioner, for its successful treatment. The subject has been admirably elucidated by Dr. Stokes, in his truly excellent published lectures on fever. The chest should be carefully examined by the stethoscope, in order to ascertain, as accurately as possible, the state of pulmonary disorder, and to determine whether the symptoms referred to this organ be symptomatic, or dependent upon inflammatory action, or active congestion. The able pathologist just mentioned remarks that, when the bronchial surface is chiefly affected, there is much more lividity of the countenance, than when a portion of the substance of the lungs is diseased. This symptom will generally verify the reports of auscultation. But the treatment will entirely depend upon the nature of the bronchial affection. If the dyspnœa and other pulmonary symptoms depend upon inflammatory irritation, rather than upon increased secretion from the mucous surface; if there be heat of skin, more or less vascular reaction, and if the patient be young and robust; *bleeding*, general or local, will be necessary, according to the severity of the symptoms, and stage of the disease. If, however, these symptoms depend chiefly upon a copious secretion from the bronchial surface, as will be shown by the stethoscope, bleeding will be most injurious, and very decided means of an opposite nature will be requisite, in order to prevent contingent asphyxy. In this latter case, extensive counter-irritation, the *mistura ammoniaci*, or the *decoctum polygalæ*, with *camphor*, *ammonia*, the *tinctura camphoræ composita*, or other stimulating expectorants, must be resorted to, according to the urgency of the case, particularly if lividity of the face exist. When the strength is very much reduced, *wine* will also be necessary, with light nourishment. The temperature of the surface should be kept up. Dr. Stokes very properly directs the patient to be enveloped in soft flannel. When the bronchial affection is more strictly inflammatory, and the secretion does not interrupt materially the functions of the lungs, antimonials may follow the bleeding. But in either case, if the symptoms referred to this organ, particularly the dyspnœa, or the cough, become urgent, and be attended by the tracheal rattle, an *emetic* of ipecacuanha, or of sulphate of zinc, should be immediately exhibited. In this state, Dr. Graves, whose extensive resources, in matters of difficulty, I have had frequent occasion to notice, has tried the application of *moxas* in the course of the eighth pair of nerves, and the use of the sulphate of quinine and opium, in enemata; these latter exerting a powerful influence, in his opinion, in lessening excessive secretion from the bronchial surface.—If the substance of the *lungs* be affected, a single moderate bloodletting, or local depletions, may be prescribed, if the patient be robust and the disease not far advanced. If the bowels be not materially disordered, antimonials may afterwards be given; but they should be combined with anodynes. Ipecacuanha, with calomel or camphor, and opium, or extract of poppy, is, perhaps, preferable in most cases.—*Diaphoretics* in frequent doses are always of service, and may be conjoined with diuretics. After depletions have been carried sufficiently far, or if the lungs are affected very late in the disease, *blisters*, *sinapisms*, or the *warm terebinthinated embrocation*, placed on the chest,

and camphor, ammonia, ipecacuanha, or other expectorants, with hyoscyamus, or extract of poppy, are the principal means we possess. When, in this complication, the skin is cool and pale, the pulse very weak and small, and the features collapsed, the warm expectorants, as polygala, ammoniacum, ammonia, camphor, the stimulating tonics, and wine, should be given, according to the peculiarities of the case.

546. β. *Predominant affection of the intestinal mucous surface* should be treated by means similar to those advised in this complication of synochus; and the more especially, as the latter fever, when thus characterised, either passes into, or is very nearly allied to, the typhoid form. In the early stages of this complication, a combination of small doses of hydrargyrum cum creta, rhubarb, and Dover's powder, with compound cretaceous powder, given every three or four hours, is generally of service. If the constitutional symptoms will permit, and if this affection appear at an early period of the fever, a local depletion should be premised, and a blister or sinapism be afterwards placed upon the abdomen. The terebinthinated epithem, applied sufficiently hot, and covered so as to prevent evaporation, if properly managed, is the most efficacious means – more particularly if the abdomen be tense, tender, or tympanitic. In this latter state, an injection with assafœtida, or with the extract of rue, or with from two drachms to half an ounce of spirits of turpentine in addition, will give great relief.

547. In a far advanced stage, *diarrhœa*, especially if attended by tension, pain, or flatulent distension of the abdomen, requires great attention. If the medicines just recommended prove not of service, the *chlorurets*, particularly the chloruret of lime, may be given, with camphor, and extract of poppies, &c. Mucilaginous injections, containing syrup of poppies, or laudanum, or compound tincture of camphor, may also be administered, and a rubefacient epithem placed over the abdomen. — If *hæmorrhage* from the bowels occur, it may be ascribed chiefly to exudation from the softened mucous surface, as shown by the post mortem appearances; and *superacetate of lead* with opium, or acetate of morphine, or extract of poppy, should be exhibited, either in the form of pill, or with the pyroligneous acetic acid, in strong camphor julap. The lead has been recommended, in these cases, by Drs. BARDESLEY, GRAVES, and STOKES. I have resorted to it in these several combinations, and have given it in two or three instances with kréosote. — I have likewise employed, by the mouth, and in enemata, the spirits of turpentine, which generally proves the most active remedy of any in such circumstances. In some hopeless cases, it has succeeded contrary to expectations. In one, however, that recently occurred to me, although it arrested the hæmorrhage for a time, there was a return which carried off the patient. If the disease be far advanced, or the powers of life much reduced, the turpentine should be given in small or moderate doses, and its effects carefully watched. I have also prescribed it in conjunction with kreosote, the acetate of lead and aromatics, in similar circumstances.

548. γ. *Prominent affection of the brain* may arise in the course of typhoid fever, either from congestion within the head, or from the depressed state of nervous power, unconnected with inflammatory action, or even with vascular determination. This circumstance, long believed by pathologists, has been fully confirmed by M. LOUIS, who found, that the presence or absence of delirium has little or no connection with perceptible organic lesion of the brain. If, however, there be increased heat or severe pain of the head, spastic contractions of some muscles, flushed face, injected eyes, or other indications of active disorder of the cerebral circulation, particularly in the stage of reaction, the hair should be removed, and local depletion resorted to. The head ought to be kept cool, by cold sponging, or lotions. If delirium be attended by these symptoms, the same means are required; and, if it be, at the same time, low, insensible, or muttering, a blister should be applied to the neck and nape, or behind the ears, or to the calves of the legs, or a sinapism may be substituted in the latter situation. Whenever the affection of the head is connected with increased determination to it, especially in an early stage, stimulating antispasmodics, as ammonia, musk, or camphor in large doses, cannot be of service, and may be injurious. The last of these, however, may be used in small doses with nitre, and it may be increased according to the degree of stupor, and coolness of the scalp. If the delirium depend upon exhausted nervous power — if it be attended by stupor; by a weak, soft and very quick, or somewhat slow pulse; by a moist skin, or copious perspiration; or by extreme prostration, particularly after the eighth or tenth day, or in the nervous stage; camphor in doses of from one to three or four grains every two, three, or four hours; or the preparations of *valerian*, or of *serpentaria*, or of *arnica*, or *ammonia*, or of *ether*, or *wine* or *opium*, may be severally employed as circumstances will suggest. In other respects, the treatment of this state, and of sopor and coma, its frequent attendants and sequents, should be directed, as explained in the articles COMA (§ 16. 19.), and DELIRIUM (§ 16, 17.). — *Retention of urine* is very apt to occur in this state; therefore, in it especially, but also in all others, attention ought to be paid to the circumstance. If an undue accumulation of water in the bladder be detected upon examining the hypogastrium, it should be immediately drawn off.

549. δ. *In the most severe form of nervous fever* (§ 476.), bloodletting is seldom of service, unless at the commencement of reaction, or from the vicinity of the most affected organ. When the skin is very hot, *tepid sponging*, *diaphoretics*, external *derivatives*, and emollient *diluents*, with *nitre*, or small doses of the *muriate of ammonia*, are the most appropriate. The infusion of *valerian* may be given as the disease passes into the nervous stage, either with the *ammoniated tincture* or with camphor, and *muriatic ether*, or other stimulants. — HILDENBRAND advises the *arnica montana* with camphor, in this state. — If exhaustion increase, and coma come on, these medicines, or others of a similar kind, may be prescribed in larger doses, or at shorter intervals; and a blister applied to the vertex, or occiput, or to the nape; or a large sinapism to the epigastrium, or insides of the legs. LALLEMAND and MACKINTOSH have adduced instances of benefit, in the comatose state, from pouring boiling water on the lower

extremities. *Musk*, the *ethers*, preparations of *cinchona*, or any of the stimulants already mentioned, may likewise be tried, in various combinations, in this stage; or an infusion of *green tea* may be given in the usual manner.

550. ε. If the disease be sudden in its attack, or *apoplectic*, care should be taken to ascertain whether or not this character arise from weakened nervous energy of the brain, or from vascular congestion. When a pale, collapsed countenance and eyes, weak and small pulsation of the carotids, and coolness of the scalp, indicate the former, restoratives will be necessary. But, when there are increased temperature of the head, and excited action of the carotids, although the countenance be pale, a small or moderate bloodletting, local or general, or even a cautious repetition of it, in young or robust persons, will generally be required.—The same remarks equally apply to the occurrence of *paralysis*. If the paralysis appear at an advanced stage, even local depletions may be injurious. In this case, we must trust chiefly to blisters and other external derivatives, and to the means already stated (§ 548.).

551. If, in the early stage of this, or, indeed, of any other form of typhoid fever, the thirst be urgent and attended by vomiting, desire of cold fluids, and heat of skin, stimulants are generally injurious. If tenderness of the epigastrium accompany these, inflammatory irritation, or erethism, of the gastro-intestinal mucous surface should be inferred. In this case, *leeches* ought to be applied; and cold or iced drinks, and saline medicines, particularly the nitrate of potash, or the muriate of ammonia, frequently exhibited. A combination of camphor mixture, the solution of the acetate of ammonia, nitrate of potash, and spirits of nitric ether, will generally be serviceable in these circumstances. Effervescing draughts are productive of little benefit, as the extrication of fixed air distends the stomach, and either causes it to react upon, and throw off, its contents, or gives rise to much distress and pain. If irritability of the stomach still continue, a large blister may be applied over the epigastrium. Dr. STOKES advises, in the more obstinate cases, the raw surface to be sprinkled with a small quantity of the acetate of morphine. I have rarely found the warm turpentine embrocation fail of removing this state of disorder, when properly employed.

552. ζ. When *singultus* occurs in the stage of reaction, it is generally connected with the foregoing state of the stomach, and particularly with irritation about the cardiac orifice. In this state, the treatment just advised is the most appropriate. When it appears in the nervous period, or later, it depends upon exhausted nervous energy; and requires stimulants, antispasmodics, and anodynes. Camphor, ammonia, the ethers, musk, valerian, opium, and their preparations, variously combined, are the most serviceable.

553. η. *Diarrhœa* is one of the most frequent precursors of disease of the intestinal mucous follicles; yet should it not be rashly interfered with, and still less abruptly arrested, particularly when it occur early, or at a critical period. I have imputed the affection of the intestinal mucous surface in great part to the morbid condition of the blood; this surface being one of the channels by which effete, or injurious materials, pass out of the circulation during the course of fever. It is evident, therefore, that if we shut it up, without opening others, the alterations of the blood will increase, and occasion serious organic changes, and ultimately a fatal issue. The most rational procedure, when diarrhœa is an early complication, is not to interfere with it, unless it become severe, or continue long; and then it should be moderated rather than arrested, and by such means as will increase the depurating functions of the skin, the kidneys, and liver, and remove the irritation excited in the digestive mucous surface and follicles. The remedies most likely to produce these effects, are actually those which have been found most serviceable in this state of disease. Hydrargyrum cum creta, compound ipecacuanha powder, camphor, nitre, mild anodynes, variously combined with demulcents, emollients, and diluents, are the most generally of service. In more advanced states of this complication, and in later stages of fever, those medicines which have been already noticed (§ 156.), as well as some about to be mentioned, may be resorted to.—When the pulse is small, very frequent, and weak, and the strength exhausted, diarrhœa must then be arrested, otherwise it will speedily terminate life. Astringents, opiates, absorbents, restoratives, wine, &c., are all requisite in this case.

554. θ. *Tympanitic distension* of the abdomen may occur early in this fever, and be attended by thirst, by a desire of warm diluents, by tenderness on pressure, particularly in the lower part of the right side of the abdomen, and by diarrhœa. When these symptoms are present, disease of the intestinal mucous follicles may be inferred. In this case, a number of leeches, according to the strength of the patient, and stage of the fever, should be applied, and followed by the warm turpentine embrocation on the abdomen. If tympanitis and diarrhœa appear late in the disease — particularly if the stools be foul, watery, or mucous — ulceration of the intestinal surface should be dreaded, and the means already advised (§ 156.) should be resorted to; or the chlorurets given in the infusion of valerian, or in emollient vehicles, with camphor, anodynes, &c. From one or two to four or five drachms of spirits of turpentine may be prescribed once or twice, or even oftener in some cases, in a suitable vehicle, if these fail; or this substance, or assafœtida, or extract of rue, with some anodyne, may also be administered in mucilaginous enemata from time to time. In most cases of flatulent distension of the intestines, there is great disposition to ulceration of the aggregated mucous follicles — if, indeed, it has not already commenced; and both morbid conditions are greatly aggravated by the continuance of the flatulent state. The *intention*, therefore, is to procure the discharge of flatus, by means which may at the same time sheath and soothe the irritable mucous surface, and restore the lost tone of the capillaries of the diseased part; and, whatever operates in this way, will be productive of benefit. It is only by a judicious combination of agents, that this effect can be attained; and those just mentioned seem the most efficient, especially when the skin is cool, the pulse feeble, and the prostration extreme; and, in this state, the more energetic stimulants and tonics, or wine, or opium, may also be employed, according to the peculiarities of the case. (See § 155—159.)

555. ι. The occurrence of *perforation of the intestines*, and consequent *peritonitis*, should not be overlooked in the enteric complication, or other severe forms of low nervous fever. Peritonitis seldom arises except from this cause, for large patches of the mucous surface, with Peyer's glands, may be destroyed by ulceration; and yet the peritoneum will be unchanged. When, however, diarrhœa has been suddenly arrested early in the disease, by an injudicious use of astringents, general peritonitis and effusion may result, without perforation, and even without ulceration. But this is only one of several bad consequences which may proceed from injudicious interference. If, in an advanced stage of fever, and after thirst, diarrhœa, tympanitis, and great prostration of strength, the patient suddenly complain of pain in some part of the abdomen, extending over it, with tenderness, increased distension, and rapid sinking of the powers of life, peritonitis has occurred. In this case, large doses of opium, to palliate the patient's sufferings, are the only means that can be used with any benefit. — Dr. Stokes, who has very ably elucidated the subject of peritonitis from this cause, and its treatment, directs one grain of opium to be given every hour, or two hours, until a decided effect is produced by it; and afterwards at longer intervals. (*Dublin Hosp. Rep.* vol. v.; and *Dublin Jour. of Med.* vol. i. p. 125.) When effusion of the intestinal contents into the peritoneal cavity occurs, the result must be fatal. But when adhesion of the peritoneum to the opposite surface takes place previously to the perforation, or when the perforation is speedily followed by a limited inflammation and effusion of lymph, recovery is possible. The formation of coagulable lymph can hardly, however, be expected in peritonitis occurring in the course of fever; as the states of vital action, and of the circulating fluids, are generally incapable of producing it.

556. *b. Treatment of putro-adynamic fever* (§ 484.).—The phenomena which especially characterise this variety, may appear either at an early stage of fever, or at an advanced period,—they may be the concomitants, or early consequences, of depressed vital energy, and imperfect powers of reaction; or the results of vascular reaction being so great, relatively to the state of vital influence, as to exhaust both the irritability of contractile parts, and the tone of the extreme vessels. In either case, alterations of the circulating fluids, and deficient vital cohesion of the soft solids, speedily follow, and coexist with these changes. In conformity with this view, with the pathological facts stated above (§ 529.), with a recognition of the characters of epidemics which have been observed in modern times in different countries, and with the results of personal observation, it may be safely inferred, that the treatment of this fever should mainly depend upon the state of vital action early in the stage of excitement, and the period of the disease in which the putro-adynamic signs appear; and that, in a practical point of view, it will be, therefore, advantageous to divide this variety of typhoid fever into—1st. The *consecutive putro-adynamic*, or that form which is contingent on more or less manifest reaction; and, 2d. The *primary putro-adynamic*, or that which is attended by imperfect, or no, reaction, and in which the characteristic phenomena appear early in the disease. It should, however, be recollected, that both these forms may occur in the same epidemic, or that either may predominate; and, moreover, that the first or contingent state of putro-adynamia is sometimes met with in all epidemics, whether the fever be common synochoid, typhoid, or exanthematous, owing to the causes stated above, and with a frequency relative to the prevalence of these causes (§ 468.).

557. α. The *stages of premonition* and of *invasion* of this variety, are scarcely different in their characters from those announcing nervous or typhus fever. The same means as have been advised above (§ 540.) may, therefore, be resorted to, with the intention of preventing the further progress of disease, or of rendering it more mild.—When the symptoms of invasion are either indistinct or protracted, the consequent fever is often rendered much less dangerous than it otherwise might have been, by the adoption of the measures already detailed, and more particularly by exhibiting an energetic *emetic*, and by promoting its full operation by warm or tepid mucilaginous diluents. Tepid *sea water*, or a weak solution of common salt in a tepid state, has been employed with advantage, for the purpose either of promoting the action of the emetic, or of producing full vomiting, when there has been nausea or sickness.

558. β. In the *consecutive putro-adynamic*, or when the *stage of excitement* is more or less developed,—when the pulse is frequent, full, or sharp; the skin hot, and thirst considerable, or if an internal heat be felt; vascular depletion may be practised, but with due reference to the circumstances of the patient, and to the period which has elapsed from the time of invasion. So long as the characters of putro-adynamia have not appeared, these symptoms fully warrant a cautious recourse to depletion; and in young robust persons, even a repetition of it.—If rigors and shiverings are followed by inordinate or tumultuous reaction, the necessity of larger depletions is obvious. But, even in this case, they should not be carried too far, or to the extent of producing syncope; otherwise, in attempting to avoid the exhaustion consequent upon excessive action, a quantity of blood may be withdrawn, too great for the diminished power of tonic contraction possessed by the blood-vessels,—the vessels being incapable, owing to the loss of their tone, to accommodate themselves to, or contract sufficiently upon, their contents, when the reduction of these contents is great,—and thus collapse of vascular action, and of vital power, may follow.

559. γ. In the *primary putro-adynamic*, or in cases attended by indistinct signs of invasion, and by imperfect reaction, we can hardly venture upon depletion, unless indications of congestion or prominent affection of an important organ present themselves. In this instance, local depletions, or dry cupping, may be tried. If petechiæ appear early in these cases, or if the pulse be very compressible, very small, or broad and open; if the skin be cool, damp, or unnatural, yet not hot; if the tongue be flabby, or covered by a dirty mucous, although the fever is evidently not far advanced, or is very recently passed the stage of invasion; then bleeding should not be attempted. In this case, very different means must be em-

ployed; and with an energy proportionate to the prostration of strength attending these symptoms. If petechiæ, or vibices, or blotches, have appeared on the skin, they will furnish an additional indication, particularly if they assume a dun, or dark, or livid colour; and will indicate the propriety of having recourse to the tonics, stimulants, and antiseptics, and the combinations of them, about to be noticed.

560. δ. In *either form* of this fever — in the *first*, after depletions, in the *second*, after the operation of an *emetic*, which should be given at any time during the invasion, or for three or four days afterwards — the bowels ought to be freely evacuated, by either of the mild *purgatives* mentioned above, and by the occasional use of laxative enemata; and frequent but small doses of *nitre* may be afterwards exhibited in the saline medicine already prescribed, or of the *muriate of ammonia*, in camphor mixture, or any other suitable vehicle. These latter are more especially indicated, if any heat is felt in the region of the stomach, and if the tongue is red at its edges and point. If there be increased heat of skin, tepid sponging the surface with the weak nitro-muriatic solution, or with a mixture of pyroligneous acetic acid, rose water, and camphor mixture, will prove both grateful and beneficial. — It is seldom, even in the primary putro-adynamic, that *tonics* are productive of much benefit very early in the disease. But, when exhibited with *refrigerants*, they are often of great service. The infusion or the decoction of cinchona, either with the solution of the acetate of ammonia, and nitrate of potash, or with the muriate of ammonia, a few drops of muriatic acid, and sometimes also with muriatic ether, is the kind of tonic which I can recommend from experience, as being the most suitable to an early stage of adynamic fever.

561. It is in this variety of typhoid fever, more especially, that the question as to the superior efficacy of alkaline medicines and of the non-purgative salines, or of mineral and vegetable acids, becomes a matter of extreme importance. Of the latter I can speak from observation; of the former I have not yet made sufficient trial to enable me to form a satisfactory opinion. It were to be desired that Dr. STEVENS, who has so strongly advocated the use of alkaline and saline substances in this fever, would furnish us with that sort of evidence of their efficacy, which would justify an early and decided recourse to them; and that those, who have ample means furnished them of settling the question at issue, would at last put it beyond the reach of cavil. That these substances are beneficial, at least several of them, is fully shown by the experience of successive ages and of numerous writers. This is the case in respect of nitre, muriate of ammonia, and chlorate of potash, of the excellent effects of which I am convinced by repeated observation. But the superiority of alkaline subcarbonates over acids, has not yet been proved. It is also doubtful, whether or not the benefit found to result from the former has not chiefly proceeded from the medicines with which they have been combined. At present we are guided in some measure by what we know of the physiological action of these substances. The fixed alkaline carbonates redden the blood when carried into it; but they relax the tone of the digestive mucous surface. Nitre produces a similar change in the blood, and resists any tendency to decomposition. Acids constringe the mucous and contractile tissues, impart firmness to the coagulum, but render the blood more dark than natural. With these imperfect data, the experience derived from accurate observation ought to be our chief guide: and whether we adopt acids in the earlier stages of the disease, and alkalies subsequently, or reverse this order, or even prescribe, in conjunction with neutral salts, either an acid, or an alkali in excess, much difficulty will be felt in ascertaining how much is due to either of these means, and what may be legitimately imputed to other remedies, with which we may be morally bound to combine them, in order to render their beneficial operation more certain. When certain remedies, which have been particularly recommended in this form of fever, come under review, these substances will receive further attention.

562. In various states of putro-adynamic fever, *external derivatives* will be required, as in the other varieties. When bloodletting is necessary at the commencement, they should follow this operation, particularly when prominent affection of an important organ exists. As to the choice of derivatives, little need be added to what has been already advanced. If blisters be adopted, attention is sometimes required to prevent spreading or sphacelating sores. They should, therefore, be applied only until they cause redness of the surface; when they may be followed by a warm poultice. Equal care is necessary to prevent sphacelation of the parts pressed upon in bed, and the occurrence of foul sores, from the contact of the morbid excretions, or from both causes conjoined. The means likely to counteract or remedy this occurrence have been stated above (§ 166.).

563. ε. In the *modifications* of this fever, noticed above (§ 488.), a decided recourse to the same medicines as are necessary in the advanced stages of the regular form, must be had, more particularly when signs of colliquation are early and prominent. The intention in this case is to arrest the progress of the changes of the blood, by supporting the powers of life, and promoting the functions of excretion. If it should be found possible to correct, in a more direct manner, the state of the circulating fluids, this indication ought also to be adopted, and the means which operate in this way resorted to. In conformity with the former indication, full vomiting should be induced, if it have not already taken place, and a mild stomachic purgative afterwards given. This latter ought to be repeated, according to the state of the bowels, and the appearance of the evacuations, which will furnish indications for the employment also of enemata, and indicate such as are most appropriate. In the worst forms of erysipelas, and in diffusive inflammation of cellular structures, I have found equal parts of the decoction of cinchona, and the compound infusion of senna, with tartrate of potash, subcarbonate of soda, and compound tincture of cardamoms, an excellent purgative, and I see no reason against its use in this state of adynamic fever. After the bowels have been freely evacuated, decoction of cinchona, or a strong infusion of valerian, with chlorate of potash, and chloric ether, may be prescribed, according to the severity of the disease. Of the good effects of the decoc-

tion of cinchona with the compound tincture, nitrate of potash, and subcarbonate of soda, I can also speak from experience. When the prostration of strength is extreme, a pill containing two or three grains of camphor should be taken with each dose of either of these, at short intervals.

564. Other tonics, and different combinations of them from these now mentioned, will frequently be productive of great benefit, when morbid excretions have been evacuated. However specious the arguments adduced by some writers against the employment of *acids* in the putro-adynamic states of fever, it cannot be denied that good effects have been produced by them, especially when exhibited with powerful tonics. The infusion or decoction of cinchona, with muriatic acid, or with nitro-muriatic acids, and chloric ether (formerly Clutton's febrifuge); the sulphate of quinine with sulphuric acid, and Hoffmann's anodyne; and pyroligneous acid in large doses, with camphor, the solution of the acetate of ammonia, and tonic or aromatic infusions, or the infusion of serpentaria or of arnica, are the most energetic, and may severally be tried, according to the peculiarities of the case. A solution of camphor in acetic acid was a favourite medicine with many writers on putro-adynamic fever, and was employed by them both internally and externally.

565. Dr. Stevens's saline treatment is most appropriate in this form of fever. He directs twenty grains of the muriate of soda, thirty grains of the subcarbonate of soda, and eight of the chlorate of potash, to be given every two or three hours — or more or less frequently, according to the urgency of the case — dissolved in water, in the advanced stages. He believes that, when these salts are prescribed before the stomach has ceased to perform its functions, they will not irritate the alimentary canal, but will be absorbed into the circulation, and correct its morbid state. One or two table-spoonfuls of common salt may also be administered occasionally in a tepid gruel enema. The strength should, at the same time, be supported by strong beef tea, or the regimen about to be recommended.

566. ζ. If putro-adynamic fever be attended by *predominant affection* of any organ, local depletions, followed by external derivatives, will be necessary, particularly in an early stage of the fever. — At a later period, external derivation, and the other means advised for the complications of nervous fever, according to their seat, should be employed. In this variety, however, a more liberal use of tonics, conjoined with the antiseptics just mentioned, is generally required. — When this or any other form of typhoid fever is complicated with asthenic *inflammation of the fauces or pharynx*, or both, the means already recommended are quite appropriate. In these cases, deglutition is very difficult, and sometimes impossible. Recourse to external derivatives, and to injections, is then urgently required. The action of the bowels should also be solicited by purgative enemata, unless diarrhœa exist; and the medicines that are indicated should be administered in clysters, and in sufficiently large doses. As the patient is generally unable to gargle his throat, advantage will sometimes accrue from syringing it with any of the tonic mixtures above prescribed, or with a solution of the chloruret of lime or of kréosote; and if a part, or the whole, or either of these, should be swallowed, the more benefit will be derived.

567. η. If this variety become complicated with *diarrhœa*, disorganisation of the digestive mucous follicles and surface will rapidly take place, if the treatment be not prompt and judicious. The means already advised (§ 546. 447.) for this complication must be adopted in this case. If the diarrhœa occurs at an early period, it will generally be moderated by tonic infusions, with the nitrate of potash, or with the muriate of ammonia, and the compound tincture of camphor. A combination of ipecacuanha, nitre, camphor, and opium, or extract of poppy, will also often diminish or remove it. If *hæmorrhage* supervene from the bowels, these medicines will sometimes be sufficient to remove it. In more urgent cases, the energetic remedies previously directed (§ 547.), or the pyroligneous acetic acid, with camphor and kréosote, or turpentine, &c., should be prescribed by the mouth, and in enemata. When diarrhœa or hæmorrhage characterises putro-adynamic fever, the alkaline subcarbonates will frequently aggravate or perpetuate it, and render convalescence protracted. In other respects, the treatment directed for the complications of nervous fever, and for its last stages, is also suitable to this; these stages requiring either the measures just described, or several of those about to be noticed, with a more or less direct reference to the putro-adynamic state, or various combinations of the substances already enumerated (§ 548—555.).

568. c. *Treatment of Exanthematous Typhus* (§ 497.). — The *premonitory* and *invading periods* of this fever should be treated as recommended above (§ 540.), with the view of arresting or rendering more mild the procession of morbid phenomena.—*a.* In the *stage of reaction*, the indications are — (*a*) to moderate excessive excitement; (*b*) to guard important organs from the effects of prominent action.—If full vomiting has not occurred previously, it should be excited by an emetic, at the commencement of this stage, or on the first, second, or third, day of it. If, however, inflammatory signs have become evident, particularly if the lungs are affected, a moderate *bloodletting* should precede the emetic. The eruption, which generally appears in this period, is usually followed by slight alleviation of the symptoms, and should therefore be promoted by mild, tepid diluents, which may be made either diaphoretic, mucilaginous, or acidulous, according to circumstances. As to *bloodletting* in this disease, it is pernicious in many, if not in most cases; and not merely in the nervous, but even in this stage. In the mild and regular typhus, it is superfluous: but when a highly inflammatory character marks this period, or when local action becomes very prominent or excessive, it must not be omitted; otherwise the local affection may run into disorganisation, and the nervous stage will be rendered more protracted or dangerous. The amount, repetition, and mode of depletion, will depend upon the peculiarities of the case. — When the bowels are open in this stage, *purgatives*, unless of the mildest kind, are unnecessary. Severe purging is prejudicial, as it derives from the skin, interrupts the regular course of the disease, and risks the production of the enteric complication. Tonics and stimulants are also injurious.

569. β. In the *nervous stage*, the disease has induced a state of exhaustion; and the system requires to be supported, and even gently excited. HILDENBRAND recommends an *emetic* early in this period, if it have not been given previously; and *blisters* to be applied, about the seventh or eighth day, when the nervous stage commences. *Camphor*, with the solution of the *acetate of ammonia* and *nitre*, forms one of the best medicines that can now be exhibited. The quantity of camphor, however, should not at first exceed one grain every two hours, or a grain and a half every three hours. — *Arnica* was one of the medicines most commonly employed in Germany during the prevalence of this fever in that country, early in the present century. HILDENBRAND states, that its operation is stimulant, alterative, and, in large doses, emetic; and that it does not promote, but rather prevents, diarrhœa. In typhus, it lessens the stupor, giddiness, and delirium, and increases the cutaneous transpiration; but it is useful only when the inflammatory character is quite gone. It should be given in the form of infusion, in a quantity short of producing nausea. This most able and experienced writer advises also, in the course of this stage, the use of volatile stimulants, especially the infusions of the roots of *angelica* and *imperatoria*, and of the flowers of the *calamus aromaticus*.

570. In the typhus epidemic, in the military hospitals in Vienna and surrounding countries, during the late war, where it was impossible to prescribe for the cases individually, the following plan was pursued by HILDENBRAND, with great success, in the simple and regular disease: — On the first day of the fever, an emetic was administered, and succeeded by diluent diaphoretic decoctions. About the seventh day, when the typhomania and debility were increased, the skin and tongue dry, and the belly distended, blisters were put on the calves of the legs, and eight ounces of an infusion of two drachms of the flowers of arnica, and as much angelica root, with a little of HOFFMANN's anodyne, were given daily, two table-spoonfuls being taken every two hours, alternately with camphor powders. — Stimulants, in this fever, should be prescribed in frequent but small doses, rather than in large quantities. Cinchona and other tonics are superfluous as long as the disease is mild and regular. But they, together with wine, &c., are required, if the putro-adynamic state appears in this stage.

571. γ. If the preceding stages have been prudently treated, and if the disease has been regular and mild, nothing more is necessary in the way of medicine, as the *period of crisis* approaches, than to promote the evacuations attending it; and, as the chief of these is perspiration, mild diluents, and the diaphoretics in common use, or those just mentioned, are to be continued. All medicines should not be abandoned immediately after a crisis. Stimulants, however, should be milder, and given at longer intervals. HILDENBRAND advises the camphor and arnica to be given up, and the infusion of angelica to be continued for some time. As *convalescence* advances, the treatment should be chiefly dietetic and regimenal.

572. δ. The *irregular forms of typhus*—the modifications and complications — require appropriate means, or variations of the procedure now recommended.—If the *inflammatory character* is violent, a more active antiphlogistic treatment is necessary. But the existence of deficient power, and the knowledge that the nervous stage must follow, should influence the practitioner. For an inflammatory state of the brain, or the semi-apoplectic state, bleeding generally and locally must be adopted, to an amount which the circumstances of the case will suggest. When the lungs are affected, this practice, aided by antimonials, blisters, and diaphoretics, is equally necessary. If the inflammatory state be not entirely removed, and if it is not safe to bleed more, or if this state be prolonged into the nervous stage, external derivatives and antimonials are to be chiefly confided in. The same practice is applicable to the association of *hepatic disease* in this stage. The affection of the intestinal mucous surface requires the same treatment as was recommended in synochoid and nervous fevers (§ 546. *et seq.*) — Sometimes the *gastric* or *bilious* character predominates, particularly in summer and autumn, owing to impurities in the prima via, and accumulations of bile in the hepatic ducts and gall-bladder. Emetics are necessary in these cases especially, unless there are indications which forbid them; and mild purgatives, in the inflammatory stage — in the nervous, aperient clysters — should be preferred.

573. ε. In the nervous stage various irregularities often occur. If this character is excessive, or has taken place suddenly, large and repeated doses of volatile stimulants are necessary. Camphor, ammonia, ether, musk, cinchona, serpentaria, wine, opium, and blisters, are severally useful, when judiciously combined. Phosphorus has been recommended for this state, but HILDENBRAND found it useless. During this stage, a passive, asthenic, or nervous, kind of inflammatory action may occur, particularly in the mucous surface of the intestines and in the mucous follicles; but it sometimes also affects the brain and lungs. When it attacks the *intestines*, there is a painful feeling excited by pressing the abdomen; the pulse is small and irregular or unequal; the belly is tympanitic or tense; and the stools very frequent and morbid. For this state, a moderate or small local depletion; blisters, sinapisms, or hot turpentine embrocations, followed by warm poultices, over the abdomen; camphor, with hydrargyrum cum creta, and DOVER's powder, in large quantities of mucilage; or camphor with ipecacuanha, nitre, and opium; mucilaginous enemata, with extract of poppies, &c.; and the other means already mentioned (§ 547.); should be chiefly relied upon. If this form of inflammation, or of inflammatory congestion, attack the *liver*, tenderness and fulness in the right hypochondrium, and jaundice, generally accompany it, and a very dangerous complication results. Local depletion is sometimes of use, but as frequently it is of little service. Mercurials, excepting, perhaps, the hydrargyrum cum creta, are still less efficacious. Blisters over the hypochondrium and epigastrium; frictions with rubefacient liniments in this situation; rubefacient applications on the insides of the thighs; emollient and aperient enemata, if the bowels require to be assisted; camphor, with nitre, or sulphate of potash, and anodynes; diuretics conjoined with mild diaphoretics; and the nitro-muriatic acid given internally with the spirits of nitric ether, or used externally as a lotion or wash; may severally be productive of benefit.

574. ζ. The nervous inflammation of the *brain* is indicated by sopor and profound typhomania, and should be combated by blisters on the head; by camphor, by arnica, and the means directed for this affection in nervous fever (§ 548.). If tightness of the chest and dyspnœa occur in the nervous stage, congestion of the weakened vessels of the *lungs* may be inferred. In this state, a small bleeding, to the amount of four or six ounces, may be directed in some cases, and followed in all by blisters on the chest, and antimonials conjoined with camphor.

575. ε. If the *putro-adynamic character* supervenes and predominates as the nervous stage proceeds, the debility, equally with the morbid state of the blood, requires attention. The preparations of cinchona, either with mineral acid, or with alterative neutral salts, large doses of camphor, wine, opium, and the other means directed for the various phases and complications of this condition, will be required according to the peculiarities of individual cases. If *diarrhœa* or *dysentery* comes on in this state, opium in large doses, but at distant intervals; warm dilute wine, with spices and other aromatics; mucilaginous and farinaceous liquids, or gruel, with common salt, taken in small quantities but often, and administered in enemata, with syrup or extract of poppies; and the other remedies noticed above (§ 553.); should be prescribed. — If *singultus* or *meteorismus* occur, they should be treated conformably with the principles already explained (§ 554.). — Swellings of the parotids are unpleasant accidents, even when critical. They should be checked at first by keeping the bowels moderately open, and cold applications to them. If this end be not accomplished, then suppuration should be promoted by stimulating poultices; and the abscess should be early opened, in order to prevent contamination of the surrounding cellular parts. If gangrenous sores appear in any part, the means directed above (§ 166.), more particularly the chlorides, kréosote, powdered bark, turpentine, &c., either severally, or variously combined, or in the form of wash, epithem, or poultice, ought to be promptly and assiduously employed.

576. iii. *Of certain Medicines, &c. in Typhoid Fevers.* — *a. Antimonials*, especially James's *powder* and *tartar emetic*, are frequently of service in the early stages of fever: the latter for its emetic operation, and its febrifuge or contra-stimulant action during excitement; and the former for this last effect, in connection with its diaphoretic influence. The remarks already offered respecting these medicines (§ 162.) are applicable to the use of them in the fevers under consideration. It is chiefly in the early periods, in the more inflammatory states, in the pulmonary complications, and either in aid of, or as substitutes for, bloodletting, that they should be employed, more particularly tartarised antimony. However, the results of Razori's practice, and the recent trials made of this medicine by Dr. Graves, in the advanced stage of typhus, indicate the propriety of having recourse to it, at a later period, in much more liberal doses than have been hitherto considered safe. This able physician, reasoning from the good effects of the medicine in delirium tremens, was induced to resort to it in a case presenting a quick, failing pulse; a black, dry, tremulous tongue; tympanitis; low, muttering delirium; startings of the tendons, and nervous agitation. He prescribed four grains of tartar emetic, in eight ounces of camphor julap, with a drachm of tincture of opium — a table-spoonful to be taken every second hour. The patient vomited after the second dose; and, after the fourth, he fell into a calm sleep, and soon recovered. Besides the good effect of this medicine, that of vomiting at this stage of fever, as recommended by many of the older writers, is shown by this case. Dr. Graves refers to other instances (*Lond. Med. and Surg. Journ.* vol. vii. p. 541.), in which tartar emetic and opium produced decided benefit, in most unfavourable states of the advanced periods of low nervous fever, and of exanthematic typhus. The combination of tartarised antimony with nitre is most appropriate in the stage of excitement; but, in the nervous stage, opium seems indispensable to the good effects of the antimony.

577. *b.* Of other *antiphlogistic* and *contra-stimulant means*, it is unnecessary to add any thing to what has been already advanced. The contradictory opinions entertained as to the propriety, or amount, of depletion are readily explained, when the various forms of typhoid fever, and circumstances of the case, are taken into consideration, in connection with the intentions with which *bloodletting* on the one hand, and *restoratives* on the other, are resorted to; and with the fact that both are very frequently required, not only consecutively but even simultaneously. This circumstance was well known to very many of the numerous writers on these fevers during the three last centuries, both in this and in foreign countries. They well knew and strenuously inculcated the fact, even as late as the days of Clarke, that, in order to prevent the accession of the putro-adynamic state, it is necessary to bleed, and to use other antiphlogistic remedies, with decision, early in various fevers and epidemics. And next to bleeding, *nitre* and the *muriate of ammonia* were held in estimation, for their effects in lowering morbid reaction at the commencement of typhoid fevers, and in preventing putridity in advanced stages. Thus, whilst *nitre* was conjoined with antimonials, ipecacuanha, small doses of camphor, or with the spirits of nitric ether, to fulfil the former intention, and to promote perspiration and the action of the kidneys, it was given mith tonics and stimulants, to produce the latter indication. The writings of Delius, Hillary, Haenel, Wood, Razori, and many others, show us how very little we have hitherto improved upon their practice in these fevers. The same remark applies to the use of the *muriate of ammonia*, whose operation as a refrigerant, antiseptic, and tonic ranks it as one of the best and most generally applicable of the many remedies employed in fever.

578. *c.* As to the use of *alvine evacuations*, we have arrived at similar conclusions to those very generally acted upon during the seventeenth and eighteenth centuries, but partially lost sight of towards the close of the latter. — The good effects of *emetics* at the commencement of typhoid fevers were almost universally admitted, until Broussais banished them from his code of therapeutics. — That circumstances sometimes sometimes occur, which either render them unnecessary, or even forbid them altogether, has been allowed; but

very sufficient evidence has been adduced of their good effects, more particularly in the periods of premonition and invasion, and even early in that of excitement. Many writers of great experience, especially Cheyne, Tuomy, Stoll, Sandiford, Reil, Hildenbrand, Hufeland, &c., have advised them in the advanced stages of these fevers; and, although they are rarely employed in these periods by practitioners in this country, I believe that they will often prove of service even then, when judiciously resorted to, in exanthematic typhus. The injurious effects imputed to them by Marcus, Wendelstadt, Broussais, and others, are to be referred to the employment of them in the gastric complication, and in other circumstances which contra-indicate their use.

579. The operation of *purgatives* in low fevers is now well understood; the indiscriminate use of them encouraged by the writings of Hamilton having been checked and tempered by the partial adoption of the views of Broussais. And yet I believe that the particular state of the intestinal mucous surface that exists in these fevers may be increased by a neglect of this class of medicines; and that, when appropriately combined, many of them are calculated to prevent, or to alleviate, the morbid condition which the disciples of Broussais imagine them to produce. — A tolerably active purgative early in excitement, or in the other circumstances above noticed, both lowers excessive action, and removes morbid excretions, which, if allowed to remain, would prove a cause of irritation and contamination to the frame. In cases, however, where the vascular excitement is attended by vital prostration, either early or late in the disease, the use of purgatives requires much caution. When excitement is considerable, *calomel* with jalap, or with rhubarb, will be given at first with advantage; but, in other circumstances, the calomel should be withheld. When, with excitement, there is considerable pulmonary affection, the tartrate of antimony may be added to the purgative adopted, as advised by Dr. M'Cormac, and indeed very generally adopted in practice. But when vital depression is the predominant feature of the disease, we should be as cautious in the use of purgatives, as in having recourse to bleeding. The evacuation of the serous portion of the blood by means of the former, is nearly equally depressing with the latter operation. In the advanced stages, and especially when putro-adynamic signs begin to appear, the blood-vessels, owing to the loss of a great portion of their tonic contractility, cannot accommodate themselves to the evacuation of much of their contents, in whatever way it may be effected; for the column of blood in the vessels is no longer presented to the contraction of the ventricles in that state of tension, which favours its healthy circulation. If the bowels, however, require the aid of a purgative, during a state of prostration, it ought not to be withheld; but it should be so selected, as to produce no greater evacuation than may appear requisite, and be so combined as to leave a tonic or salutary impression upon the digestive mucous surface. In such cases, equal parts of the compound infusions of gentian and senna, or an infusion of cinchona and rhubarb, or the compound decoction of aloes, or rhubarb and subcarbonate of soda, or the purgatives already mentioned (§ 150, 151.), or some of those prescribed in the *Appendix* (F. 180, 181. 205. 216. 252. 433.), may be resorted to. In the putro-adynamic form, and in the advanced states of typhoid fever, purgatives ought to be always combined with tonics and aromatics. They should never be given, excepting very manifestly required; and then in moderate doses, and combined as now advised, particularly when there is diarrhœa, or evacuations of blood, or meteorismus. However, rhubarb, or turpentine, in small or moderate doses, with aromatics, will often be of much service in such cases.

580. *d.* There are several *stimulants* of great use in low fevers; and which, owing to their peculiar or febrifuge operation, may be given with great benefit, in that state of excitement, which is attended by vital prostration, as well as in more advanced stages of the disease. Of these the most applicable and beneficial is *camphor*. This substance is most generally adopted; and has received the encomiums of most writers on typhoid fevers, and more particularly of Riverius, Stoll, Ferro, Home, Marcus, Thomann, Gebel, Reil, Schlegel, Horn, and Hildenbrand. I have prescribed it not only in these, but also in pestilential, exanthematic, puerperal, and common continued fevers; and am satisfied as to its good effects, either when exhibited alone, or when combined with other appropriate medicines, and given in proper doses. In the *stage of excitement*, the dose, and the medicines which should be associated with it, should have reference to the state of vital power, to the mildness or severity of the disease, and to the nature of the prominent affection or complication. In this stage, particularly if vital power is not much lowered, it may be given in frequent doses of half a grain, or a grain, with a weak solution of the acetate of ammonia, or in a mixture with it and spirits of nitric ether, or with nitre (F. 494. 496.), or with muriate of ammonia (F. 431.), or with antimonials (F. 493.), or with any two or more of these. It may be also exhibited, in some circumstances with advantage, conjoined with calomel. If vital power is much depressed in this stage, the dose of the camphor may be increased, and the antimonial or the calomel omitted, or given merely at the outset. In some one or other of these combinations, it will prove of benefit, whatever complications the fever may present. As the disease passes into the *nervous stage*, and, more especially, as this stage passes into extreme exhaustion, the dose of camphor should be increased, and it may then be conjoined with tonics, various stimulants, antiseptics, &c., as arnica, cinchona, serpentaria, valerian, angelica, opium, sulphate of quinine, the chlorides, musk, aromatics, &c., according to the period and peculiarities of the disease. Many of the best writers in Germany prescribe it, early in the nervous stage, with arnica, or with acetic or citric acid. Hautesierk, Callisen, Ludwig, Bonnevault, Frank, Jaegerschmidt, and Hufeland direct a solution of camphor in acetic acid to be taken internally, and used externally, early in most states of typhoid fever. With the pyroligneous acetic acid, the camphor may be conjoined with still greater benefit. The inflammatory state of any organ supervening in the course of typhoid fevers does not contra-indicate the use of camphor, if given appropriately to the degree of vascular action and of vital power,

581. *Arnica* has been very much employed in Germany in low fevers, and in the nervous stage of typhus, yet it has not received a satisfactory trial in England nor in France. Stoll, Fischer, Collin, Ferro, Mercier, Frank, Richter, Hecker, Hildenbrand, and other high authorities recommend it, generally as directed above (§ 569.). Quentin prescribes an infusion of it with valerian. The flowers and the root are most commonly employed, and usually in the form of a weak infusion (F. 222, 223.).

582. In the low nervous form of typhoid fever, as well as in the nervous stage of exanthematic typhus, or in that stage and state of the disease for which the German physicians prescribe arnica, *valerian* may be employed with advantage. Matthæi, Frize, Reil, Thomann, and others recommend it. I have given an infusion of it in several cases, and made it the vehicle of other medicines, particularly the chlorate of potash, camphor, the alkaline subcarbonates, serpentaria (F. 269, 270.), &c. It is indicated in such states of fever as require a gentle tonic and stimulant of the nervous influence, especially when the nervous symptoms are prominent, although the head be cool, and the pulse weak. In these circumstances it may be conjoined with camphor, tonics, &c.

583. *Serpentaria root* was praised by Frize, Stoll, Reil, Marcus, and others, in the advanced stage of low fevers, and in the circumstances just mentioned. It is still used, when the skin is cool or the pulse is weak, and when warm stimulating tonics are required. It is most serviceable in the form of infusion, with aromatics and tonics (F. 262. 416. 826.). *Angelica root* was recommended by Reil; *imperatoria root*, by Hoffmann; and the root of *calamus aromaticus* by Hildenbrand. They are very rarely employed in this country, although they are of service, particularly in the form of infusion, as vehicles for other medicines, and on account of their warm, diaphoretic, and stimulant effects. They may be employed variously combined with each other, or with camphor, tonics, &c.; and are indicated in the same circumstances as require the use of arnica, viz. in the low nervous and putro-adynamic states. Their infusions are good vehicles for tonics, the chlorates, or alterative salts. I have sometimes prescribed them with chloric acid and chloric ether, or with the chlorides of soda and potash.

584. *e. Cinchona and other tonics* have been praised by Huxham, Lind, Langrish, Grant, Westphal, Sims, Vallisneri, Casson, Fordyce, and most of the writers on fever during the last century, and by many contemporary authors; whilst others have attributed more or less mischief to their use. When the various forms of typhoid fevers, their complications, and the very different pathological states in the successive stages of their course, are considered, this contrariety of opinion is easily explained. When the nervous stage has appeared, and when the putro-adynamic state is pronounced, whether early in the disease, as in the putrid or septic variety, or in the advanced stages of the nervous and exanthematous, the preparations of *cinchona*, and the *sulphate of quinine*, are the best tonics that can be selected, both for the permanence of their action, and for their influence in arresting the disposition to colliquation that pervades the fluids and soft solids of the frame. In the early states of the disease, and where the propriety of having recourse to tonics is a matter of doubt, the *infusion of bark*, with the solution of the acetate of ammonia, and spirits of nitric ether, or the *decoction of cinchona*, with nitre and muriate of ammonia (F. 437, 438.), will generally prove serviceable.

585. *f.* The propriety of having recourse to *acids* in the states of low fever just alluded to has recently been disputed; and if the effects produced by them on the blood be considered, as shown by the experiments of Friend, Eller, Gianella, Haller, &c., and as stated in the article Blood (§ 135, 136.), rational doubts of their salutary influence may be entertained: yet the experience of most writers is in favour of them, particularly in fevers of a low character. Spangenberg, Huxham, Langrish, Wood, Mursinna, Rowley, Boyer, Rademacher, Schlegel, Horn, Fordyce, Bang, Millar, Frank, Hufeland, &c. recommend the *mineral acids*, especially the *muriatic*, in the circumstances mentioned above. From a careful observation of their effects in many cases, I believe that they will prove beneficial in some cases, and injurious in others, according to the period and state of fever, and the mode of prescribing them. If they are given before the blood has become materially altered, and the vital energy much exhausted, but after requisite vascular or alvine evacuations have been carried sufficiently far — whilst the skin is still warmer than natural, and whilst the pulse is broad, open, and compressible, the mineral acids, with tonic infusions, will generally be serviceable. In this state, the infusion or decoction of cinchona may be given with muriatic acid and chloric ether; or the sulphate of quinine, with infusion of roses and sulphuric acid, or also with sulphuric ether. When the prostration is considerable, this latter may be the more energetic medicine. In more doubtful cases, particularly when the heat of surface is great, the infusion of cinchona or of valerian may be given with the nitrate of potash, or with the *nitrate of soda*, a few drops of nitric acid, and the spirits of nitric ether; and when the skin is cooler, either of these infusions, or some one of the others already mentioned, may be prescribed with equal parts of the *nitro-muriatic acid* and the tincture of serpentaria.

586. In the treatment of typhoid fevers it should never be forgotten that the state of the circulating fluids depends chiefly, if not entirely, upon that of the organic nervous influence, and that agents which apparently deteriorate the blood may yet be of use by administering to this influence. The *carbonic acid* gas was supposed by Jansenn, Fortier, and Percival, to act as an energetic tonic, when taken into the digestive canal; and they, therefore, directed the use of those fluids which contain it most abundantly; and even advised it to be thrown up the rectum. A similar practice was lately recommended by Dr. Clanny, with the view of supplying the blood with this substance. But M. Chomel has shown the inefficacy of the practice (§ 538.). The acids which have appeared to me most serviceable in the early period of the adynamic, nervous, or putro-adynamic forms, are the muriatic, and the pyroligneous acetic, particularly when given in the decoction of bark (F. 388.), or in either of the warm stimulant infusions mentioned above.

When the nervous or putro-adynamic states are far advanced; when the temperature is low, and the skin lurid or discoloured; I believe, that whatever benefit follows the use of mineral acids, depends chiefly upon the salutary efforts of nature, or the substances prescribed at the same time. In the state just mentioned, the more energetic tonics and stimulants, in conjunction with camphor, the chlorate of potash, opium, wine, &c., are much more deserving of confidence. Besides cinchona and sulphate of quinine, other tonics, as cascarilla, calumba, gentian, &c., may be used; but they are inferior to bark; and ought to be given chiefly in conjunction with substances appropriate to the peculiarities of the case. The *willow bark* has been recommended by OTTO, SCHLEGEL, WHITE, and HUFELAND, but it does not appear to be equal to cinchona.

587. *g.* The *chlorates, &c.* — The *chloride of potassium* (muriate of potash) was first employed, under the name of digestive salt, by SYLVIUS; and, owing to its febrifuge properties, it afterwards obtained the appellation of febrifuge salt of SYLVIUS. It was given in doses of from one to two or three drachms: and, although its action is stimulant, aperient, diuretic, and antiseptic, it has seldom been used in modern times. It is of service in the low stages of fever, and when there is evident change in the circulating and secreted fluids; but it is inferior to the *chlorate of potassa* in these states. This latter salt was recommended by GARNETT and some other writers, but at no time has it been generally used. I have prescribed the chlorate of potash in several diseases, since 1819, and consider it a valuable medicine, especially in the advanced stages of typhoid fevers. When excitement or vascular reaction is about to pass into the nervous stage, and when inflammatory determination has been removed, either of these salts, but the latter especially, will be prescribed with benefit. The chlorate may be advantageously conjoined with tonics, and camphor; or it may be given in doses of five or seven grains every two or three hours, in tonic infusions, or in larger quantities at longer intervals. — A solution of *chlorine*, or of *chloric ether*, or of both, may be used in the same states, for which the chlorate of potash or the chlorides are here recommended.

588. The *chloride of sodium*, or common salt, although sometimes used, in various forms, but commonly as an aperient and anthelmintic, by the older writers, has recently been seldom resorted to, excepting in enemata, in the treatment of low fevers. Formerly *putridity* was much insisted upon as a characteristic of certain states of fever; for, owing to the intensity and concurrence of the exciting causes, to the treatment, and to the influences in operation through the course of the disease, these changes of the fluids and soft solids, which, although not strictly putrid, yet somewhat resemble it, or even approach it, were common occurrences, in the course of the inflammatory, as well as of the adynamic varieties. These changes, inasmuch as they consist, in some measure, of an incipient dissolution of the vital cohesion of the tissues, and of the healthy condition of the fluids, quickly passing, with the disappearance of life, into manifest decomposition, were not altogether inappropriately termed putrid; and, for want of a more suitable name, they may still retain the denomination. With the modern disuse of this term, and from a disbelief of the possibility of putridity taking place in a living body, the operation of medicines in preventing or counteracting it was denied. Thus an *antiseptic* property was denied to medicines, although it could not be doubted that many substances had the power both of averting and of remedying the changes usually termed putrid. This power was imputed to their influence upon the nervous system, particularly the cerebro-spinal part of it. I have, however, shown at other places, by experiments performed by myself and others, that numerous substances are quickly conveyed into the circulation, where they directly change the state of the circulating fluids and secretions, and affect the organic or ganglial nervous influence.

589. Conformably with this view, the older opinion as to the operation of antiseptics on the living, as well as on the dead body, — that certain substances prevent or counteract the changes usually denominated putrid or septic, — seems well founded. There can be no doubt that the circulating fluids are contaminated or altered in the course of fever, owing to the *superabundance* of certain constituents, and the *loss* of others necessary to the continuance of health. The impeded functions of the lungs, the skin, liver, and kidneys, in the early stage of the disease, will occasion the former of these changes; and the stop put to the functions of digestion and assimilation — to the sources of supply — will produce the latter. That the muriate of soda is necessary to the healthy state of the blood, cannot be doubted; it therefore follows that the privation of it, for a number of days, during the treatment of fevers, will materially favour the morbid condition which the fluids assume in the advanced stages. But as other substances, as the muriate of potash, muriate of ammonia, nitrate of potash, and nitrate of soda, act on the blood and on the economy in a similar manner to the muriate of soda, although not so beneficially, universally, and permanently as this last, which has been so bountifully supplied by nature, we are enabled to account for the benefit derived from the use of them, in the advanced stages of fever, by writers in the sixteenth and seventeenth centuries. It seems very probable, that the common salt taken so abundantly with our food, after having produced the effects arising from its neutral state, is decomposed by the nervous or vital influence, or by the electricities circulating through the frame; and that each of its constituents performs ulterior offices in the economy, that are necessary to the continuance of health, and enters into new combinations, produced by the actions of the respective organs, in the circulating and secreted fluids.

590. If this view be just, the insufficient supply, or the privation, of this salt in the early stages, whilst the discharge of it continues by the excretions, in either its neutral or its decomposed states, will cause a deficiency of it in the blood in the advanced periods of fever, and will give rise to further changes both in the circulating and in the secreted fluids. In conformity with this opinion, a modification of the medical and regimenal treatment, usually recommended in typhoid fevers, should be adopted. It is not improbable, that the evils resulting from a total privation of a substance so necessary to the

healthy discharge of the functions, as the muriate of soda is, would have been more generally manifest in these diseases, if other substances, acting somewhat similarly upon the blood and on the system, had not been commonly employed in the treatment of them. I have been led, by the antiseptic properties of certain medicines, to have recourse, in the latter stages of low fevers, to the most energetic of them, particularly the nitrate of potash, the chlorate of potash, the muriate of ammonia, camphor, and the terebinthinates, cinchona, &c. in various combinations, either with each other, or with different stimulants and tonics, with the view of exciting the nervous influence, of supporting the powers of life, and of counteracting the changes, frequently terminating in a dissolution of the vital crasis and cohesion of the fluids and soft solids. But in fevers, which are characterised by excessive action at the commencement of excitement, and by extreme exhaustion, loss of irritability, and depravation of the fluids, in the latter stages, a too early recourse to some of these medicines may increase the morbid action, and aggravate local determinations; while a too cautious reserve of them, either as to quantity or as to the period of fever, may allow the diseased changes to proceed without interruption to a fatal issue. It is, therefore, imperatively required of us, that we should determine, by attentive observation, both the exact period in which medicines of this description should be commenced with, and the particular substances that should be first employed. As respects the kinds of fever just alluded to, as well as those forms which are either nervous, or more uniformly putro-adynamic, at earlier stages, we are at no loss for means, which are both refrigerant and antiseptic, and which may be employed from the commencement, either when excitement is most excessive, or when it is entirely absent, if due care be taken in the mode of prescribing them. By this early attention, particularly in putro-adynamic and inflammatory putrid fevers, to those means which may best preserve the fluids from the changes they are apt to undergo, especially when these fevers are left to themselves, or injudiciously treated, the advanced stages are rendered much more mild and even manageable. The more refrigerant of the substances, formerly termed antiseptics, as nitrate of potash, nitrate of soda, muriate of ammonia, &c., when duly administered in the early course of fever, and combined with or followed by those which are more stimulant and tonic, as camphor, cinchona, chlorate of potash, arnica, &c., as exhaustion and signs of putro-adynamia appear, will generally prevent the more dangerous changes in the fluids from taking place. The *muriate of ammonia* is now seldom used internally, although Hoffmann, Jacob, Barchusen, Loesecke, Tissot, Werlhof, Monro, Hirschel, Hillary, M'Causland, Gmelin, and others, have recommended it highly in putro-adynamic fevers. I have frequently employed it; and Dr. Conwell has found it of great service in the fevers of India. Schmidt prefers it in such cases as are attended by diarrhœa.

591. About the time when M. Labarraque discovered the *chlorides of soda* and of *lime*, cases of fever of a putro-adynamic or malignant form were frequently occurring in an institution to which I am consulting physician. I had made trial of various methods of treatment, but found camphor, in large doses, variously combined, and aided by other means according to the peculiarities of the case, the most successful of any. Shortly afterwards, M. Labarraque's process for preparing these chlorides was published at Paris; and as early as 1825 I procured them from Mr. Morson, for the use of this, and another institution, to which I was physician. I employed them internally, in enemata, and externally, and as disinfectants; and the results were such as have induced me to have recourse to them ever since, in the various circumstances and diseases in which I have recommended them in this work. The *chloride of soda* is a valuable medicine in all the typhoid forms of fever, when judiciously prescribed. It may be given early in the putro-adynamic variety, when excitement is imperfect or low, and the skin discoloured, or petechiæ are appearing, and continued throughout the disease. But when vascular reaction is considerable, or local determination prominent, particularly in the nervous and exanthematic varieties, this substance should be withheld, until these states are subdued, or about to lapse into the nervous stage. — At first it ought to be prescribed in small doses, so as not to offend the stomach — in from ten to fifteen drops of the solution, as prepared by Labarraque, every three or four hours, in camphor julap or in an aromatic water. As the disease passes into a state of exhaustion or of manifest putro-adynamia, or when there are a lurid skin, low muttering delirium, stupor, meteorismus, black sordes on the tongue, teeth, &c., the supine posture, inconscious offensive evacuations, petechiæ, blotches, a disposition to gangrene in parts pressed upon, coma, &c., it should be given in larger doses, or more frequently, and in tonic infusions or decoctions, or with camphor, serpentaria, or other stimulants and tonics. I have seen it productive of great benefit in such cases; but it should be commenced before these symptoms appear, and be persisted in, as its good effects are seldom manifest in less than three or four days, or more; and it should not supplant the use of wine, opium, suitable nourishment, and other means which the stage of the disease and peculiarities of the case may suggest. It should also be frequently administered in enemata; and the surface of the body ought to be often sponged with a stronger solution of it in warm water, with the addition of camphor. M. Chomel has lately given the chloride of soda an extensive trial; and he states that it has proved more successful in low fevers than any other means, when perseveringly employed. Dr. Graves has also recently employed it, and has found it extremely serviceable. It acts, first, on the tissues with which it is brought in contact, as a gentle stimulant and antiseptic; and is most probably partially decomposed in the digestive organs, and reduced to the state of common salt. In this state it is carried into the circulation, where it supplies the waste of this substance that has taken place in the early stage of the disease.

592. The *chloride of lime*, in doses of one or two grains, may be also employed with great advantage. When exhibited in solution, it will be preferable to commence with half a grain every hour, or with a grain every two hours, gradually increasing the quantity as the stomach

may tolerate it. It is best adapted to the more extreme cases of putro-adynamia, and especially to those attended by urgent diarrhœa and meteorismus. In these it may be conjoined with camphor and other stimulants. It was employed by Dr. **Reid**, of Dublin, in low fevers and in dysentery, a few months after the period of my having first had recourse to the chloride of soda. It may be prescribed in the same circumstances and combinations as the latter; but is not so generally appropriate, nor does it admit of so early, or of so prolonged, an exhibition.[*]

593. *h. Alkalies* and *alkaline carbonates* have been employed in various states of typhoid fever, and frequently with service. The *carbonate* and other *preparations* of *ammonia* have been very generally resorted to when diffusible stimuli have been required. In the early stages of these fevers, the carbonate may be used, with advantage, to make a neutral saline mixture with the pyroligneous acid, and either the alkali or the acid may be given in excess, or the mixture may be taken whilst effervescing. The preparations of ammonia are most useful in the nervous and exanthematic varieties of typhoid fever; and in conjunction with camphor, or with tonic infusions, in the nervous stage. In the putro-adynamic state, they have seldom appeared to me to have any good effect, unless combined with these, or other tonics.

594. The *carbonates* of *soda* and *potash* are seldom used unless to form neutral *citrates* or *tartrates*, and to obtain the fixed air given out during the combination. The advantages of this latter are, however, by no means considerable; but the salts themselves are of service, by supplying, in some respects, the place of that commonly employed. The *subcarbonate of soda* has been occasionally used, and is recommended by Dr. **Stevens** as an ingredient in his saline powders. In the more adynamic states of typhoid fevers, or in the intestinal complications, the subcarbonate of soda should be given in a tonic infusion or decoction, with camphor, and with opium, or extract of poppy, or compound tincture of camphor, to prevent it from relaxing the digestive mucous surface, and from increasing the diarrhœa. Unless it be thus combined, or conjoined with the chloric salts, which Dr. **Stevens** directs, it may not only aggravate the affection of the bowels, but also favour relapses, or cause the disease to pass into the dysenteric complication. An *acetate of soda*, formed by pyroligneous acid, with an excess either of the acid, or of the alkali, according to the state of disease, and taken whilst effervescing, or afterwards, appears to me, from the few cases in which I have had an opportunity of using it, to deserve a more extensive trial.

595. The salts employed by Dr. **Stevens**, viz. the muriate of soda, the subcarbonate of soda, and the chlorate of potash, cannot be supposed to act, even upon the digestive organs, in the states in which they are prescribed, without undergoing some change from their mutual action, and from the fluids with which they mix. Indeed, the results may be assumed to be muriates of soda and of potash, and subcarbonate of soda, taking the proportions of the individual salts into consideration. When these salts are taken into the stomach during the middle and latter stages of typhoid fevers, the passage of at least a portion of them into the circulation may be expected, and the loss of the saline ingredients of the blood in the early stages, argued for above (§ 588.), will be supplied. Upon this principle, and for the reasons there stated, this method deserves a more extensive trial than it has hitherto obtained; and when the nature of the salts, and the modes of their operation, are considered, it does not seem to differ materially from that by means of the chloride of soda, first adopted by myself.—There are certain points upon which Dr. **Stevens** very strongly insists, and which are partly contradicted and partly confirmed by former observers: these are—1st, The superabundance of acid in the excretions; 2d, The influence of all acids in rendering the blood dark and grumous; and, 3d, The mischief produced by them in the latter stages of fevers. Now, without disputing the accuracy of the first statement, although a confirmation of it is required, I will admit the truth of the second; for it agrees with my own experiments, and with those performed by writers early in the last century, to whom I have referred in the article **Blood** (§ 135.). That acids will be injurious in the latter stages of fever, seems a rational inference from these experiments, in connection with the dark and morbid state of the blood at that time; and yet numerous writers have recommended them, and adduced proofs of their good effects even in the most malignant states of remittent, continued, and exanthematous fevers. The muriatic or hydro-chloric, citric, and pyroligneous acids have been severally employed in these states, and found of service; but they have also frequently failed. That the blood is black and dissolved in scurvy cannot be doubted, yet the advantages derived from citric acid have been great, unless some remarkable delusions as to the causes and treatment of this disease have existed[*]; and

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[*] Dr. **Reid** mentions an important fact illustrating the cause of putro-adynamic fevers, — a cause which exists to a greater extent than is supposed, especially in large cities, although in a much less degree than in the instance about to be adduced. At Valladolid, during the war in Spain, the palace of the "Holy Inquisition" was appointed for the barracks of a British regiment. Under the colonnade was a well, from which water could be drawn into the uppermost stories. This water had a sweetish decayed taste; but, for the want of better, the soldiers used it both for drinking and cooking. No other regiment in the garrison was so unhealthy; and the prevailing disease was putrid fever, of which there was not the slightest symptom in any of the other regiments. At last the reason was discovered: skeletons were found in the well, and several were observed with pieces of the flesh adhering to the bones. If the chlorides of soda or of lime had been then known, or if that which had been long previously recommended been employed, the mortality from this fever, and from putro-adynamic dysentery, would not have been so great as it proved during the Peninsular campaigns.

[*] From several opportunities of observation, I am of opinion that scurvy has been often confounded with putro-adynamic fever; that both diseases formerly proceeded from the same causes, and often occurred simultaneously in the same camp, army, fleet, or ship; that the causes were chiefly putrid water, mouldy and adulterated bread, diseased and unwholesome flesh, vegetable and animal exhalations, insufficient nourishment, and the depressing passions; and that the protracted use of salted provisions of a good quality was but little concerned in producing either of these diseases. During the seventeenth and eighteenth centuries, trading vessels were provisioned as cheaply and as sparingly as possible, and fleets and armies were provided by contractors who enriched themselves and those who passed their supplies at the expense of the lives of thousands. Bread which was actually nauseous; the flesh of animals dead of epizooties; provisions which had been either salted for years, or nearly half putrid; numbers sleeping in a small space

such actually appears in some measure to have been the case. The truth, however, seems to be, that whilst pathologists have lately been occupied exclusively with the living solids, Dr. Stevens has concerned himself only with the blood, and kept too much out of view the influence of life, especially as manifested in the organic nervous system, upon both the circulating and secreted fluids.

596. As far as my own observations enable me to form an opinion as to the respective merits of these acids, and of the alkaline subcarbonates and salts, I conclude — 1st, That the *acids* may be of service early in fever, whilst vascular excitement is considerable, although vital power may be weak; that they seldom will be injurious in this period, as long as the skin continues warmer than natural, and the blood preserves its colour; and that but little confidence should be placed in them when the surface is at, or below, the natural temperature, or materially discoloured, unless they be conjoined with substances calculated to excite the powers of life. 2d, That the *subcarbonates of soda* and *potash*, the solution of *chlorine*, and the *chlorides*, are preferable in the middle and latter stages, more especially when the blood appears morbid, the skin discoloured, and the excretions offensive; but that the subcarbonates should not be trusted to in the last stages of typhoid fevers, unless conjoined with substances calculated to support the vital energies; and that, at this period, *chlorine*, the *chlorates*, and *chlorides*, should be preferred, as being more tonic, stimulant, and antiseptic than the carbonates. 3d, That the *sulphate of soda*, the *phosphate of soda*, and the *sulphate of magnesia*, are severally of service in the stage of excitement, when they may be given, at first so as to act gently on the bowels, and afterwards in small doses, as refrigerants, or alteratives; and that the *muriate of potash*, the *citrates*, and *acetates* may likewise be employed with the latter intentions. And, 4th, That circumstances may occur, in which it will be advantageous to exhibit the neutral salts with either an acid or an alkali, as the muriate of soda; with a vegetable acid, as prescribed by Morgan; or with soda, as advised by Stevens; or to prescribe saline substances with an excess of either of their constituents, as the muriates with an excess of acid or of alkali.

597. i. *Opium, &c.*—Much difference of opinion has existed as to the propriety of giving opium in typhoid fevers. But when we find Sydenham, Polidori, Rolfinck, Schlegel, Van Hoven, Home, Horn, Marcus, Latham, Stokes, Graves, &c. favourable to the practice, the grounds of dissent from it ought to be carefully examined. There are circumstances and states of fever which forbid its use, but there are others which as imperatively require it; and I believe that the objectors err grievously in not discriminating between them, and in not studying either the conditions which contra-indicate it, or the modes of exhibiting it in the cases that would be benefited by it. Sydenham considered that it prevented coma, or stupor, when given after vascular and alvine evacuations had been judiciously employed. Odhelius, Gilchrist, Home, and Graves combined it with antimonials; and the propriety of the practice cannot be doubted, in the circumstances in which they employed it. In the present day, the indications for the exhibition of opiates have been so ably stated by two accomplished physicians — Dr. Latham and Dr. W. Stokes — that whatever I may advance as to this subject must in great measure be an echo of their observations. When the disorder of the sensorium outruns the other symptoms; when by venæsection or topical bleeding, or by alvine evacuations and refrigerants, the general and local symptoms are relieved, but the delirium still continues; when to this state are added, tremors, subsultus tendinum, and unrestrained evacuations; when there has been at first high vascular excitement, and large evacuations have been required to guard the brain or other organs from mischief, and wild delirium has followed; if the patient has previously been in a delicate or nervous state; if he has been addicted to an excessive use of spirituous or vinous liquors, particularly the former; if the habits of the patient and his occupations have been such as to inordinately excite and exhaust the sensorium; or if the anxieties, the toils, or the debaucheries of life have previously injured the health, and more especially the state of nervous energy; — in these several circumstances, should opiates be resorted to, in the advanced progress of typhoid fevers, and of synochoid fever that has passed into the nervous or typhoid state. On most of these, Dr. Latham has insisted with great precision and force; and I entirely subscribe to the value of his remarks. Dr. Stokes remarks, that *three* circumstances call for the use of opium in fever: 1st, Where there is persistent watchfulness; 2d, Where an inflammatory condition of the brain has existed, and been subdued, but delirium or other nervous symptoms still remain; 3d, Where an excited state of the sensorium exists without heat of scalp, or remarkable throbbing of the arteries of the head; and to these I may add a fourth, Where there are much relaxation of the bowels, unrestrained evacuations, tremors, watchfulness, or delirium, or subsultus tendinum.

598. The *mode* of exhibiting opiates is sometimes of great importance. In many cases, one or two grains of solid opium may be given, either alone, or with camphor and nitrate of potash. The combination with camphor is to be preferred, when there is much adynamia, and no inflammatory determination to the brain. When the bowels are very remarkably disordered, ipecacuanha may be added to these. The *acetate of morphine* is often superior to pure opium, when given in doses of from a quarter to half a grain, with camphor,

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and imperfectly renewed air; the constant evaporation from the too frequently washed decks; water kept in wooden casks until it became blackish, inky, stinking, and nauseously putrid; were causes often in protracted and simultaneous operation. I have never been in a ship in any other capacity than as a passenger; but some of my voyages have been long, and have afforded me occasions of witnessing, even at the commencement of the nineteenth century, the existence of some of these causes. For many years matters have been altered, especially in the navy. The mutiny at the Nore; the advance of knowledge; the stricter attention to the supply, preparation, and quality of the provisions; the preservation of water in iron tanks, and some other subordinate circumstances; have done more to banish putrid fevers and scurvy from our fleets, than the use of citric acid or any other antiscorbutic or antiseptic; and I have no doubt that the prevention of these causes, and the general adoption of the chlorides, will be found the most certain means of preventing and of curing these diseases.

or with aromatic spirits, or warm spices, as Cayenne, &c.: particularly in cases of extreme prostration. The *muriate of morphine* may be preferred, if the chlorates are also prescribed. Opiates are sometimes of service when exhibited in small mucilaginous enemata. Hildenbrand, who is averse from the use of opium in the exanthematic typhus, unless under circumstances manifestly indicating it, very justly remarks that, when it is determined upon, it should be given in a full or large dose, once or twice repeated after a proper interval, rather than in small and often repeated doses.

599. Other *narcotics* may be prescribed in certain states of typhoid fever, but they are not so deserving of confidence as opiates. The extracts of *poppy* and *hyoscyamus* are occasionally useful, particularly when opium disagrees; but even in such cases, the acetate of morphine, prescribed as just directed, will be of service. Brera praises *belladonna* in the states of fever indicating the propriety of having recourse to opium. This narcotic is sometimes useful in the delirium attendant on erysipelas of the scalp. Mr. Blackett (*Lond. Med. Repos.* vol. xix.) recommends it in similar circumstances. It seems deserving of trial in the states of nervous fever mentioned above, and in the nervous stage of exanthematic typhus.

600. *k. The use of wine and of some other stimulants* requires much discrimination. It has been supposed by some writers, that *wine* is contra-indicated where there are delirium; a dry, black, or red tongue; red or suffused eyes; or much heat of surface. This is partly true; but one, or even more, of these symptoms may be present, and yet wine will prove of great benefit. Indeed, wine may be exhibited in the same circumstances as require the use of opium. When the delirium is of the kind above stated (§ 597.), and is accompanied with the same phenomena, &c. — when the state of the tongue is the result of extreme adynamia, inflammatory determination having been subdued — when the suffusion or redness of the eyes is the result of want of sleep, and is attended by a cool scalp — and when the heat of skin exists chiefly on the trunk, and is attended by indications of putro-adynamia — then wine will be given with benefit, and it is even indicated. This subject has been very ably canvassed by some contemporary writers, particularly by Drs. Wilson, Philip, Alison, Graves, Stokes, and Tweedie, whose experience gives weight to their opinions; and they very nearly concur with me in the propriety of exhibiting wine with due precaution even in these circumstances, as well as in others which are less doubtful. — Gilchrist, Heisham, Halls, Wenzel, Harles, Matthæi, Hufeland, Horn, and others, even notice the influence of wine in reducing the heat of skin in fevers tending to putro-adynamia, and my own experience confirms the observation.

601. The *indications* for the exhibition of wine in the typhoid states of fever may be reduced to the following: — (*a*) When the patient has been proceeding favourably, and the pulse suddenly becomes weak, very soft, or irregular; the skin cool or damp; the countenance collapsed; and the strength prostrated; — (*b*) When the patient complains of a feeling of exhaustion, and expresses his wish for wine or support; — (*c*) When vital depression occurs unexpectedly or suddenly, or without any evident cause; — (*d*) When the depression is owing to injudicious depletions, or excessive evacuations, or to the depletions or other means required to subdue inflammatory determinations at an advanced stage, or to protracted or excessive diarrhœa, or to hæmorrhage from the bowels, or from any other part; — (*e*) When, with these symptoms, the abdomen becomes tympanitic, and the exhaustion increases; — (*f*) When the delirium is low, muttering, and constant, and attended by tremors, or subsultus tendinum; the surface, and particularly the scalp, being cool, the pulse soft, weak or small, and the posture supine; — (*g*) When petechiæ or vibices of a dark hue, and other signs of putro-adynamia, appear; the scalp being cool, and the action of the carotids not materially excited; — (*h*) If early convalescence be slow, unattended by local affections of an inflammatory tendency, and owing chiefly to debility; — (*i*) If, with one or more of the foregoing indications, or with a soft pulse, moist tongue, or cool skin, in the latter stages, it be ascertained that the patient has been addicted to spirituous liquors, or to wine in excess; — (*k*) and if the character of the epidemic be of a low kind, and if the early excitement be attended by weak vital resistance, and soon pass into exhaustion — then the propriety of having recourse to wine or other active stimulants, with requisite precautions, cannot be disputed.

602. The *kind* of wine, its *quality*, and its *quantity*, are deserving of particular attention. — Old sherry, Madeira, and white hermitage, of the best quality, should be preferred. The red and acid wines are most apt to disagree; yet port and red hermitage are useful in some cases, particularly when diluted, and conjoined with aromatic spices, in the form of negus. Navier recommends champagne; but it is suitable only to the stupor or coma attendant upon an extreme state of adynamia. — The *quantity* of wine given in the twenty-four hours should depend upon several circumstances; but it may vary from four or five ounces to sixteen or twenty. Dr. Bateman thinks that it should not exceed a pint: very much larger quantities have, however, been given with benefit; but these are only the exceptions from the general rule. Regard ought to be had to the age and previous habits of the patient, as well as to the state of the disease. Young persons are readily excited, and should take only the smaller quantities. Older patients, and those especially who have been habituated to much wine, or to spirituous liquors, often require the full amount just named. The use of it ought always to be commenced in small quantities, and increased as the indications may guide the practitioner. In all cases, it should either be diluted, or given in the patient's food; and the effects carefully watched. — Dr. Tweedie justly observes, that, if the patient relishes the wine, if he is tranquillised by it, and if there is a gradual and steady improvement in the symptoms, without any marked excitement after it has been taken, benefit will result from it. On the other hand, if the pulse or heat of the skin are much or quickly raised by it; if the face becomes flushed, and the patient restless or incoherent; wine is either improper, or the quantity has been too great. If, after having been stimulated, he soon lapses into the previous state of exhaustion, or

seems weaker from each successive dose, no advantage will be obtained from it. When wine has produced the desired effects, it should be gradually withdrawn.

603. Other *fermented liquors*, particularly when bottled, and even *brandy*, have been used, in the circumstances indicating the use of wine. I have employed bottled stout with benefit. It is an excellent vehicle for the subcarbonate of soda or of potash, or for small doses of the muriates, or for both conjointly, and is most appropriate to the advanced stage of putro-adynamic fever. Spruce beer, ginger beer, and Seltzer water, may severally be employed, and in a similar manner. Brandy ought to be much diluted, and is best suited to those who have been habituated to spirituous liquors. In cases attended by a protracted or colliquative diarrhœa, and extreme prostration, the brandy should be burnt, and given in some thin sago or arrow root.

604. *Yeast* has been frequently recommended in typhoid fevers. Dr. Stoker considers, that it may be given in all the stages in which it can be retained by the stomach, even when the existence of inflammatory complications prevents the use of other stimulants; and that it is generally easily taken alone, or with any other medicine, or in any vehicle that may be deemed advisable. In the worst forms of typhus, when it is most needed, he states that it is rarely rejected, but, on the contrary, is much relished; and that it is moderately laxative, often superseding the use of purgatives. If it prove not sufficiently aperient, he gives a little tincture of jalap in it; and if the bowels are too much relaxed, a few drops of tincture of opium are added to each dose. It appears to Dr. Stoker to correct the morbid contents of the alimentary canal, and the consequent symptoms of putrescence; petechiæ and black tongue being more effectually removed by it, than by any other means. He has, therefore, substituted it for bark and wine, when they could not be employed on account of inflammatory symptoms, and has conjoined it with them when there was no such counter-indication. He prescribes the yeast in doses of two table-spoonfuls every third hour, with an equal quantity of camphor mixture. If administered in enemata, three times the above dose may be employed. Dr. Stoker, whose experience of this treatment has been long and most extensive, observes that, instead of increasing the tendency to tympanitic distension, by promoting fermentation, as may be objected, it actually prevents the accession of this symptom; and that, in the most obstinate instances of typhoid tympany, he has found enemata of yeast and assafœtida the most efficacious remedies.

605. *Other stimulants* require little attention. *Musk* has been recommended by the Franks, Gebel, Gmelin, Marcus, Horn, Stoker, and others in cases of true adynamia—of extreme prostration, with much affection of the sensorium. It may be prescribed in the same circumstances as admit of the use of wine. Thomann, however, found it quite inefficacious. It should be given in large doses to be of any service—from ten to fifteen grains, with camphor or ammonia, or other medicines which the peculiarities of the case will suggest. *Phosphorus* and *phosphoric acid* have likewise been employed. They do not appear to possess any claims to particular notice; but may be injurious if too liberally or inappropriately administered. I have seen benefit derived from the infusion of *green tea*, when the stupor or coma has been great; and I believe that strong *coffee* has sometimes proved useful in similar states. It has been recommended by Zambelli and Grindel. The warm *spices*, especially *capsicum*, are often of service, and may be given in considerable doses in the latter stages of typhoid fevers, but chiefly as adjuvants or corrigents of other remedies. The *spirits of turpentine* are frequently productive of benefit, when prescribed in small doses, with aromatics or spices; but a large dose may be attended by very serious consequences, when exhaustion is extreme. It is an excellent medicine in enemata, with castor oil, muriate of soda, or other purgatives, when the bowels require to be opened; and with assafœtida, or extract of rue, when there is much tympanitic distension. Substances of a similar kind, or the usual carminatives, have been directed in enemata by Thomann and Hufeland, in order to remove this symptom; but the injection just recommended is the most certain in its effects. The means noticed above (§ 158.) may also be resorted to. When there is hæmorrhage from the bowels, these are generally efficacious. If they fail, a solution of the superacetate of lead, in pyroligneous acid, with the addition of *kréosote*, may be thrown up, in any vehicle which the peculiarities of the case may require.

606. Many practitioners are averse from giving stimulants or tonics in typhoid fevers, from a fear of thereby aggravating or inducing inflammatory determinations. But even where the nervous inflammations noticed above (§ 508.) may be presumed to exist, and particularly in an advanced period of these complications, a judicious use of stimulants is actually necessary. It is a well known fact, and well expressed by Dr. W. Stoker, that, at a certain period of inflammatory affections, stimulants become antiphlogistics; and this is more especially the case in respect of these affections, when they occur in the course of fevers. The nervous energy is then depressed, irritability is most remarkably impaired, the fluids changed, and the whole constitution incapable of manifesting the phenomena, or of developing the lesions, constituting true or sthenic inflammation and its consequences. A spurious or asthenic state of action only, quickly passing into disorganisation, can possibly take place in these circumstances; and it can be remedied solely by stimulating and antiseptic means. These facts are frequently placed before our senses, and demonstrated by the treatment found most beneficial, as well by that most injurious, in malignant sore throat.

607. *l.* Various *external means* have been suggested for typhoid fevers. Some of the most serviceable of them have already been noticed. The *cold affusion* over the general surface is very rarely admissible in this class of fevers; but applied to the head only, it is often of manifest service, when the determination to the encephalon in the early stage of excitement is great, or when the delirium is high or maniacal, or attended by increased heat of the scalp, and excited action of the carotids. In these cases it lowers morbid action remarkably, and procures sleep. *Tepid bathing* and *sponging* are favourably noticed by Brocklesbury, Wolff, Jackson, Hallé,

Brandis, and others. *Tepid* or *warm sponging* with a solution of the chlorides, or of the nitro-muriatic acids, or of camphor in pyroligneous acid, are deserving of general adoption. Tepid or warm *aromatic baths*, or sponging the surface with infusions or decoctions of aromatic plants, have been employed by Marcus, Horn, Harles, and Dupin. Kerksig advises *warm aromatic embrocations* to be placed over the abdomen, when there is diarrhœa or meteorismus. — The use of *blisters* has been sufficiently noticed. They may be applied over, or near, the affected organ, when the affection consists chiefly of congestion, or impaired action. In other circumstances, they may be used as derivatives. This remark is applicable to the use of *sinapisms*, and to the warm turpentine embrocation. Callisen recommended *boiling water* to be used as a blister and derivative; and the idea has been adopted by some recent writers. One of the most beneficial external means that can be employed, is a liniment, consisting of the compound camphor liniment, with soap and Cayenne. This may be rubbed gently but assiduously over the hypochondria, or insides of the thighs, twice or thrice daily. I have occasionally resorted to this treatment, for upwards of twenty years, and often with great benefit. Several of the *liniments* prescribed in the *Appendix* may be used; but the Cayenne should be added, particularly when sensibility and consciousness are impaired. — *Dry cupping* may also be tried as a derivative, during the early or middle stages of the disease. In the putro-adynamic state it is seldom admissible.

608. iv. As to the *Prophylactic Measures* that may be resorted to in typhoid fevers, it is unnecessary to add any thing to what is stated above (§ 117. *et seq.*), and in the article Infection. The mean there recommended are quite applicable to these diseases.

609. v. The *Diet* and *Regimen* in typhoid fevers are particularly deserving of attention. Both ought to be suited to the stage and form of the disease. — *a*. In the early period of excitement, the air should be pure, dry, cool, and without any current. The apartment should be large and open, the bed without curtains, and the air renewed, without exposing the patient to any chill. Barley water, fresh whey, rice gruel, or common gruel, with a little salt, when the excitement is low, or when thirst is not much complained of, may be employed as the usual beverage. The temperature of the drink, and of other ingesta, should be tepid or somewhat above it. If bronchial or catarrhal symptoms are present, warm, mucilaginous, and mild diaphoretic drinks should be allowed. It is improper in this stage to attempt to excite perspiration by warm coverings. If stupor is present in this stage, the external senses may be stimulated, and neither light nor noise need be excluded.

610. *b*. In the *nervous stage*, the air of the apartment should not be too cool; and the bedclothes ought to be warmer. A uniform temperature, and the purification of the atmosphere, must be always attended to. A cold, moist air, and currents of air, during this stage, induce diarrhœa, bronchial or pulmonary congestions, or other dangerous complications; whilst a too warm, close, and impure air, particularly when breathed by a number of persons, favours the development of putro-adynamic changes. The greatest cleanliness is requisite. Neglect of this produces gangrenous sores and ulcers, particularly where pressure is made, or slight bruises have been inflicted. The tongue should be scraped, and the teeth and mouth washed with salt and water, or gargled with them or with the chlorides, if the patient can do so. The hair may be cut off in the early stage; but the removal of it in this may be injurious, if the adynamia is extreme, and the scalp cool at the time.

611. In the nervous stage, bland, very digestible, and fluid nourishment may be allowed. The drinks should be mucilaginous, and gently warm. Whatever food or drink is used, whether gruel, thin arrow-root, &c., or weak animal soups, broths, beef tea, &c., should contain the usual quantity of salt, for the reasons stated above (§ 589.). If the treatment by the chlorides, &c. is adopted, this becomes a matter of less importance. Fruit tends to produce diarrhœa, and is seldom admissible. Wine, as advised above, is generally required, particularly when this stage passes into extreme prostration; and may be given in the nourishment adopted, or in soda water, Seltzer water, &c., diluted with warm water, or with tepid fresh whey. If brandy be used, it may be given in the same vehicles, or in weak black tea, in a state of much dilution. In the true typhus, stimulating the external senses is more necessary in this stage than previously; and it is often beneficial, as Hildenbrand and Naumann advise, to rouse the patient's moral sentiments and affections, and to disperse his fugitive and chaotic ideas, by recalling former associations and objects of affection or of ambition. In extreme cases, however, the physical powers should be excited at the same time as the moral; otherwise the latter will be appealed to in vain. In a case of putro-adynamic fever, in which I took great interest, these united means proved successful in rallying the energies of life, under peculiarly unfavourable circumstances. During an expected crisis, a greater warmth of the bedclothes is proper, and warm whey or other appropriate fluids should be given to encourage salutary evacuations (§ 167.).

612. *c*. During the *abatement* of the disease, the importance of diet and regimen increases, as treatment by medicine is now gradually abandoned. Nourishing food of easy digestion, taken in small quantities; pure air, and wine in some cases, are generally required; but these should be strictly prescribed as to kind, quantity, and frequency, according to the peculiarities of the case. As *convalescence* becomes established, the animal broths and soups may be succeeded by a little solid animal food, of the lightest kind. The dangers to be apprehended during recovery have been fully stated above (§ 168.), their causes assigned, and the means of preventing them pointed out (§ 169.). Little further is, therefore, now required. But it will be most useful to recollect, that the management of convalescence should have some reference to the particular form and complication of the disease. In the exanthematic typhus, the danger of consecutive disorder is the least, particularly if it have run its course regularly and terminated by crisis. After low, nervous, and putro-adynamic fevers, affections of the brain, liver, bowels, lungs, and me-

senteric glands, are not unusual, particularly when the patient has been prematurely exposed to changes of weather, to irregularities of diet, &c., and when the treatment has been injudicious, during early convalescence, or too soon relinquished. In all the varieties, the risk of these affections is increased by the complications which the fever presented; the organ which was prominently deranged remaining longer weak, or more susceptible, than others, of being disordered by excitation, or by injurious agents. Therefore, in cases where the predominant disorder has been expressed on the encephalon, particular care should be taken to preserve the sensorial functions from early excitement or irritation, or undue exercise. Where the respiratory organs have been much affected, premature exposure to cold, or to changes of temperature, &c. ought to be guarded against; and where the digestive organs have manifested the onus of morbid action, the return to a full or stimulating diet should be long delayed, and the most digestible food only ought to be taken, and in moderate quantity. (See further on this subject, § 167—170.; and art. Debility, § 36—46.)

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Fever, Puerperal; *see* Puerperal Diseases.

Fever, Scarlet; *see* Scarlatina.

Fever, Yellow; *see* Pestilences.

FIBROUS TISSUE — Alterations of the. Classif. — Special Pathology — *Morbid Structures.*

1. *A. The Fibrous System* consists — 1st. Of *fibrous membranes* — *membranæ fibrosæ* — as the periosteum, the cerebral and spinal dura mater, the fibrous capsules, the sheaths of tendons, the aponeurotic expansions, the sclerotica, the capsule of the corpora cavernosa penis and of the clitoris, &c., the tunica albuginea, and the membranes proper to the spleen and kidneys; — 2dly, Of *fibrous cords*, in which the fibres are formed into fasciculi — *organa fibrosa fascicularia.* — Several of the *former* should be viewed as compound structures; as the dura mater, the tunica albuginea, the fibro-synovial sheaths, &c.; but the fibrous tissue constitutes their chief basis. With the exception of the fibrous membranes of a few glandular organs, it is easy to demonstrate that all the fibrous structures are connected together, and that the periosteum is the centre and basis of connection. This tissue consists of whitish, or grayish, shining, satiny, fibres of great fineness and strength. These are interwoven in various directions, in the first division of this tissue; and are placed parallel and very close to each other, in the second. Their cohesion is very great. Hence the fibrous tissue is the strongest in the body. Although it must be inferred to possess vessels and nerves, yet neither have been actually traced into it. That it is endowed with vital properties cannot be denied; but it manifests them obscurely in health, but often very remarkably in the course, or as a consequence, of certain diseases. Its physical properties are most perfect when the powers of life are energetic, and are much impaired when these are depressed or exhausted. During prolonged debility, and in cases of extreme vital exhaustion, the cohesion of this tisse is diminished, and laceration or extension of it takes place with less violence. During constitutional disorder, or contamination of the system by specific maladies, and in the scrofulous or gouty diathesis, it often becomes the seat of morbid action, and then evinces vital properties in a most evident manner. Injuries and irritations of this tissue, particularly when the vital functions are impaired or disordered, are often the source of the most violent and dangerous affections. — The fibrous tissue, however, is, with the exception of the periosteum and the capsules of joints, not very prone to disease; and, even when these are affected, a scrofulous or syphilitic taint has been the cause.

2. *B.* Leaving out of consideration the congenital alterations of this tissue, I will briefly notice those changes of it which are usually the result of disease. — *a.* Fibrous parts are seldom *thinner* than natural, or atrophied. — *b. Thickening* is much more frequent, and is evidently the result of slow inflammatory action. — *c.* They may also be *expanded* or *distended* by morbidly increased bulk of the organs which they envelope. We occasionally meet with this change in the fibrous coverings of the spleen, kidneys, articular capsules, &c. When the expansion arises from the accumulation of fluid, it is generally attended with thinning; and then, in some cases, the distension is chiefly in one part only, in the form of a sac, or is irregularly elongated. But the expansion may also be conjoined with thickening, as when it has proceeded from the changes consequent upon an inflammatory state of the contained parts, in which the fibrous envelope itself had participated, as in diseases of the spleen, &c. — *d.* The articular ligaments and capsules, however, are frequently *elongated* and expanded without any internal change, and merely from diminished tone or vital cohesion — in some cases so much so, as to give rise to dislocations. — *e.* Fibrous parts may be also too *short* or too *narrow*. *Morbid contractions* are observed in tendons and ligaments, and are generally the result of inflammatory irritation consequent upon great extension, cramp, &c. — *f.* The changes of *colour* met with in this structure are generally associated with change of organisation, excepting in jaundice. The morbid colours most frequently observed, are various shades of yellow, seldom brown, and rarely black, as in melanosis.

3. *C.* The *continuity* of this structure is sometimes destroyed; but generally from wounds, sudden extension, as in dislocations, and external violence of any kind. Continuity may likewise be destroyed by purulent collections, by tumours, and various morbid depositions between its fibres; but there is here, with a few exceptions, rather

an expansion of the structure than actual breach of continuity. Incised wounds of this tissue heal in general with tolerable ease, in a healthy state of the system. But this is by no means the case when the habit or constitution is in fault, or when there is obvious disorder of the stomach and liver; and the difficulty is still further increased if the injury is attended with loss of substance, or when the tissue is lacerated. In these latter, the continuity of structure is in some measure supplied with cellular tissue, which becomes very dense by degrees, but never altogether tendinous. Hence the disposition to rupture or dislocation that exists so long, and indeed ever after such accidents. The chief exception to this is presented by the periosteum on some occasions, where it seems to have been quickly restored.

4. *D.* The *texture* of fibrous parts is changed generally by *inflammation* and its effects. But this disease is not frequent in fibrous structures, excepting the periosteum, the articular ligaments and capsules, and the dura mater.—In all these parts, however, it more frequently follows external injuries, than arises spontaneously. When it is spontaneous, it is almost always merely a concomitant of other diseases of a constitutional kind, such as *scrofula*, *syphilis*, *gout*, and *rheumatism*. The inflammation of this structure is rarely of an acute kind, excepting in some forms of gout and rheumatism; and in these the inflammatory state is consequent upon, and subordinate to, a morbid condition of the organic nerves, rather than identical with that which is caused by external injuries, or which assumes the phlogistic character. These specific forms neither pass through the same phases, nor terminate, as common phlogosis. The inflammation, also, proceeding from the scrofulous and syphilitic taint possesses the characteristic features of those specific diseases.

5. *a.* The course of inflammation is much more frequently slow; and often the phenomena are so indistinct, as to be overlooked. The changes thereby induced are generally co-ordinate with the activity and degree of the inflammatory action. *Redness*, in various degrees of depth, and attended with different states of vascular injection, is usually present. In some cases, there is a diffused rose-red, especially when the inflamed tissue has access to the air. In others, more or less large and numerous red spots or irregular streaks are observed. In many, the inflamed part has a more or less yellowish colour; and if it be naturally glistening, this appearance is entirely lost. After chronic, or often-repeated attacks of inflammation, other discolourations are sometimes remarked — the parts being either dark grey, brownish, livid, or even blackish.

6. *b. Swelling* is seldom remarkable in inflamed fibrous structures. But if the inflammation continue long, or if it recur frequently without complete resolution, fibrous organs, or the cellular tissue surrounding fibrous structures, are generally greatly swollen, and their boundaries indistinct, with a gelatinous fluid infiltrated into the adjoining texture, giving it a reddish, soft, and œdematous appearance. When the intensity of the inflammation is very high, it runs tediously into suppuration; the swelling and œdematous infiltration of the adjoining cellular substance at first increases, whilst the fibrous tissue wastes, the effused fluid, at various points, afterwards assumes a puriform appearance, increases, is concentrated, and at last more or less destroys this structure, the swelling at the circumference of the part becoming somewhat diminished.

7. ii. INFLAMMATION OF THE FIBROUS STRUCTURE OF THE JOINTS may occur primarily in this part, or extend to it from the lining synovial membrane, which, like other serous membranes, inflames readily, and in which the inflammation of joints most frequently commences. Inflammation of joints, implicating their fibrous structures, generally arises from external injuries, from metastasis of inflammation from other parts, from pus or morbid secretions absorbed into the circulation, from syphilis, gout, rheumatism, &c., and occasions reddening, swelling, softening, &c. of the synovial membrance. If the inflammation be not resolved, there is consequent secretion into the cavity of the joint, sometimes of a fibrinous lymph occasioning anchylosis, but more frequently of a puriform matter, or of a fluid, which, after being retained there, assumes a puriform character, and which often softens or erodes the cartilaginous coverings of the heads of the bones. Frequently, also, inflammation of joints commences in the fine membrane lining the cartilages, or in the articular extremities of the bones themselves. This commonly occurs from the scrofulous and syphilitic taints, and gives rise to the *caries articulorum centralis vel interna*, of RUST. When the disease originates in the synovial membrane or bones, the fibrous, fibro-cartilaginous, and even the bony parts of the joints themselves, are sometimes co-affected. This is especially the case when the causes act violently on the joint and affect equally all the tissues composing it, as after a violent injury, such as a penetrating wound, compound dislocation, or fracture extending into it. In all such cases, an acute, and progressing general inflammation of the joint takes place, on which anchylosis, abscess, or caries, are usually consequent.

8. *A.* In the scrofulous and rheumatic, however, a more undecided and chronic state of inflammation occurs, either spontaneously or from injuries, occasioning changes in the joints, which, according to their extent, seat, and symptoms, have been called *morbus coxarius, hip disease, claudicatio* or *lameness, luxatio spontanea* or *spontaneous luxation, fungus articulorum, articular fungus, white swelling, &c.* However, with all these names, it is essentially the same disease. The joint is more or less remarkably swollen, less movable than in the healthy state, and always somewhat bent. The swelling is, at certain parts, hard, firm, elastic; at other parts, more doughy, or even obscurely fluctuating. The integuments, to the last, even when sinuses are formed, remain unchanged, although sometimes slightly varicose, with a hardened state of the subjacent cellular and adipose tissues. The muscles surrounding the joint often appear pale and, together with the adjoining cellular substance, infiltrated with lymph. The articular ligaments are more or less swollen, of a dull hue, frequently without any distinct fibres, hardened in some parts and softened in others, and often consolidated with the surrounding cellular structure. They are also whitish in some patches, and in others discoloured, generally converted into a mass containing minute cavities filled with lymph, a

gelatinous fluid, or ichorous pus. The internal articular ligaments, the cartilaginous coverings of the bones, and the synovial membrane are entirely or partially destroyed. The bones either primarily or secondarily affected are, in a greater or less degree, inflamed, softened, swollen, and become, internally carious; or they are but little swollen, tolerably hard, yet superficially eroded, or destroyed by caries. Owing to this carious state of the heads of the bones, whether attended with swelling or not, dislocation takes place. The articular cavity contains at first a large quantity of thickish, albuminous-like, often a pale reddish synovia; and, in later stages of the disease, if the joint be more or less destroyed by suppuration, a thin, frequently foul-smelling, pus, mixed with blood, cartilage, and cartilaginous fragments, fill up entirely or partially the cavity of the joint (OTTO).

9. *B. Ossification* is frequently observed in the fibrous structure, particularly in the ligaments and dura mater, and less frequently in the periosteum, the tendons, the fibrous membrane of the spleen; and but rarely in the other parts of this system. It is to be viewed as a consequence generally of slow inflammation, and occurs in different forms: as in some cases only the fibro-cartilaginous base of bone is deposited in plates or roundish-flat prominences; more frequently phosphate of lime is secreted either in distinct spots or small masses surrounded by a circle or plexus of vessels, or in the form of splinters, or, lastly, in larger masses, involving the fibrous tissue equally throughout. If the articular ligaments undergo this change, they are then usually *shortened*, occasioning *stiffness* of the joint, or more or less complete *anchylosis*, according to the extent of the ossification. An *earthy mass*, less resembling bone than chalk or gypsum, consisting principally of the urate of soda — *gouty tophus* — is often deposited in the ligaments, in the neighbouring aponeurosis, and periosteum of one or several joints, in gouty persons, at first in a soft state, but gradually becoming hard, and often in large quantity.

9. *C. Sphacelation*, or *gangrene*, rarely occurs as a termination of inflammation. It is met with primarily in those fibrous parts which are well supplied with blood-vessels, viz. the periosteum, dura mater, fibrous envelope of the spleen, &c. In the tendons, aponeurosis, and articular ligaments, it very rarely occurs primarily, excepting when they are exposed to the air by wounds or ulcers, in which case they often are destroyed and exfoliate together with the surface of the bones and cartilages. Fibrous structures, however, are often attacked with mortifications in conjunction with, or in consequence of, gangrene of the adjoining parts. Anthrax sometimes extends to and destroys fibrous tissues; and when mortification attacks a limb, the articular ligaments participate so entirely, that a spontaneous separation often takes place at a joint.

10. *D. Adventitious productions* are but rarely observed in the fibrous system. — *a. Encysted tumours* seldom form in it, if we except those bursal tumours which occur on the tendinous sheaths and articular capsules, and partly between the tendinous fibres of the aponeurosis, and especially on the elbow-joint and knee-cap, and which have their origin in the mucous bags placed in these situations. — *b. Tubercular formations* are equally rare in fibrous parts. Scrofulous deposits are, however, occasionally found in the dura mater and periosteum. — *c. Sarcomatous* and *fungous tumours* are more frequent in fibrous structures, particularly in the periosteum. Fungous growths on the tendons are more rare, as are the sarcomatous swellings upon the articular ligaments. — *d. Carcinoma*, or *cancer*, does not occur primarily in this system, but attacks it secondarily equally with other parts.

11. *E.* The *changes observed in the contents* of cavities formed by fibrous membranes are frequently marked and important. Morbid collections, as a watery serum, a gelatinous fluid, puriform matter, blood, &c., are not infrequently found in the aponeurotic sheaths surrounding or separating the muscles in the cavities of joints. The *synovia* also varies exceedingly; sometimes it is deficient in quantity, so much so as to occasion stiffness, creaking or a peculiar noise of the joint. More commonly it is in unusual quantity, particularly in all inflammatory states of the synovial membrane, but occasionally without any distinct inflammation, as in the knee-joint, in rheumatic, rickety, or syphilitic subjects. Sometimes the effusion exists to such a degree that the joint is more or less swollen, or even dislocated, or its use prevented. This local state of disease has usually been called *dropsy of a joint, hydrops articulorum, hydrarthus, meliceria*. The synovia is occasionally turbid, reddish, watery, albuminous, gelatinous, &c., as well as increased in quantity.

12. *F.* Substances *adventitious to the situation* have occasionally been found in the cavities of joints — *a. Blood* is rarely observed; but — *b. Pus* occurs more frequently, it either having been produced within the joint itself, from an acute inflammation of the synovial membrane, and of the bony cartilages and ligaments forming the joint, or having made its way into the cavity from without. I have, however, seen cases where pus has rapidly collected in one or more joints after *phlebitis*, or after the absorption of this fluid from other and distant parts. It has been supposed, that the pus, in such cases, has been secreted or deposited in the cavity of the joint, as it has passed into the circulation from the situation where it was primarily formed, without previous inflammation of the joint itself. But the presence of this morbid secretion in the blood may have excited inflammatory action of the synovial membrane, rapidly passing into the suppurative stage. In most of such cases, the parts containing the pus have been found eroded, and have presented other changes usually consequent upon inflammation, even when vascular injection has been absent. The question is, whether such changes have taken place previously or subsequently to the secretion of pus in the joint? That the more advanced of them are consequent upon the production of this fluid may be admitted; but that inflammatory injection and action preceded, and quickly produced, the purulent collection, seems most probable.

13. *c. Cartilaginous concretions*, which have grown from the inner or expanded surface of the synovial membrane, by necked appendages, and been subsequently broken off, are occasionally found in the cavities of joints, either entirely loose, or attached to them by thin threads. They are at first soft, then mostly cartilaginous, sometimes partly cartilaginous and bony; more rarely altogether bone; usually rounded, but occasionally

flattened or angular; and varying much as to size and number. Lieutaud has adduced instances of *quicksilver* having been found in the cavities of joints; but such occurrences must have been rare, and are now never observed. (See art. Periosteum.)

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Exfoliation of Tendons may occur in whitloe, or during suppuration from punctured or poisoned wounds, as in dissection, &c. I have seen three such instances. *Fungus hæmatodes* seated in fibrous parts is not rare.

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FLATULENCY.—Syn. Φυσα, Φυση. *Flatuositas; Flatus; Flatulentia; Aërifluxus*, Sauvages. *Pneumatosis Ventriculi, et Pn. Enterica*, J. P. Frank. *Pneumatosis*, Chomel. *Limosis Flatus*, Good. *Flatuosité*, Fr. *Die Blähung, Windigheit*, Germ. *Flato*, Ital.

Classif. — 1. *Class*, Disease of the Digestive Function; 1. *Order*, Affecting the Digestive Canal (*Good*). I. Class, I. Order (*Author*, in *Preface*).

1. Defin. *An undue formation and accumulation of air in the stomach or intestines, with frequent rejection of it.*

2. It is of some importance to ascertain the source of the flatus which is often formed so abundantly in the digestive canal. John Hunter first supposed that air is sometimes exhaled from the blood by the vessels of secreting surfaces; and, if we view merely the results of the experiments of M. Edwards upon respiration, and the absorption and exhalation of various gases, by the lungs, in connection with the secretion of air into the swimming-bladder of fishes, this opinion will appear not ill-founded, even independently of the support it derives from pathological observation. In such cases we have reason to infer that it is not air, as it exists in the surrounding atmosphere, that is thus exhaled, but its constituent gases. The experiments performed by MM. Gérardin, Magendie, and Chevreul have thrown much light upon the question as to the source of the gases found in the digestive canal, as well as upon their composition; and have shown, that they are partly exhaled from the digestive mucous surface.—It would appear, from the researches of these writers, that they consist, in the *stomach*, of nearly three parts in four of azote, the fourth part being oxygen and carbonic acid; and, in the *intestines*, of carbonic acid, azote, carburetted hydrogen, and hydrogen, in various proportions. It may, therefore, be inferred that the air which collects in the digestive canal is derived from three sources: 1st. From the common air swallowed with the food; — 2d. From the changes or decomposition of the ingesta, and of the contents of the canal generally; — and, 3d. From the occasional exhalation of gaseous fluids from the mucous surface during certain states of local and constitutional disorder. The oxygen found in the stomach, amounting to eleven parts in a hundred, is most probably derived from the first of these sources. It is, however, either absorbed from this situation, or combines with other substances, as none is found beyond the pylorus. The azote and carbonic acid may be attributed partly to the last source; whilst a portion of both, and the whole of the hydrogen and its compounds, may be assigned to the second.—The air, which is generated so rapidly, and eructated so frequently, during acute inflammatory diseases, particularly in gastritis, hepatitis, &c., must be exhaled from the irritated mucous surface, inasmuch as there is no other source existing in such circumstances to which it can be attributed, especially when the constant vomitings, and frequent evacuations from the bowels, have left nothing in the *prima via* capable of furnishing the enormous quantity of air which is often ejected.

3. Flatulency, since the time of Cullen, has been very generally viewed as a symptom of dyspepsia and of other diseases. But I agree with Sauvages, Good, and several other writers, in considering it to be occasionally a primary disorder. Whether it be idiopathic or symptomatic, its phenomena, and the disorders consequent upon it, are different according to the part of the alimentary canal in which the flatus is generated or confined. I shall, therefore, treat of this affection, *first*, as respects the stomach and œsophagus — *Flatulentia ventriculi*; and, *secondly*, with reference to the intestines — *Flatulentia Intestinorum*. But although it may be seated in either the stomach or the bowels more particularly, it very frequently exists in both at the same time.

4. I. Flatulency of the Stomach will be considered at this place—(*a*) in respect of its idiopathic occurrence; (*b*) as a symptom of other disorders; and (*c*) with reference to the disturbances

it tends either to induce or to aggravate.—*A. Primary or idiopathic flatulency of the stomach* is met with chiefly when the stomach is empty, or after the process of digestion in this viscus is completed; and is seldom associated either with impaired appetite, or diminished powers of digestion. It is most troublesome in the morning before breakfast, or during long fasting; or when an unusually protracted period has elapsed between meals. In such cases, the flatus often rises into the œsophagus, producing much uneasiness and often distress, owing to its excretion being prevented by the spasmodic constriction of the upper part of this tube. In swallowing also the more solid ingesta, the bolus meets the flatus in the œsophagus, and is interrupted or impeded in its passage to the stomach. In such circumstances, a conflict sometimes arises between the descending ingesta and the ascending flatus, and a very painful *spasmodic dysphagia* is thereby induced, until the eructation of air gives relief and allows the transit of the bolus into the stomach. In this form of the disorder, the air most probably is exhaled, at least in great part, from the internal surface of the organ. In other respects the patient's health is not deranged, and the functions of digestion, defæcation, and assimilation are regularly and perfectly performed. In other instances, slight defect of organic nervous power, owing to sexual indulgences, or to sedentary occupations, is the only pathological state to which this affection can be imputed.

5. *B.* The *remote causes* of flatulency are the nervous and hypochondriacal temperaments; and all the influences and habits which depress or exhaust the energy of the organic nervous system, or lower the tone of the digestive canal, especially sedentary occupations; excessive mental exertion and anxiety; venereal indulgences; intemperance in eating and drinking; the ingestion of cold fluids, particularly when the body is overheated; exposure to a cold air, or to cold in any way, whilst the stomach is empty, or whilst fasting; neglect of the functions of the bowels; the use of bulky or flatulent vegetables, or of fruits prone to undergo fermentation, especially cucumbers, melons, salads, &c.; irregularities of diet; and previous or existing disease.—Fast eating, and imperfect mastication, often give rise to flatulency, by the quantity of air which is generally swallowed on such occasions, and by the imperfect or slow digestion which usually results.

6. *C. Symptomatic flatulency of the stomach* is extremely common.—(*a*) It is almost a constant attendant upon *indigestion*; and (*b*) often accompanies general *debility*.—(*c*) It is also frequent in *hypochondriasis* and *melancholia*; (*d*) and in the numerous forms of *hysteria*. In this last, the flatus often rises into the œsophagus; and whilst the reaction of the coats of the stomach propels it into this tube, spasmodic constriction of the part just below the pharynx confines it for a time, and causes a distressing feeling of suffocation, &c.—(*e*) Flatulency is an almost constant symptom of *inflammatory* and *organic affections* of the stomach.—(*f*) It generally ushers in an attack of *gout*;—and (*g*) it both precedes and attends *asthmatic affections*.—(*h*) It is a common phenomenon of all the functional, inflammatory, and organic *diseases of the liver*; and is very characteristic of accumulations of bile in the gall ducts and gall-bladder; and of *torpor of the biliary organs*.—(*i*) It often, also, occurs in the *functional* and *inflammatory disorders of the bowels*, and sometimes in affections of the other abdominal viscera.—(*k*) It not infrequently even accompanies *chronic diseases of the brain*;—(*l*) and the *adynamic* and *malignant forms of fever*.

7. *D.* The *phenomena* usually characteristic of flatulency vary somewhat with the diseases of which it is a symptom. In the course of digestion, flatus escapes with or without noise, and often with an acid, bitter, nidorous, or fœtid odour. Sometimes it is without either odour or taste; and at other times it retains the smell and flavour of the ingesta. When constriction of the cardia, or of the lower part of the œsophagus, prevents eructations, or when the coats of the stomach are so weakened, or so over-distended, as to be incapable of reacting sufficiently, *tympanitic* fulness of the epigastrium and hypochondria, with a painful sense of distension, or severe gastrodynia, frequent respiration, and heavy pain or oppression in the lower parts of the chest, are generally complained of. If eructations occur, especially for some hours after a full meal, acrid or rancid matters, or portions of undigested food, are frequently regurgitated at the same time, and impress the palate and pharynx with an acrid and irritating sensation, or produce an unpleasant, dry cough, by affecting the epiglottis and larynx. Cardialgia is then often associated with this symptom, or precedes the eructations. When flatulence precedes or attends organic lesions of the stomach, or obstructions of the liver or pancreas, the symptoms caused by, and associated with, it are often severe. Disordered action of the heart, anxiety, hiccup, gastrodynia, &c. being not uncommonly observed.

8. *E.* The *disorders induced or aggravated* by flatulence of the stomach, are various in different habits and constitutions. When the stomach is much distended by flatus, and especially when the œsophagus admits and retains for a time the air in its lower part, the feeling of oppression, dull pain, and the other symptoms just mentioned, are much increased. The actions of the diaphragm are impeded, and the regularity of the circulation through the cavities of the heart is interrupted by the pressure of the over-distended organs. Hence the intermissions and irregularities of the pulse, the sense of anxiety, flutterings, feeling of suffocation, and palpitations, so often associated with, or consequent upon, affections of the digestive organs. Whytt attributes *incubus* to flatulence of the stomach, and, I believe, very justly. In delicate, nervous, and hysterical females, various symptomatic disorders, besides those now stated to arise directly from this cause, are often experienced. The modes of dress, particularly the very strait corsets used by this sex, aggravate the disorders consequent upon flatulent distension.—Severe pains of the left side, congestions of the lungs, or of the brain, headachs, convulsions, faintness, vertigo, and several anomalous complaints, often thus originate, not only in females, but also in males, especially those who are sedentary, hypochondriacal, and debilitated. In this class of persons more particularly, the pressure of the distended stomach prevents the due action of the bowels, and either impedes or interrupts the passage of fæcal matters from

the cæcum, along the transverse arch of the colon. — Thus costiveness, and functional disorders of the cæcum and large bowels are occasioned, and are often followed, by displacement of parts of the colon, and by inflammatory and organic lesions.—It is obvious, that an aggravation of disorder will be occasioned by flatulence, where any of these affections already exist.

9. *F. Infants* are very liable to flatulence, particularly when their natural food is taken too greedily, or when it disagrees and becomes acid on the stomach. In some cases, a portion of air may be swallowed by sucking; but, however occasioned, the eructations that occur are often accompanied by the regurgitation of a considerable portion of the ingesta. Flatulence is, however, most distressing and injurious when it affects infants brought up without their natural sustenance, or during the period of weaning. In them, acidity of the primæ viæ, watery diarrhœa, or costiveness, or both alternately, morbid offensive evacuations with severe griping pains, and emaciation, terminating not infrequently in marasmus and mesenteric disease, are often observed.

10. II. FLATULENCE OF THE INTESTINES may be either *primary* or *idiopathic*, or *symptomatic*, but most frequently the latter.— *A.* The *primary form* of intestinal flatulence is evidently itself but a symptom, if we trace the disorder up to its origin, or but one of the various phenomena resulting from debility of the digestive canal — from deficient energy of the ganglial nervous system. In this form, however, the flatus is either expelled from time to time, *per anum*, or accumulates and gives rise to borborygmi, or to tympanitic distension of the abdomen; but these symptoms seldom become very urgent in this state of the disorder, unless some other affection supervenes. The bowels are generally costive, sometimes irregular; and the secretions poured into the digestive canal, both from its own surface and from the collatitious organs, are deficient, and occasionally even morbid; the flatulence and imperfect functions of these parts being the almost coëtaneous effects of the impaired influence of the organic nervous system. The air which collects in this part of the digestive tube is to be ascribed chiefly to alterations of its contents, and to exhalation from the mucous surface. — This form of flatulence may continue long without any other material disorder, excepting slight debility, want of activity, costiveness, &c.; and it may occasion, in a short time, some one of the various serious diseases about to be noticed.

11. *B. Symptomatic intestinal flatulence* is a common complaint. It is a frequent result of *costiveness*, or imperfect digestion in the bowels, particularly in the duodenum and cæcum; and of a deficient or morbid secretion from the intestinal mucous surface, and from the liver. When the quantity of air collected is great, colicky symptoms, obstinate constipation, and irregular action, or atony, of the muscular fibres of the intestines, are the usual consequences. The coats being unable to contract regularly, or sufficiently to expel the air, or obstructions being opposed to the ejection of it, various effects of a serious kind often result. Portions of the bowels react with much violence upon the distending cause, whilst other portions are distended until the contractile power of the muscular coat is almost or altogether lost. Thus, spasmodic constriction in one part, and paralytic distension in another, are produced; and the organic sensibility of the nerves of the canal are remarkably excited or altered. Flatulent *colic* is the consequence; and, if this be not relieved, intus-susceptious, ileus, or inflammation of a portion of the bowel, may ultimately supervene. If, in addition to imperfect or morbid secretion, the tone of the muscular coat is still further reduced—when its power of reacting upon the collection of flatus is lost more generally or completely, *meteorismus* or *tympanitis* will be produced, and the abdomen will be tense, painful, or tender, and the fæcal evacuations either altogether suspended, or interrupted, and hard or scybalous.

12. Intestinal flatulence is a most common symptom in *hysteria*, and is in it generally indicated by borborygmi, in *inflammations of the bowels*, in *dysentery*, in functional and organic *affections of the cæcum*, in *hepatic disorders*, especially *bilious colic*, in the *colic from lead*, and in the bowel complaints of *children*. It is very frequently met with in the advanced stages of *typhoid fevers*; and, as I have shown, it is one of the indications of extreme adynamia with predominant affection of the bowels. HIPPOCRATES remarks (*Coac. Prænot.* l. i. 46.), that inflation of the abdomen, without rejection of the flatus, is a dangerous sign; and the accuracy of the opinion must be admitted. In low fevers, the accumulation of air is often extremely great; and whilst it is an indication of danger, it tends to increase it, by impeding the functions of respiration and circulation, as well as by exhausting the vital tone of the intestines.

13. *C.* Inflation of the bowels, particularly of the *colon*, gives rise to various symptomatic disorders, when it reaches a considerable height; and it not infrequently occasions the same affections as arise from flatulence of the stomach. Respiration and circulation are both often deranged by this cause; and congestions of the veins and sinuses of the brain consecutively induced. Hence vertigo and headache often follow a sense of oppression in the chest, and irregularity of the heart's action. Hypochondriacal and hysterical symptoms are always aggravated by collections of flatus in the bowels; and these latter are favoured by costiveness. Hence the advantages resulting in these diseases from the use of stomachic or tonic aperients.—The colon may be also partially displaced, and adjoining parts injuriously pressed upon by collections of flatus in the large bowels.

14. III. Although flatulency very often is limited to either the stomach or bowels, presenting the pathological relations just explained, yet it also frequently extends almost simultaneously to both, or affects one or other more or less prominently. In this case, the effects produced by it will vary accordingly, and depend upon the degree in which it exists. — Flatus, moreover, is generated in other situations, as in the *uterus*, in the *urinary bladder*, and even in the *shut cavities*, but in very rare instances, particularly as respects the latter of these. In these parts, it is either exhaled from the vessels furnishing the secretions poured out on their internal surfaces, or developed in consequence of the changes which these secretions undergo during their retention. The form

ation of air in serous cavities is never, I believe, observed, excepting as a result of inflammatory action in some part of their surface that has given rise to a secretion of a sero-albuminous fluid; and it is not improbable that the air is produced by the partial decomposition of the albuminous portion of the secretion. These occurrences are more particularly noticed in other places.

15. V. TREATMENT. — *A.* In the *primary states* of the disorder, attention to *diet*, and gentle *tonics*, with mild *aperients*, will generally restore the healthy functions of the stomach and intestines in a short time. If much distress be experienced from the retention of the flatus, the addition of a *carminative* spirit or oil, as those of anise-seed, pimenta, nutmeg, or cardamoms, to the above, will give relief; but the frequent use of heating spices may be injurious in other circumstances, particularly if the complaint depend upon chronic inflammatory action of the digestive mucous surface, as is frequently the case. The practice of rejecting the air, either upwards or downwards, should not be indulged in, for, although momentary relief is thereby obtained, an increased disposition to generate it is produced, and the evil augmented. It is only when air collects to the extent of producing much disorder, that its expulsion should be procured. — In this case, any of the numerous carminatives in common use may be given, if they be not contra-indicated by the presence of inflammation. In some such instances, however, the more energetic of them may be exhibited with advantage in enemata. The extract of *rue*, or any of the *essential oils*, may be thus prescribed.— HUFELAND and others advise warm dry *aromatic epithems* to be applied over the abdomen in these cases; and THUNBERG recommends the *cajeput oil* to be rubbed upon this part, or to be given internally, when the state of the circulation and of the animal heat indicates the propriety of exhibiting carminatives. —*Charcoal*, as suggested by J. P. FRANK, and *magnesia*, if not the most efficacious, are among the safest means that can be used. The same may be said of *camphor*, and the *terebinthinates*, and the plants which owe their efficacy to either of these principles. The *subnitrate of bismuth* is often of great service, particularly when conjoined with small doses of ipecacuanha and hyoscyamus.

16. Whenever flatulency of the stomach or bowels is unconnected with inflammatory action— when the pulse is soft or weak, or not increased in frequency, when the abdomen and hypochondria are not painful on pressure, when the tongue is moist, or pale, and not red at its edges, and when there is no unusual thirst — then carminatives, antispasmodics, stimulants, and tonics, combined with one another, and with absorbents and aperients, will give relief; and they may be either given by the mouth, or administered in enemata. — But even in these cases, our chief dependence should be placed upon suitable tonics, with the use of the cold salt-water bath, and attention to the secretions and excretions, for the cure of the complaint. — If an attentive view of the case suggests the existence of inflammatory irritation in any part of the alimentary canal, the *nitrate of potash*, and the *subcarbonate of soda* or of potash, with *demulcents* or *emollients*, and weak camphor mixture, will be most appropriate. In these cases, external *derivatives*, gentle frictions of the abdominal surface with warm *rubefacient liniments*, as recommended by WHYTT, the application of hot terebinthinate embrocations or epithems, or fomentations as used by DARWIN, will be of great service. When the complaint is connected either with slight inflammatory action, or with imperfect secretion, especially of bile; or with both, as observed in numerous instances; *deobstruents*, and *mild purgatives*, will be required. In such cases, the blue pill, or PLUMMER's pill, or the hydrargyrum cum creta, ought to be given at bedtime, with soap, ipecacuanha, and taraxacum.

17. *B. Flatulence in infants or young children* ought to be treated chiefly by appropriate food and regimen, and by mild purgatives. *Magnesia* in *dill-water*, or in *fennel-water*, or in *anise-seed water*, will frequently give relief; but an alterative, as the hydrargyrum cum creta, will generally be required on alternate nights. The warm or tepid bath, followed by frictions of the abdomen with some warm liniment; enemata with a little common salt, and some carminative water; and an occasional dose of castor oil, with warm clothing, and pure dry air, will also be productive of benefit.

18. *C.* In the more decidedly *symptomatic states of the complaint*, the treatment should be chiefly directed to the disease on which it depends. But in these states it is generally most urgent, and hence requires the adoption of means calculated to procure immediate relief. If those already described, employed according to the peculiarities of the case, prove inefficacious, it has been recommended by REICH, PAMARD, THILOW, and PIORRY, to draw off, or to facilitate the escape of, the flatus, by a siphon, or by the introduction of a flexible hollow tube into the rectum. In most instances of difficulty, I have found the terebinthinates with aperients, enemata with either spirits of turpentine or extract of rue, and terebinthinate embrocations or liniments applied to the abdomen, succeed in procuring the expulsion of the flatus, by exciting the action of the muscular fibres of the canal. — When this complaint depends chiefly upon debility, and is associated with other disorders proceeding from this source, the means advised in the articles COLIC, COSTIVENESS, and DEBILITY, according as it may present more or less of the features of either, should be prescribed; and *diet* and *regimen* ought to receive due attention.

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FŒTUS — Diseases of the.

Classif. — General Pathology.

1. The *fœtus* is liable to a greater number of diseases than has generally been supposed. Some of these, together with the lesions of the fœtal appendages, have been noticed in the article Abortion, § 10. As these diseases occasion various malformations, congenital alterations, abortions, or even the death of the fœtus, a brief enumeration of them will be useful in various points of view, but particularly as indicative of the sources, in which several maladies of infancy originate.

2. i. The *Causes* of fœtal disease are, as respects the *mother*—violent or prolonged mental emotions; imperfect or unwholesome nourishment; excessive fulness or deficiency of blood; a morbid state of this fluid, produced by food, medicines, or disease; alteratives, as mercury, &c., in large doses, or too long continued; attempts at procuring abortion; the use of strait corsets; injuries, falls, or blows on the abdomen; a cachectic state of constitution, particularly the syphilitic and scrofulous taints; constitutional or other diseases, as eruptive, periodic, or continued fevers, tubercular consumption, &c.; venereal excesses during pregnancy; a laborious life, or inordinate physical exertion, and previous lesions of the ovaria, uterus, or fœtal appendages. The chief causes as respects the father, are, predisposing only, with the exception of the syphilitic or scrofulous taints. There is every reason to believe that, if the father is aged, or debilitated, or suffering from constitutional or local disorder, associated with sexual exhaustion, at the period when impregnation is effected, the fœtus will be weakly formed, and thereby predisposed to disease, especially when the mother is exposed, during utero-gestation, to the more energetic causes, or to those just enumerated.

3. ii. The *Diseases* observed in the fœtus, either consequent upon one or more of the above causes, or occurring without any assignable cause, are—1st. *As respects the cerebro-spinal system* — effusions of fluid in the ventricles, or in the spinal canal, or between the membranes, giving rise to hydrocephalus, spina bifida, imperfect or arrested formation of portions of the brain or spinal cord, to inflammatory congestion of the membranes, or of portions of the brain or cerebellum (Lobstein), with spasmodic contractions of the limbs, &c.; — 2d. *As regards the thoracic viscera* — inflammation and suppuration of the thymus gland (Véron); tubercles in the lungs, in the early stages (Billard, Langstaff, and myself), and in a state of softening (Husson); inflammation of the substance of the lungs, and of the pleura; dropsy of the pleural cavities; hydro-pericardium, and malformations of the heart; — 3d. *As respects the abdominal viscera* inflammation, and even ulceration, of the internal surface of various parts of the alimentary canal; tubercles in the liver (Hoogeven, Husson), in the mesentery (Oehler), and in the spleen (Billard); inflammations of the liver (Brachet, Véron), of one supra-renal capsule (Andral), of the peritoneum (Desormeaux, Véron), of the small intestines (Billard); dropsy of the peritoneal cavity in various degrees (Dugés); enlargement of the mesenteric glands; accretions of the peritoneum, and of several viscera, from chronic inflammation (Andry, and myself); retention of urine, and excessive distension of the bladder, ureters, and pelves of the kidneys, from obstructions to the discharge of it in the liquor amnii (Sandifort, Moreau, Ph. Pinel, A. Cooper, Chaussier, Dugés, &c.); rupture of the bladder (Dugés); lesions of the kidneys, and other parts of the urinary apparatus (Ruysch, Hoffmann, Wrisberg, Vrolik, Boetschler, Denis, Boivin, &c.); and obliterations of canals, and occlusions of their outlets, as of those of the alimentary canal, and of the urinary and generative organs; — 4th. *As respects the general frame* — intermittent fevers, small-pox (Deuttel, &c.), and other eruptive fevers (Andry); syphilis, and jaundice (Hey, Andry, Baumes, &c.); — and, 5th. *As regards external parts* — malformation of the palate, mouth, and lips; dislocation of various joints, and even of the hip joint (Dupuytren, Chaussier, North); contractions of muscles; fractures, gangrene, &c. of the limbs (Joerg); hardening of the cellular tissue (Uzembezius, Mauriçeau, Stratford, &c.); anasarca, and œdema of one or more limbs (Gardien, Dugés, Andry, &c.); hydrocele (Andry); various tumours and nævi; and several affections of the skin (Goeckel, Ledel, Oehler, Chaussier, Andry, &c.).

4. My limits prevent me from remarking upon these; but it may be mentioned, that Mauriçeau was born with the small-pox; and that jaundice may arise in the fœtus — 1st, from the same causes as induce it in the adult; and, 2dly, from jaundice in the mother. M. Dugés mentions that a lady was subject, during pregnancy, to colic and jaundice from biliary calculi; and, in four instances, the children were born deeply jaundiced. I attended, some years since, a lady in tubercular consumption, who was delivered, in the seventh month, of an emaciated and very small fœtus, that died a few days afterwards. On examination, the lungs were found loaded with tubercles, and the mesenteric glands enlarged. M. Tonnellé found an enormous fungoid tumour (*fungus hæmatodes*) on the right side of the head of a fœtus; and M. Voisin, a polypus adhering to the posterior part of the palate.—The existence of worms in the bowels of the fœtus has been asserted by some writers, and denied by others. The evidence is not sufficiently conclusive either one way or another.

5. iii. The *Death of the Fœtus* may take place from the greater number of these diseases, or from lesions of the placenta, umbilical cord, or membranes (see Abortion, § 10.). Although there are numerous exceptions to the rule, the more vigorous the fœtus, the stronger and more lively will be the sensations of its movements. It is evident that the existence, and far less the nature, of the fœtal malady cannot be ascertained before delivery; yet, in some instances, it may be suspected, from what is known of the causes. An attack of ague in the fœtus is usually made manifest to the mother; but does not generally cause abortion. The feebleness and slowness of the fœtal movements, after the fifth month, are indications of impaired strength of the fœtus, which should not be overlooked. The total cessation of

motion; a feeling of uncomfortable weight gravitating to the side on which the patient lies, and of general uneasiness and coldness in the lower part of the abdomen; flaccidity of the abdominal parietes subsequent to a certain degree of tension; fœtor of the breath, pallor of the countenance, lividity of the eyelids or surrounding circle, and flaccidity of the breasts; generally denote the death of the fœtus; and when the pulsation of the heart cannot be heard on auscultation, this event may be inferred with certainty.

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FUNGOID DISEASE. — Syn. *Hæmato-cerebriform Disease; Milt-like Tumour*, Monro. *Soft Cancer*, Auct. var. *Spongoid Inflammation*, Burns. *Medullary Sarcoma*, Abernethy. *Carcinoma spongiosum*, Young. *Fungus Hæmatodes*, Hey, Wardrop. *Fungoid Disease*, A. Cooper. *Fungus Medullaris*, Maunoir. *Matière cerebriforme*, Auct. Gall. *Carcinome mou et Spongieux*, Roux. *Tumeur Encéphaloide*, Laennec. *Fongus Médullaire*, Lobstein. *Carcinus Spongiosus*, M. Good. *Carcinome Sanglante*, *Cancer mou*, Fr. *Der Blutschswamm*, Germ. *Bleeding Fungus.*

Classif. — 3. *Class*, Sanguineous Diseases; 4. *Order*, Cachexies (*Good*). IV. Class, IV. Order (*Author*, in *Preface*).

1. Defin. — *A tumour, or tumours, consisting of a whitish, pulpy, brain-like substance; generally soft, circumscribed, elastic, or obscurely fluctuating; giving rise to large vascular growths, which bleed profusely; always connected with constitutional vice; contaminating the frame, and terminating fatally.*

2. i. Description. — This is the most malignant formation to which the body is liable. When it appears covered only by the integuments, and has not yet acquired considerable bulk, the surface of the tumour which it forms is smooth, generally equal, and not discoloured; it is commonly soft and elastic, and communicates to the touch an obscure sense of fluctuation. When removed from the body, the hæmatoid tumour is generally circumscribed, and more or less rounded; it frequently possesses a capsule of condensed cellular membrane. — *A.* M. Laennec has *divided* the disease into, 1st, the encysted; 2dly, the irregular and non-encysted; to which he has added, 3dly, the interstitial impregnation of organs by the cerebriform substance. This last is not mentioned by Mr. Wardrop, who has described this disease with great accuracy. M. Laennec has never met with it in the lungs. It may be, therefore, considered as a rare form of the disease. When divided, the substance soils the knife, and is composed of an opaque, whitish, homogenous matter, resembling, in colour and consistence, the cerebral pulp. Hence the name, Encephaloid, given it by the French pathologists. It softens after exposure for a short time to the atmosphere; and when the softer part is washed away, or when the mass is compressed, a filamentous or fine cellular tissue remains.

3. *B.* The *consistence* of the hæmatoid tumour varies in different cases, and sometimes in different parts of the same mass — being sometimes more dense than the firmest brain, at other times as soft as the brain of a fœtus, as the milt of a fish, or even not much firmer than custard. According to M. Lobstein, the different degrees of softening is owing to the progress of the disease; and this appears to be generally the case. In the *first* stage, or that of crudity, the melanoid tumour has the consistence of a firm brain, or of the conglobate glands; in the *second*, the consistence is less, being that of the fœtal brain; in the *third*, it approaches that of milt or custard: to these may be added a *fourth*, when the tumour is situated externally, or near the surface of an organ or part, viz. that attended with ulceration and the rapid production of bleeding fungi from the ulcerated part.

4. *C.* The *colour* of this production varies sometimes in the same mass. It is commonly of the colour of the brain; occasionally portions of it are redder, and exhibit more of a fleshy appearance; and in other cases, parts of it resemble a clot of blood. When the hæmatoid mass is encysted, it is readily detached from its capsule; and, in the early stage, is often divided into several lobes, placed closely together, and separated by an extremely fine cellular tissue, which seems to convey the vessels for its nutrition. In the advanced stages, the division into lobes disappears. The non-encysted form is, however, more common, particularly in the viscera. The masses constituting this formation vary from the size of a pea to that of the head of a fœtus at the full time.

5. *D.* The medullary structure, although the general, is not the only, form observed in the primarily diseased mass. Some of the fungoid productions are composed of distinct parts provided with cellular capsules, and differing in size, colour, and consistence. Some of these parts resemble slightly softened glue; others have earthy particles mixed with the pulpy cerebriform matter; many present insulated portions of the colour and consistence of boiled yolk of egg. As the tumour increases, the softening and disorganisation characterising the successive stages of its growth takes place. Disorganisation generally commences in the central parts: cavities now form in it, chiefly containing blood; and, when the blood is washed away, and the tumour is placed in water, numerous membranous shreds and filaments are seen floating in these cavities.

6. If the fungoid mass is situate near the surface of any internal viscus, discolouration of, and adhesion to, the part covering it, followed by ulceration, take place. But the ulcerative process, instead of giving rise to loss of substance, produces a fungous growth, and, as well as when the tumour forms exteriorly, the increase of bulk, which had hitherto been slow, now becomes rapid.

The fungus which thus forms is soft, easily torn, of a dark red or purple colour, of an irregular shape, and bleeds profusely when slightly injured; and differs from the firm dense structure of the cancerous fungus. It resembles, when small, the softer kinds of polypous vegetations which form on mucous surfaces.—When the primary hæmatoid tumours are situated towards the surface of the body, they increase in size more rapidly than when seated internally. They generally soon lose their uniform round and smooth appearance; they project very considerably, and at last become irregular at their surface. Their consistence diminishes, particularly in the projecting portions, where the soft elasticity passes into obscure fluctuation. The veins running over or from the diseased mass assume a varicose appearance; an erysipelatous-like redness of the prominent parts supervenes, followed by lividity, adhesion of the integuments to the tumour, ulceration, and soft reddish fungous excrescences. The growth of the tumour is now remarkably rapid. The surface of the fungi exudes a thin fœtid sanies, often with blood, which is sometimes discharged in great quantity; hence arose the name fungus hæmatodes, which applies only to the advanced stage of the malady. When the fungus is very large, its more prominent parts often lose their vitality, and separate in most offensive sloughs.

7. In some cases, the voluntary nerves have been connected with the diseased mass, and have participated in the change of structure; but they have not been found changed beyond the limits of the tumour. In the eye, the optic nerve is always changed in structure; and in a case referred to by Mr. Wardrop, the anterior crural nerve passed into the centre of the diseased mass, and was so completely lost in it, that it was impossible to distinguish between the two structures. This appearance being general whenever large nerves enter into the hæmatoid tumour, has led M. Maunoir to infer that the cerebriform matter composing it is nothing else than a morbid accumulation of the nervous pulp. This opinion is combated by M. Lobstein, who avers that he has met with cases in which, particularly in early stages of the disease, the nerves passed through the tumour without experiencing any change. I am, however, disposed to doubt this, at least as respects the fully developed disease: if they pass *through*, I believe, from the dissection of a case which occurred to me, that they are always changed, and identified with the morbid mass: if they pass merely *by* it, or between insulated portions of it, no change will be observed.

8. The most remarkable characteristics of this disease are, 1st, The frequently simultaneous occurrence of a number of the tumours constituting it in different parts of the body; the least connected with each other, either by structure or function: and, 2d, That when an apparently isolated mass of the disease is met with in an extremity and extirpated, it always soon afterwards manifests itself in some distant part, either externally or internally; the subsequent disease being even more rapid in its progress than that preceding it. The simultaneous appearance of the hæmatoid tumours, or their successive manifestation, although sometimes observed to take place in the course of the absorbent system, seem not to be always propagated through this medium; for in the case of the diseased mass appearing first in one of the lower extremities, the subsequent occurrence of it may not be in the glands above the originally affected part, but in some distant or internal organ, as in the lungs, liver, in an upper extremity, &c. This was well evinced in a most remarkable specimen of the disease which came before me several years since in a lad of about fifteen; who presented in all the extremities, upper and lower, in the parietes of the thorax and abdomen, in his neck and head, a number of those tumours, certainly not under fifty. They varied from the size of a walnut to that of a large orange; many of them were of simultaneous origin, and those which were the latest in appearing did not occur in the seat of the glands of the absorbents leading from the primary tumours. A somewhat similar, and still more remarkable case, in respect of the great extent and number of the tumours, both internal and external, I had lately an opportunity of seeing frequently with Mr. Bushell.

9. Often, however, when the original mass is advancing through the changes I have described, the absorbent glands become affected by the disease, and the internal viscera and the whole constitution are contaminated; or, perhaps, it would be more correct to say that the original contamination is thereby so far heightened as to occasion a more general formation of this diseased structure. When the absorbent system is affected, Mr. Wardrop states, that usually one or more glands swell in the vicinity of the primary tumour, and that this takes place sometimes at an early period of the disease, and occasionally not until the primary tumour is far advanced. In some cases the diseased glands grow to a great size, whilst in others they are but slightly enlarged. Occasionally the primary affection makes little progress, whilst the disease of the glands advances rapidly.—The structure of the glands thus secondarily affected is entirely converted into the cerebriform matter, exhibits a homogeneous pulpy mass, and is contained in a cellular capsule. Mr. Wardrop has never observed a fungus arise from the diseased gland.

10. This morbid production may appear in one part only, or in several at the same time, or in distant parts successively. The tumours which first appear may be called *primary*; those which occur afterwards, either in the absorbent glands or in remote parts, may be named *consecutive*. But the disease may terminate fatally without any more than a single mass being developed. Mr. Langstaff has adduced an instance of this. The primary tumour may be small, and the subsequent productions most extensive, or the reverse.

11. There is scarcely any organ or part of the body exempt from this disease. The extremities, the mammæ, thyroid gland, the testes, ovaria, uterus, the lungs, the liver, pancreas, spleen, the stomach, the intestines, the urinary bladder, prostate gland, the mesentery, omentum, the eye, the brain, the spinal cord, the nerves, the glands, the heart, the muscular parts of the trunk, the bones, &c., have all been found affected with this malignant disease. It seems to commence in the cellular tissue; but, as it is developed, the proper texture of parts to which it extends is either converted into it, or is absorbed in proportion as it is increased.

12. ii. Progress and Duration.—*a.* The

progress of the disease may be divided into four stages. — In the *first*, the tumour has the consistence of the conglobate glands; in the *second*, it is much softer; in the *third*, the softening is still greater, and amounts to a state of semi-liquefaction, and gives the sensation of fluctuation; in the *fourth*, ulceration or vascular fungi arise. — Signs of general cachexy appear in the second or third stage, and are very decided in the fourth. — *b.* The *duration* of this malady is generally some months at least; and it may continue for two or three years. In the early stages, it is not usually attended by febrile action, or much pain; and it may exist for a considerable time without occasioning emaciation; but there is always more or less debility. Acceleration of pulse, and emaciation, appear in the advanced stages, often accompanied with effusion into the adjoining cavities, particularly when an internal organ is the seat of the malady, as the liver, uterus, &c. — In the *third* and *fourth* stages, the vital functions are very manifestly affected. The stomach loses its power, or rejects the ingesta. The patient experiences most severe pain; and the energies of life decline. The complexion often assumes a livid, earthy, or peculiar yellowish hue, or pale straw colour; the pulse becomes smaller and weaker; and at last the patient sinks, generally without either delirium or insensibility having existed for any considerable time before death.

13. iii. Diagnosis and Complications.—This disease was confounded with cancer until the commencement of this century, when Burns and Hey first remarked the difference between them. They are still considered by some Continental pathologists, and by Dr. Carswell, as varieties or modifications of the same constitutional malady; and there are several circumstances which both favour and militate against this opinion. They both occur in similar habits of body and temperaments; they often arise spontaneously, or without any manifest cause, or are traced to the same exciting agents; they are both dependent upon constitutional vice, as well as upon perverted organic action and secretion in their seats; and they both undergo somewhat similar local changes, and occasion an increasing contamination of the fluids and soft solids. Moreover, as I have stated in another place (see article Disease, § 141—144.), and as Drs. Kerr and Carswell have justly remarked, both may co-exist, or the carcinomatous may pass into the fungoid formation. Dr. Carswell observes, that numerous examples might be given of scirrhus, medullary sarcoma, and fungus hæmatodes, as they are commonly called, originating in the same morbid state, and passing successively from the one into the other in the order in which they have been named. Indeed, these varieties are sometimes met with, not only in different organs of the same individual, but even in the same organ.

14. The points, however, of dissimilarity are very striking, as remarked in the article referred to (§ 141—144.); and, notwithstanding these circumstances, are sufficient to constitute them distinct diseases. As these points have not been brought into view by the able writers just mentioned, and as they deserve a fuller notice than I have bestowed on them in the sketch indicated above, I shall here state them more fully. — *a.* There is no relation between the hard, incompressible texture of scirrhus, in which carcinoma commences, and the cerebriform, elastic, and soft substance constituting fungoid disease. — *b.* Carcinoma commences in scirrhus, which confounds in one mass all the tissues which it invades, and often without much increase of bulk, although with augmented density; fungoid disease always consists of a more or less evident tumour, which seems to destroy every trace of any other structure. — *c.* Carcinoma, even in an advanced stage, when fungous projections sprout from its ulcerated parts, presents but little vascularity; whereas the fungoid disease possesses large vessels, and vascular cavities, so that it derives one of its most common names from this circumstance. — *d.* Fungoid disease attacks organs in which true carcinoma has not hitherto been seen to originate; as the lungs, the liver, the brain, the spinal cord, and the nervous trunks. — *e.* Cancer affects the aged, fungoid disease the young; and the former is attended with more pain at the commencement than the latter: — and, *f.* as, MM. Maunoir, Lobstein, and Velpeau have remarked, there is something peculiar in the cachexy attending carcinoma, that is not observed in the fungoid malady; for it is not unusual to see persons, labouring under this latter affection, possessing their natural colour. This, I believe, occurs most frequently when some external part only is affected, or when the disease has not invaded the digestive or assimilating organs, or, when absorption of the morbid matter has not taken place to a great amount. In a case now under my care, the healthy complexion is preserved, and yet neither the able practitioners who have seen it, nor myself, have any doubt as to its nature.

15. M. Lobstein asks, with reference to the question of the identity of these two maladies, whether, admitting that true cancer sometimes gives rise to the fungoid formation, it therefore follows that this latter is the same as cancer? May there not exist, simultaneously, tuberculous degeneration of the lungs, fungoid disease of the liver, and fibrous tumours in the womb, without inferring the identity of these three morbid formations? Fungoid disease, therefore, appears, from its vascular relations, from its peculiar structure, and from its early characters, its advanced course and terminations, to be a distinct malady, although it may be consequent upon, or complicated with, other alterations of structure. When it occurs in young subjects, it is always *primary*, or is not preceded nor attended by the carcinomatous formation. But in persons past the meridian of life, in whom only scirrho-cancer or carcinoma is met with, the fungoid structure is sometimes produced *consecutively*, or in an advanced stage of it, and thus occasionally exists as a secondary complication with that disease, or as one of the advanced changes of structure consequent upon the constitutional vice. The question, therefore, as to difference is reduced to this, that, when fungoid disease attacks young persons, it is always a primary and distinct malady; and that, when it affects persons advanced in life, it is either primary, or consecutive of, and complicated with, carcinoma (see art. Disease, § 141—144.). In a few instances, other morbid formations besides this have been found associated with the cerebriform structure, as fibrous tumours, scrofulous

matters pus, melanosis, hydatids, osseous and earthy deposits, &c.*

16. iv. Causes. — *a.* The *predisposing causes* of fungoid disease are debility of constitution, early age, and peculiarity of diathesis. Children, and persons who have not passed the meridian of life, are much more frequently affected by it than persons in the decline of life. Those of the lymphatic and nervous temperaments, of a scrofulous constitution, of a sallow or pale complexion, and of a lax fibre, with a flabby state of the soft solids, and languid circulation, are oftenest its subjects. As to the influence of sex, sufficient data have not been furnished to admit of an opinion; but the most of several cases which I have seen have occurred in males. The same may be said of the influence of climate; but, like cancer, it seems to be most prevalent in countries the inhabitants of which partake largely of animal food. It has even been supposed that eating much pork predisposes to it. An hereditary disposition to it may be admitted with more truth. General debility is, however, its most common antecedent. — *b.* The *exciting causes* are often unknown. Sometimes an external injury, as a blow or bruise, has occasioned it, often after a long period. Most of the cases which I have seen appeared to have arisen chiefly from a poor and unwholesome diet, aided by cold and moisture.

17. v. The Prognosis is extremely unfavourable. If the malady is developed so as to admit of precise recognition, a fatal issue may be delayed a short time by a tonic or restorative treatment, but can never be averted. Extirpation, or amputation, has been attempted, but with no benefit, and often with disadvantage. Although the diseased part be removed in this way, its source is still in the constitution, and it soon afterwards is developed in some other situation, generally in an internal viscus, the nearest to the seat of the extirpated part. If it exist also in an internal organ, the shock occasioned by the operation accelerates its growth and fatal progress.

18. vi. Origin. — Many writers on this disease, and especially the French pathologists, suppose that the diathesis in which the disease originates is connected with the cancerous taint; and that the fungoid is only an advanced stage, or higher grade of carcinoma. M. Maunoir and Lobstein are opposed to this view; and my opinion, as just stated, coincides with theirs. Although both diseases are distinct as to the *kind* of action, as to the form of the morbid structure that results, and as to some of the circumstances in which it takes place, yet the *manner* in which they both arise may not be different; their morbid actions being similar in some respects, but different in others. Hence the alliance occasionally observed between them; as in other diseases generally connected, but specifically different. The opinion, therefore, which I have stated as to the origin of Cancer (§ 25, 26.), and the remarks there offered, are, in part, applicable to this disease. — Dr. Hodgkin has endeavoured to show that fungus hæmatodes and carcinoma originate in a cystiform serous membrane. That they thus arise in some instances may be admitted; but I agree with Dr. Carswell in the opinion that they are often formed independently, and where cysts cannot be detected; and that, even where cysts have existed, their formation in the cellular tissue external to the cysts has been demonstrated. — The views of M. Andral have been stated in the article just referred to, and in that on Disease (§ 138.). M. Cruveilhier believes that this, as well as some other lesions, are the results of the deposition of morbid products in the cellular tissue of organs, the venous capillary system furnishing these products.

19. Dr. Carswell is of opinion that the formation of the fungoid and carcinomatous substance takes place in the blood, whether it be found in this fluid alone or in other parts of the body at the same time; and he adduces the facts — 1st, That the morbid substance is found in the vessels which ramify in these malignant tumours, or in their vicinity; — 2dly, That it is found in those vessels which communicate with the diseased part of an

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* Besides the distinctions I have insisted upon above, Scarpa and Berard have adduced others, which I may here notice at length. The cerebriform or fungoid structure, when fully developed, is a milk-white pulpy substance, studded with rose-coloured points — scirrho-cancer has the appearance of the skin of brawn, and is traversed by numerous cellulo-fibrous radii or bands. The former comprises a number of arterial vessels, that increase with the softening which it undergoes; extravasations of blood take place in its substance; and the ulceration of its advanced stage is accompanied with hæmorrhage, which is often repeated, and frequently profuse; — the latter is nearly deprived of vessels; sanguineous extravasation is seldom observed in it; and the ulceration to which it gives rise is rarely attended by any considerable hæmorrhage. The cerebriform substance is often found in the veins of the diseased part — sometimes nearly filling them — and occasionally, also, in those in the vicinity; — a similar circumstance is very seldom observed in scirrho-cancer. The cerebriform disease attacks primarily all the systems, tissues, and organs of the body; the primary seat of carcinoma is much more limited. The former attains a great size, is lobulated, and presents a characteristic elasticity and softness; — the latter never reaches a great size, it even sometimes assumes the appearance of diminished bulk, with increased density, and has neither a rounded outline nor elasticity. — Fungoid tumours frequently co-exist, even primarily, in several organs — occasionally in considerable numbers; — carcinoma is generally solitary. The cerebriform disease softens into a rose-coloured *bouillie*; scirrhus assumes the form of a *jelly*. In their progress to the surface, the first stretches the skin, and renders it thinner, without adhering to it; the second cements itself to the integuments, which no longer admit of motion, but is firmly attached to the diseased mass. The progress of ulceration in this is remarably slow; in that very rapid. In the one, the period which elapses from the commencement of ulceration is often as long or longer than that which preceded this change; in the other, the period subsequent to ulceration is disproportionately short, and the lesions consequent upon it are of a much more acute and violent character, though the pain may be less.

It is in the early stage, or state of crudity, that these two maladies are distinguished from each other with greatest difficulty. The fungoid structure has not then attained the white colour it subsequently acquires. It is at first semi-transparent, firm, and divided into numerous lobules. Its vascularity is also not so great as at an advanced stage. But, although it thus resembles scirrhus, to conclude from this, that they are identical diseases, is to admit that the same lesion will give rise to two kinds of structure that essentially differ. But this stage of fungoid disease is very short; and in cases where a number of tumours are developed in different parts of the body, they all have the same cerebriform structure. Malignant disease may, however, present the *complicated states* above mentioned; the same tumour consisting partly of the carcinomatous and partly of the cerebriform structure. In addition to these, it may even comprise other morbid products, disseminated through it, or collected in one or more places — in one part an adventitious fibrous tissue, in another a fibro-cartilaginous formation, in a third tubercular matter, in a fourth multilocular cysts containing various substances — here a gelatinous secretion, there a milky fluid, this a reddish or bloody matter, that an osseous or a cretaceous deposit. These, as well as the cerebriform products thus accidentally or occasionally comprised in carcinomatous or malignant tumours, are not the constituents of carcinoma, but contingent formations consequent upon the morbid nutrition and secretion constituting the local disease.

organ; — and, 3dly, That it is met with in vessels having no direct communication with an organ affected with the same disease. The veins, however, and venous capillaries, are the only parts of the vascular system in which the diseased substance is found — sometimes in contact with the internal surface of the vein, or occasionally united with it by means of thin colourless fibrine, or even of very minute blood-vessels, as in the case of the cerebriform matter. In the articles referred to, I have stated that, when this morbid substance is detected in the blood, it has been absorbed, as in the case of other morbid secretions; and the accuracy of the opinion seems to be supported by the fact, that it is found only in the veins and absorbents; but Dr. Carswell believes that this is not the case, as there are instances in which the venous blood alone was the seat of the disease. If such be actually the case, an obvious difficulty presents itself; but various sources of deception arise in the course of minute researches, and mislead even the most careful. That the blood is early affected in this and other malignant diseases, I fully believe; but that the cerebriform matter is formed in it, and afterwards deposited in the parts which are its seats, cannot be supported by the history and progress of the local and constitutional affections. If it were previously formed in the blood, wherefore is it often deposited only in one situation? — wherefore is it not excreted by the emunctories? — wherefore does it not always affect a number of parts simultaneously? — wherefore is it never found in the arteries, and so frequently in the absorbents and veins proceeding from the seat of disease? — These, and other questions that may be asked, cannot be answered consistently with this doctrine. I therefore entertain the same opinion as was stated by me in the articles already referred to, and believe that, like carcinoma, it essentially depends upon a debilitated and otherwise morbid state of the system generally; and that the vital actions of the part or parts primarily and especially affected are depraved — that the nutrition, organic sensibility, and the secreting function of these parts are remarkably altered, and that the morbid product which results is partially absorbed into the circulation, and contaminates the fluids and soft solids, sometimes exciting a similar morbid action in other situations.

20. Conformably with the best ascertained facts connected with the appearance of the cerebriform matter in the vessels, it would seem, that, at a somewhat advanced stage of the disease, or when this structure becomes more or less softened, the molecules of it pass into the veins and absorbents leading from the part in which they have been formed; that they there sometimes are aggregated into masses sufficiently large to admit of their recognition; that, although these masses are generally found merely in contact with the internal surface of the veins, they sometimes adhere to it by means of the fibrine which collects around them, as in every other instance in which a semifluid or partially concrete substance, or a secreted matter of greater consistence than the blood, passes into the circulation; and that, when they thus adhere to the internal surface of the veins, minute vessels are ultimately developed in the fibrinous envelope which has been formed around them. — The principal changes observed in the blood of those affected by this disease, and which I have had an opportunity of remarking in two cases after death, are, an unusual thinness — a deficiency of fibrine and red particles — a state of partial anæmia — and imperfect coagulation. This state has been also remarked by Béclard, Velpeau, Andral, and Kerr, whose observations respecting the presence of the cerebriform matter, surrounded by a fibrinous envelope, in the venous blood, fully confirm the view I have taken of its origin in this situation, and militate against its primary formation in this fluid. (See articles Cancer, § 26.; and Disease, § 141.)

21. vii. Treatment. — This is a subject on which much cannot be said with any hope of advantage. Surgical treatment is of no avail, and strictly medical means of very little more. Whatever excites pain, or irritates the local disease, tends to promote its growth; and whatever lowers constitutional power, only lays the system more open to contamination. The intentions, therefore, which we should propose to ourselves, when entering upon the treatment of this malady, are — 1st, to support the powers of life, and thereby to resist as long as possible the extension of the disease; — 2dly, to promote the secretions and excretions, as auxiliary to the first indication; — and, 3dly, to palliate the sufferings of the patient.

22. *A.* The *first* of these is founded upon the evident and admitted fact that the disease is dependent upon, and associated with, debility; and upon the results of observation; and the means which may be employed to fulfil it need not be materially different from those specified in the article Cancer (§ 29. *et seq.*). Although no medicine has hitherto proved successful in curing the malady, yet new remedies, or novel combinations of those that are old, should nevertheless be directed against it. Besides, judicious means have often prolonged life, or enabled the system to resist its progress for a time. Conformably with these views, the preparations of cinchona; the sulphate of quinine; the preparations and compounds of iron, particularly the ferrum ammoniatum, and the muriated tincture; sarsaparilla; bitter tonic infusions or decoctions, with liquor potassæ, or the alkaline subcarbonates; and the preparations of iodine, — may be severally used, and combined with some one of the more energetic narcotics, particularly the acetate or muriate of morphine, or conium, or belladonna, or aconitum. — The preparations of *iodine* are the most successful of any means I have employed, in resisting the progress of this morbid formation. The ioduret or iodide of iron, and the hydriodate of potash, should be selected, and taken internally in small or moderate doses. The external use of iodine is often injurious. In a case of this disease, affecting chiefly the stomach and some others of the abdominal viscera, lately under my care, a combination of the acetate of morphine and kréosote palliated the urgent symptoms after other means had failed. In the still more recent case of a lady from Wales, who came to town on account of malignant disease of the stomach, that probably partook of the fungoid character, from the size of the tumour and other symptoms, this combination proved serviceable. This lady had been treated with great discrimination by Mr. Serph of Welshpool. During her stay in London, the acetate of morphine in a dilute aro-

matic spirit always afforded relief; but, when the disease had advanced further, and after her return home, it had but little effect. Mr. Serph therefore, at my request, gave her the following during the paroxysms of suffering, with great benefit. —

No. 227. ℞ Morphinæ Acetatis gr. ij.; Kréosote ♏ xij.; Pulv. Glycyrrh. et Pulv. Acaciæ, āā q. s. ut fiat massa æqualis, quam divide in Pil. xij. Capiat unam, omni horâ, urgenti dolore.

23. When the diseased part appears about to ulcerate, and afterwards especially, it should be protected from external injury or irritation; and if the bleeding from it be copious, or the discharge offensive, a solution of kréosote in weak pyroligneous acid or spirits of turpentine will prove the most efficient styptic and corrigent. The chloride of lime may likewise be employed. In addition to the other tonics just enumerated, the chlorate of potash may be tried in the decoction of cinchona. If iodine be prescribed, it should be continued for a long time. The hydriodate may be given in the compound decoction of sarsaparilla; with conium, aconitum, or any other narcotic, if much pain be felt. During the course of treatment, the secretions and excretions should be regularly promoted; and if the bowels be sluggish, their actions ought to be promoted by a tonic or stomachic aperient repeated according to circumstances. The other means, which have been recommended in the article Cancer (which see), are equally appropriate in this, and other malignant formations.

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FURUNCULAR ERUPTIONS. — Syn. *Furuncular Inflammations; Furuncles; Furunculi; Furunculus*, Sauvages. *Phyma*, Willan, Good. *Phlysis furunculosa*, Young.

Classif. — 3. *Class*, 2. *Order* (Good). 7. *Order*, 1. *Genus* (Willan). IV. Class, IV. Order (*Author*).

1. Defin. — *Inflammation of the cellular appendices penetrating the reticular texture of the corion, arising from disorder of the digestive organs, and modified in character by the state of constitutional power, and the condition of the circulating fluids.*

2. The true skin or corion is penetrated by small conical prolongations derived from the cellular tissue underneath. With these, the vessels and nerves proceed to the superficies of the corion to form the papillar tissue and vascular rete. When inflammation commences in one or more of these prolongations, furunculus or boil, hordeolum or sty, and anthrax or carbuncle, are the results; but in these, the surrounding true skin, with the subjacent cellular tissue, participate to a greater or less extent with the progress of inflammation. M. Rayer remarks, that, left to themselves, these affections always terminate in the mortification, and subsequent expulsion of one or more of the small cellular cones of the dermal tissue, which are then designated by the title of *cores*. This termination is generally ascribed to the resistance offered by the fibrous corion to the expansion of the cone of inflamed cellular tissue, and to the consequent strangulation of it; but the *cores* are probably the condensed tissue surrounding the matter which is formed in the inflamed tumour, and which is thrown off after this matter is discharged. It is even possible, that the inflammation in this affection commences in the vessels themselves which accompany the cellular elongations or cones; and that the disease is actually a limited angeitis, or artereitis, of one small branch, the cellular substance sloughing in consequence of its supply of blood being cut off, from an impervious state of some of the minute ramifications.

3. The varieties of furuncle are generally dependent upon disordered states of the digestive functions, and the characters which they assume vary with the states of vital action and of the circulating fluids. When furuncle occurs in a tolerably sound constitution, and healthy condition of the blood, it assumes a *sthenic* character, and constitutes *furunculus* or the *common boil*, or *sty* when it is seated in the eyelid. But, when it affects the aged or debilitated, or previously diseased, or the cachectic, or those in whom the circulating fluids are impure, and the vital actions languid or imperfect, it puts on an *asthenic* form, and gives rise to two varieties; one of which has been noticed only by M. Guersent and myself, and which may be called *Asthenic Furuncle*; the other has been usually named *Anthrax* or *Carbuncle*.

I. Sthenic Furuncle — *Boil; Furuncle; Phyma Furunculus*, Good; *Furoncle, Clou*, Fr.; *Die Beule*, Germ.

4. This species is *characterised by small inflammatory swelling of the skin and subjacent cellular tissue; this swelling being circumscribed, conical, hard, red, hot, and painful; and terminating in the formation of a small quantity of matter, and the expulsion of dead cellular tissue.*

5. i. *Symptoms.* — This affection begins in a small, hard tumour, most frequently seated on the hips, buttocks, thighs, back, nape of the neck, and armpits. The tumour becomes conical, painful, of a vivid or violet red colour, and reaches, in a few days, the size of a large walnut. From the fifth, to the eighth day, it points, the apex becoming white and soft. It soon afterwards breaks, and discharges a little sanguineous pus, the outer part of the slough being exposed through the small opening. The core or slough is generally expelled two or three days afterwards, and the pain then ceases, the swelling subsides, the cavity left by the core fills up, and, in a few days, the opening closes, a cicatrix only remaining. One boil is often followed by others, which follow a similar course, and attain various sizes. They

may succeed one another more or less rapidly; but they are seldom attended by fever, unless they are large or numerous. When they form in the perinæum, or near the anus, difficulty of voiding urine is often felt. In other situations, they may affect the lymphatics proceeding from their seats, and the adjoining glands.

6. ii. *Causes.* — The application of blisters, frictions with irritating liniments or ointments, inattention to personal cleanliness, the use of sulphureous or alkaline baths, and various antecedent or associated affections, are the usual causes of this eruption. Furuncle is often conquent upon the decline of, or convalescence from, fevers, the exanthemata, and inflammatory disease of the skin; and it often seems to depend upon weakness, or chronic inflammatory irritation, of the digestive organs; or upon accumulation of sordes in the *primæ viæ*. In some cases, however, it occurs without appreciable antecedent disorder.

7. iii. *Treatment.* — But little is required for this complaint beyond attention to the digestive organs. Accumulations of mucous sordes and fæcal matters ought to be freely evacuated by an aperient consisting of equal parts of the compound infusions of gentian and senna with a neutral salt or alkaline subcarbonate. A bread and water poultice, or any other soothing and relaxing application, may be kept on the part. If the boil be large, and the pain considerable, the division of the skin, at the most prominent part, will be of service. When a succession of boils appears, an emetic may be given, and its operation promoted by the infusion of chamomile flowers. The above stomachic aperient may be afterwards continued daily, or on alternate days. If the eruption still appears from time to time, gentle tonics may be prescribed. Dr. Fosbrooke recommends large doses of sulphuric acid. Mr. Copland Hutchison informed me, that he found the liquor potassæ, or Brandish's alkaline solution, in any bitter tonic infusion, most beneficial in these cases. The extract of taraxacum may be added to a mixture or draught of this kind, and an alterative pill given at bedtime, and continued for some days.

8. II. Hordeolum — *Stye; Phyma Hordeolum*, Good; *Sclerophthalmia, σκληροφθαλμια*; *Orgeolet*, Fr.; *Gerstenhorn*, Germ. — *is a small inflammatory tumour or boil in the free edge of the eyelids, most frequently near the inner angle of the eye.* — It is in every respect a similar affection to furuncle, the difference arising entirely from the nature of its seat. It is seldom larger than a grain of barley, and is generally smaller, as its name indicates. — Its *causes, progress,* and *treatment* are in all respects the same as those of common boil. — This, and the preceding variety of furuncle, are most common in young persons, just before or soon after puberty, and in adults who eat largely and take much spirituous liquors. — In scrofulous constitutions, and persons addicted to intemperance, they assume a chronic form. In such cases, local applications with camphor are of service.

9. III. Asthenic Furuncle — *Atonic Furuncle; Furoncle Atonique*, Guersent — consists of *a small circumscribed swelling of the skin, in one or several situations, with or without livid discolouration; followed by a very small purulent phlyctæna, at the summit, and by softening, destruction, and large perforation of the corion underneath; and preceded and attended by much debility and low fever.*

10. This affection was described by M. Guersent, in 1823; and early in the same year I saw two cases of it, with Mr. Painter, in a low street and ill-ventilated apartment in Westminster. Both occurred in unhealthy children in the same family, and terminated fatally. The bodies were inspected after death. Since then I have seen only three other cases, but I have met with others somewhat similar, consequent on the application of leeches. — All the instances which have occurred in my practice, as well as those seen by M. Guersent, were in children much weakened by previous disease; or in those affected by gastro-intestinal irritation, or by chronic disorder of the bronchi, or asthenic inflammation of the substance of the lungs. There have always been, both before and after the appearance of this eruption, well-marked symptoms of adynamia; and coma has generally come on before death.

11. i. *Description.* — This eruption appears chiefly on the trunk, the lateral parts of the neck, and insides of the thighs. In the cases which I have seen, the number of furuncles was considerable — not fewer than five or six; and, in two cases, there were about twenty. They commence in small, circumscribed, and hard swellings, of a livid tint, but sometimes nearly colourless. At a further advanced stage, very small purulent phlyctænæ appear in their summits, that break, and leave the skin underneath of a greyish colour, softened, and perforated as in common furunculi. They discharge at first a serous, sanguineous, or ichorous fluid. The tumours soften and disappear; and the perforations of the chorion enlarge rapidly, producing, in two or three days, holes in the integuments, varying from three or four, to six or seven, or even eight or nine, lines in diameter. These perforations are perfectly round; their margins are not elevated, nor thickened, nor injected; and they entirely resemble the holes made by a drill or auger. The cellular tissue is not thrown off in the form of a core, but is destroyed by a rapid ulceration, or phagedenic absorption. The bottoms of the ulcers have a greyish or sanious appearance, and are nearly dry. There is no discharge from them, nor have they any tendency to scab; and the perforations of the integuments frequently proceed down to the muscles, or aponeuroses, the peculiar structure of which may often be seen at their bottoms. The skin forming their margins is pale and somewhat softened, and the cellular tissue immediately beneath the cutaneous margins is often destroyed to the extent of one or two lines. — In the variety of asthenic furuncle following the bites of leeches in cachectic and debilitated children, which is the most common, the perforations of the skin are at first triangular, but their progress is nearly the same as that of the spontaneous variety, and as they enlarge they become entirely circular. The ulceration attending upon the advanced stage of disease is seldom very painful. Having reached the extent just described, it remains stationary for a longer or shorter time, and in the more unfavourable cases shows no disposition to reparation. When it evinces a disposition to heal, the bottom is more moist, somewhat redder, and more vivid; the perforated margins of the skin become more closely connected with the subjacent tissues,

granulations arise and elevate the bottom of the ulcer, and the perforation is lessened. Thus a depressed cicatrix is formed, as in other cases where the skin has been destroyed.

12. In the two cases, in which I had the opportunity of seeing the appearances after death, no attempts at reparation were visible in the ulcerated perforations, which went down to the muscles, as if the part had been removed by an auger. There was no injection or inflammatory appearances in the margins. The chief alterations were moderate emaciation, congestion, and injection of the membranes of the brain, with slight serous effusion; congestion of the substance of the lungs, with limited hepatization in an early grade; patches of injection in the digestive mucous membrane, other parts being pale; and enlargement of the mesenteric glands. M. Guersent has not mentioned the internal lesions he may have observed; but those just noticed throw not much light upon the affection, and are of frequent occurrence after other diseases. In most of the cases I have treated, there has been low nervous fever, with more or less manifest affection of the gastro-intestinal surface, or of the head or lungs. The perforations are always uniform in character, although varying somewhat in size; they are peculiar; and are hardly ever modified from the state above described. They appear analogous to the perforating phagedenic or atonic ulcers sometimes seen in the stomach.

13. iii. *Treatment.*—The means of cure should necessarily be directed chiefly to the constitutional disorder. This should be removed, by the preparations of cinchona; by the sulphate of quinine; by the mineral or vegetable acids; by camphor or ammonia; by the decoction of bark with nitre, and spirits of nitric ether; by the infusion of valerian or cascarilla with the chlorate of potash, or chloride of ammonia, and chloric ether; by camphor julap with the chloro-sodaic solution; or by similar remedies, aided by means calculated to relieve internal complications, as alteratives, external derivatives, and mild stomachic purgatives. Neither leeches nor blisters should be applied, as the former are liable to multiply the perforating ulcers, and the latter are apt to produce sphacelation. The semicupium, however, with much salt and mustard in the bath, may be used. Removal to a dry, healthy atmosphere, or to the sea-side, or to an elevated situation, and light nourishment, are also beneficial. The most efficacious local applications are, the solutions of the chlorurets of soda or lime, kréosote, the dilute acids, pyroligneous acid with camphor and kréosote, poultices of powdered bark, with spirits of turpentine, and the balsams and terebinthinates, especially Peruvian balsam, or equal parts of it, or of copaiba, and of turpentine.

III. Carbuncle — 'Ανθραξ, Hippocrates; *Anthrax; Carbo; Persicus Ignis; Carbunculus*, Celsus; *Phyma Anthrax*, Good; *Charbon*, Fr.; *Karbunkel*, Germ.; *Furuncular Anthrax.*

14. Carbuncle appears in the form of *a hard, painful, circumscribed tumour of a deep red colour, with a sensation of burning heat, terminating in gangrene.* M. Rayer states that it is an acute inflammation affecting simultaneously several of the contiguous cellular cones penetrating the reticulations of the true skin. It is not improbable that the vessels themselves, particularly the arteries, are more or less implicated in the inflammation.

15. i. *Progress.*—Anthrax occurs most frequently in the nape of the neck, or above the nape, on the back, shoulders, buttocks, thighs, and sides of the trunk. It often commences in a small tumour, of a few lines in diameter, the apex of which is sometimes covered with a sanguinolent vesicle. In other cases it is much larger from the beginning, and it then generally advances with greater rapidity. As it spreads, so it becomes more prominent and penetrates more deeply; and, in seven or eight days, it is often as many inches in diameter. Its colour deepens to a violet or bluish tint, and it is hard throughout, until the cellular tissue of the central parts passes into gangrene. Its base afterwards continues to spread, the circumference remains hard, and the centre softens, and fluctuates very obscurely. The heat is still burning, the pain is tensive, and both are now referred chiefly to the base of the tumour. When left to itself, the skin covering the anthrax becomes thin and soft after some days, and is perforated in several places. It then discharges a little bloody pus, or ichorous matter with small shreds of mortified cellular tissue. It occasionally sphacelates to a much greater extent, and its surface becomes dark, black, and insensible. For some days afterwards, new perforations are formed, through which whitish sloughs of cellular substance are passed. The openings enlarge or run into each other; give passage to a thick sanguinolent matter; and sometimes emit a fœtid odour. The sloughs are at length detached, the discharge increases and becomes thinner, and the pain and heat diminish. When the destruction of the integuments is considerable, the superficial fascia are often denuded, eroded, and even perforated—the surrounding skin being livid, bluish, thinned, and partially detached from the parts underneath. If a favourable change in the part takes place, granulations appear; and a cicatrix, which is always irregular, depressed, and puckered, and continues long dark, or brownish red, is formed, partly by the ulcerated surface, and partly by the union with it of the loose flaps of skin.

16. The constitutional symptoms are generally severe, and often precede the local lesion. Indeed, anthrax rarely occurs excepting in habits of body evincing more or less cachexy, with sanguineous plethora, and disorder of the digestive functions. For some days before its eruption, the patient complains of anorexia and increased disorder of these functions, and of lassitude, chills, or shiverings. With the developement of the tumour, the febrile commotion increases, and presents the usual concomitants of inflammatory fever. If sphacelation takes place, or if the ulceration is protracted, the attendant fever assumes gradually an adynamic character; and in delicate, old, or very cachectic persons, it is nervous or adynamic from the commencement.

17. Various *internal affections* may also be *complicated* with the external disease. Congestions or inflammations of the liver or of a portion of the lungs, enlargement of the spleen, and gastro-intestinal disorders, are the most frequent associated complaints. When anthrax is seated in the neck, cerebral symptoms are often present. If it occur in the lateral or anterior parts of the neck, dyspnœa, cough, headach, and even serious

affections of the larynx or trachea, are experienced. If it take place in the parietes of the chest, the most severe pleuritic and pulmonary symptoms sometimes supervene, from the extension of the inflammation internally to the pleura, and thence even to the lungs. When it attacks the abdominal parietes, peritonitis has even occurred in a similar manner. Anthrax may also be associated with some other external eruption, especially with the common furuncle, which may either precede or accompany it.

18. ii. *Causes.* — Anthrax is most common in spring and summer, according to M. RAYER. It is certainly most frequent in persons past the meridian of life, and in females about the total cessation of the menses. High, rich, or gross living, with insufficient exercise, and a full, gross habit of body, predispose to it, and even more directly produce it. — Causes which derange the digestive and biliary functions, the application of acrid or stimulating matters to the skin, neglect of personal cleanliness, and the bites of insects, most commonly excite it. It is often a sequela of small-pox, measles, and typhoid fevers; and it is a common attendant upon plague, and sometimes even appears in the latter stages of the putro-adynamic form of typhoid fever.

19. iii. *Diagnosis.* — Carbuncle is to be distinguished from the common boil, by the latter having only a single opening, and being smaller and more conical; and by several occurring in succession. The former, on the contrary, is broader, less acuminated, is perforated by several openings, is darker, and more gangrenous, and is generally single when occurring as an idiopathic disorder. According to DUPUYTREN and RAYER, however, anthrax is a tumour formed by the conglomeration and confluence of several furuncles. Carbuncle has very generally been confounded with malignant pustule, or anthracion. The latter belongs to a different order of affections of the skin; and is described, as well as distinguished from anthrax, in the article PUSTULES.

20. iv. *Treatment.* — This should be commenced with the exhibition of an *emetic*, the operation of which may be promoted by a tepid infusion of chamomile flowers. A full dose of *calomel* and *James's powder* should afterwards be given, and the free action of the bowels promoted by *purgatives*. Whenever the pulse is strong, full, or hard, *bloodletting*, according to the age and habit of the patient, is requisite, particularly early in the disease. *Leeches* ought also to be applied around the base of the tumour, and the bleeding from their bites encouraged by tepid fomentations. A repetition of the local depletions may be required even oftener than once. *Diaphoretics*, with tartarised antimony and *opium*, if the pain and burning be very severe, should afterwards be given, and the bowels kept open by the occasional exhibition of a purgative. When the attendant fever is of a low form, or when gangrene has taken place, and suppuration continued for some time, especially when the patient is aged, of a cachectic habit, or is addicted to intoxication, or is greatly debilitated, the decoction of *cinchona*, with the *alkaline subcarbonates*; the *sulphate of quinine* with *camphor*; tonic infusions with *muriatic acid*, and *chloric ether*; and the means advised in putro-adynamic fever, should be prescribed, with light nourishment, wine, &c.

21. The *local treatment* should consist chiefly of refrigerant applications in an early stage of the swelling. Compresses moistened with equal parts of pyroligneous acid and rose-water, to which some camphor has been added, should be constantly applied from the commencement. They generally relieve the pain and burning heat. If the inflammation still proceeds, a *crucial incision*, completely across the swelling, and down to its base, as advised by DUPUYTREN and RAYER, should be made. This will give instant relief by the loss of blood, and by removing the strangulation of the vessels and cellular tissue. It also averts gangrene, facilitates a healthy suppurative action, and hastens granulation and recovery. The actual and potential cauteries formerly advised, are now rarely employed. Several American writers recommend the application of *blisters* over the swelling — the discharge from the surface favouring a return of healthy action in the diseased part.

22. When anthrax is *complicated* with any of the internal affections indicated above (§ 17.), the treatment ought to be decided and appropriate to the morbid associations, as the progress of the complication is generally rapid, owing to the unfavourable state of constitution giving rise to this kind of local disease. — During *convalescence*, sulphureous baths, and the aperient sulphureous mineral waters, with strict attention to the functions of the digestive organs, and to *diet* and *regimen*, are usually productive of benefit. I have found the following medicines of service, when the patient cannot resort to suitable mineral waters.

No. 228. ℞ Infus. Sennæ Comp., Infus. Gentianæ. Co., āā ℥vj.; Sodæ Sub-carbon. gr. xij.; Spirit. Ammon. Arom. ʒss.; Tinct. Cardamom. Co. ʒj. M. Fiat Haustus, alternis noctibus sumendus.

No. 229. Potassæ Supertart. in Pulv. ℥j.; Sulphuris Præcipitat. ʒiij.: Confect. Sennæ ℥ij.; Syrup. Zingiberis q. s. ut fiat Electuarium molle, cujus capiat Coch. j. minimum, horâ somni quotidiè.

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ii. ASTHENIC FURUNCLE. — *Guersent*, in Archives Générales de Médicine, t. i. p. 336. — I find, upon reference to the *London Medical Repository*, for July, 1823, p. 32., that I described this eruption in the London Medical Society, at the commencement of that year; and that soon afterwards M. GUERSENT's paper respecting it appeared in the *Archives*. It was thus noticed, for the first time, almost simultaneously by this physician and myself.

iii. CARBUNCLE. — *Celsus*, l. v. sect. 28. — *A. Tosi*, De Anthracæ seu Carbunculo Tractatus, 4to. Venet. 1576. — *C. P. De Herrera*, De Carbunculis Animadvers. 4to. Pintiæ, 1604. — *T. D. Mitchell*, New York Med. and Phys. Journ. 1815, vol. ii. p. 64. — *J. B. Beck*, in Ibid. 1823, vol. ii. p. 37. — *D. Hosack*, Essays on Various Subjects. N. Y. 1824, vol. ii. p. 256. — *A. Cooper*, Lectures, Lancet, vol. i. p. 245. — *Sanson*, in Dict. de Méd. et Surg. Prat. t. iii. p. 26. — *Marjolin*, Dict. de Méd. 2d edit. Paris, 1833, art. *Anthrax*. — *Dupuytren*, Leçons, Lancette Française, Mars, 1833. — *Rayer*, Opus cit. p. 549. — *R. Coates*, in Amer. Cyclop. of Pract. Med. vol. ii. p. 29. — *J. Green*, Opus. cit. p. 270.

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